EXCELLENCE IS EXPECTED: QUALITY MONITORING AND IMPROVEMENT IN VETERINARY MEDICINE.

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Thesis abstract

Introduction: There is significant need for further theoretical and practical development in the field of quality improvement (QI) for use in veterinary medicine. The central aim of this thesis was to investigate the potential benefits and application of QI methods in UK veterinary practice, including how these methods could uphold and improve the quality of care delivered, and any barriers that may prevent the use of QI in practice.

Materials and Methods: Using a mixed methods approach (questionnaires, focus groups and review of available literature), information was gathered from professionals regarding their current knowledge, and use of QI methods and quality veterinary care (QVC) in practice. Following this, infrastructure changes that could address some of the barriers to QI were investigated using e-Delphi methods. A QI planning framework and information document was designed and tested in practice. Analysis included thematic analysis of qualitative data and statistical analysis of quantitative data.

Results: The veterinary sector faces particular challenges and barriers when it comes to successfully implementing QI methods in practice. Ten veterinary specific QI terms were created and defined by a panel of veterinary professionals. There were significant discrepancies in the level of knowledge and understanding between different job roles. Many things can alter the landscape of QVC and how QI is applied; COVID-19 undoubtedly placed enormous strain on the veterinary sector and its ability to provide QVC to patients in times of extreme stress. Creation of veterinary specific planning framework and training documents received overwhelmingly positive feedback from veterinary practices.

Conclusion: The results of this thesis draw specific attention to the importance of inclusivity among all practice staff with regards to training and information available about QI, and open communication with colleagues. Motivation is high among veterinary staff to implement QI methods, particularly those that typically would be overlooked for such tasks (vet nurses, administrators, and auxiliary staff). Development of veterinary specific QI terms, and a standardised model for the education, training, and utilisation of these methods in veterinary medicine needs to continue. A fully planned model for QI use, that embraces a more flexible and personalised approach to improvement, forms an essential first step to helping veterinary professionals use these methods in their work.

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"Per Ardua Ad Alta"

For Buddy 28/9/2013 – 28/5/2023 ***for my constant companion and my very best friend, we made it pal, and you were there every step of the way. I couldn't have done it without you, every high and every low you were there and I will always miss you.***

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Abbreviations

CEVM – Centre for Evidenced Based Veterinary Medicine

COVID-19 – Coronavirus disease nineteen

SARS COVID-19 - severe acute respiratory syndrome coronavirus nineteen

CPD – continued professional development

BEVA – British Equine Veterinary Association

BVRA – British Veterinary Receptionist's Association

RCVS – Royal College of Veterinary Surgeons

FR – Freya Rooke

MB – Marnie Brennan

NHS – National health service

JB – John Burford

TM – Tim Mair

SF - Sarah Freeman

JS – Jo Suthers

KDD – Key driver diagrams

M&M Rounds – Morbidity and mortality rounds

QI – Quality improvement

QVC – Quality veterinary care

PDSA cycle – Plan do study act cycle

KP's – Key participants

UK - United Kingdom

USA – United States of America

SAVSNET – Small Animal Veterinary Surveillance Network

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Chapter 1

Introduction

1.1 Introduction

The UK veterinary healthcare sector is a centralised system comprised of several features unique to it. Whilst it shares similarities with a variety of other sectors, it is unique in its specific composition and structure (Henry and Treanor, 2012). Veterinary services can be broadly classified into four main categories:

- Clinical services (treatment of sick animals both commercial and domestic pets).
- Preventative services (to prevent the outbreak of communicable diseases).
- Provision and production of drugs.
- Human health protection (inspection and control of marketed animals and those intended for human consumption).

In terms of economic classification, a majority of veterinary services can be described as provision of private goods, particularly development and provision of drugs (Capleton *et al.*, 2006). However, some aspects, particularly those related to preventative animal health and livestock control, do require government participation and so therefore the sector cannot be truly described as either private or public in its entirety (Capleton *et al.*, 2006).

Quality is a vital aspect of any healthcare service, whether it be for humans or animals. Clearly defining 'quality care' (QC) can be difficult. It is a term frequently used in both the human and veterinary healthcare literature; however, the term rarely has explanation or definition attached to it. Quality improvement (QI) methods comprise a series of generally iterative tests that are used to measure the quality of a current practice and to provide focus on any issues arising, as well as highlighting excellent practice to benchmark for others. These methods are successfully utilised in many different industries including aviation, education, manufacturing, and healthcare (Reed and Card, 2016; Chassin and Loeb, 2011; Kim *et al.*, 2006; Lozier and Teeter, 1996). The introduction of QI methods into healthcare and veterinary care settings can be linked to a need to gather data and measure the quality of care being delivered to patients. QI, particularly in the field of healthcare is considered an expectation by society and vital for clinical practice to continuously improve. Often patients participate in human QI initiatives as part of normal healthcare operations to benefit the care of others by improving the quality of care (Newhouse *et al.*, 2006) The same cannot be said for veterinary medicine where use of these methods is still developing, however research shows that clients of veterinary

practice hold similar expectations and values for their animals as patients do in human healthcare (Hughes *et al.*, 2018; Abood, 2007; Humble, 1994).

Evidenced based medicine (EBM) and QI are both initiated within human health to address the same goal, but attention and application are on different parts of the problem. The intention behind introducing QI methods into a healthcare setting was to address what was identified and referred to as a 'knowing-to-doing' gap. That is, once knowledge is gained on what to do, and that knowledge is imparted to the profession (EBM), why is it that change is not implemented either effectively or at all? EBM by contrast looks to impart the best available peer reviewed knowledge gained through research to the industry, enabling the healthcare 'actors' to deliver clinical care that has undergone thorough evaluation and is up to date with research (Shojania and Grimshaw, 2005). When laid out like this it is easy to see that both QI and EBM form two halves of the solution to a challenge in both healthcare and other similar industries. Successful implementation of QI in veterinary medicine is a multi-faceted issue; many different factors need to be considered and investigated to achieve uptake from a majority of professionals in a complex sector such as veterinary medicine.

1.2 Overview of thesis structure

The bulk of this thesis comprises five studies using a variety of different methodologies, an in-depth literature review and a final discussion to cover the key findings of this body of work. The literature review chapter (chapter two) consists of a critical review of the literature regarding, the history and origins of quality improvement methods both in industry and healthcare, current use, and barriers to QI in the UK healthcare sector, and potential QI implementation in the veterinary sector. Due to the limited number of studies specifically regarding QI use in the veterinary sector, associations have been drawn from studies in human medicine and those done in veterinary medicine or lack of.

The first groups of studies conducted (Chapter Three and Four) were designed to examine the current perceptions, knowledge, understanding and use of QI methods among UK veterinary professionals. This was designed to be pivotal to the rest of the thesis as a lack of published research means that current and up-to date views on these methods within the profession is lacking. By investigating both the generalised views and opinions from a representative sample of the UK veterinary population (Chapter Three) it was possible to gain an overview of what QI methods are currently being used in practice and how much people know. Following this, in-depth focus groups were held at an equine referral

hospital where maximum variation of job roles, cases seen, and treatment performed could be accessed (Chapter Four). The purpose of these focus groups was to delve deeper into the specific questions that had been identified by the results of the first questionnaire. These were: what is the knowledge and understanding of both QI and QVC, and how does this differ between professionals' groups? What is the industry current approach to QI education and training and is it effective, and what are the barriers to large scale implementation of QI in veterinary practice?

Chapter five utilised the current global crisis of COVID-19 by recruiting a group of veterinary professionals working through the pandemic to record the adaptations and changes made to procedure and protocols over the period of one year. The data gathered specifically related to several key areas essential to providing quality care but also questioned participants' levels of stress and anxiety during this time period. The data examines the effect that an extremely pressurised situation had on the process of care delivery, and by extension the quality of the care provided to patients and clients.

The second section of the thesis (Chapter Six and Seven) addressed some of the barriers observed in the data from the first section. The inconsistency in language was addressed in chapter six, and a glossary of veterinary specific definitions of QI terms by using a consensus approach methodology with key stakeholders in the industry was created. This work not only provides a resource for veterinary professionals to use, but also highlight areas of confusion that still exist in the terms that did not reach a definition. Chapter Six developed a QI training document specifically aimed at veterinary professionals, including a framework to assist in the planning and execution of a QI project in veterinary practice.

Each chapter follows a standardised structure of introduction, material and methods, results, discussion, and conclusion. The discussion sections cover not only over the key findings of the study, but also study limitations. The final discussion chapter is contained in chapter eight incorporating the findings from all previous chapters, and examination of the overall study design and any limitations. Future recommendation for the industry to continue this work as well as evaluation of the wider impact of this thesis are also included in this chapter. Finally, a principal conclusion is the final portion of chapter summing up to the main impact of this work, aims and objectives and outcomes of the project.

1.3 Aims and objectives

The central aim of the thesis was to investigate the potential benefits and application of QI methods in UK veterinary practice including how these methods could uphold and improve quality of care delivered and any barriers that may prevent the use of QI in practice. The objectives were to:

- To examine and critically evaluate the current literature, detailing the historical development of QI methods in different industries including manufacturing, aviation, education, and healthcare, comparing how this relates to QI reported in the veterinary literature.
- To gauge current knowledge and opinion of QI methods from a wide variety of UK based veterinary professionals via an online survey.
- Investigate the meaning of quality veterinary care (QVC) and quality improvement (QI) to professionals currently working in a UK equine hospital. Thereby gaining an understanding of how QI methods have and could be successfully applied to veterinary practice.
- Assess the impact of a global pandemic on the delivery and adaptation of care in veterinary hospitals, examining how QI methods could in the future assist the veterinary sector cope under pressure to deliver the highest quality care.
- Gather consensus via an e- Delphi study on appropriate and specific definitions related to QI in UK veterinary practice and use this data to create a glossary of QI terms specific to veterinary medicine.
- Create an informative document and planning framework to assist veterinary professionals in the process of conducting a structured QI intervention.
- Pilot this document at selected veterinary practices to gain feedback on the usability and efficacy of the document created and the process followed in planning and executing a QI intervention in veterinary medicine.

Chapter 2

A review of current literature surrounding the historical and current use of QI methods in human and veterinary medicine.

2.1 Defining and measuring quality care (QC)

Quality care (QC) is not a static concept and will hold different meanings to different individuals within a healthcare service. John Ruskin, a Victorian writer and critic of art and society observed: "Quality is never an accident; it is always the result of high intention, sincere effort, intelligent direction and skilful execution" (Bennett, 2016; Ruskin and Rosenberg, 1997).

It is easiest to describe QC within the context of human medicine, as it is in this sector where the majority of the literature is based, though even here definitions of QC are often generic and wide sweeping. The Institute of Medicine (IOM), a non-profit organization that provides evidence-based research and recommendations for public health and science policy, currently defines quality care as:

"The degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge" (IOM, 2018).

This definition, however, places QC in a very one-dimensional space, with a heavy focus on the clinical outcomes of care which results in a limited explanation of what quality care is. Categorising in this way solely on positive versus negative outcomes means that the IOM definition falls short in describing a holistic all-encompassing quality care experience.

The Royal College of Physicians (RCP) takes a broader approach to defining QC and measurement of quality care, describing quality care as:

"Creating a delicate balance between health and wellbeing of the population, sustainable finance, environment and resources alongside providing the best possible care for the individual" (Fig,1) (The Royal College of Physicians, 2018).

Figure 1 - Diagram displaying the triangle of quality care according to the Royal College of Physicians, in "defining the RCP's approach to quality." (2018).

This definition is more representative of the multidimensional nature of providing care as well as recognising the pressures exerted on the industry in the 21st century. When broken down in this manner, the association between providing quality healthcare and the use of quality improvement methods is much clearer: the balance held between the three factors identified can be simultaneously measured serially using a variety of QI methods.

There is an ongoing shift in the ideology of human healthcare providers, particularly within the National Health Service (NHS), looking to create a model of care more akin to a business model. Bowers *et al.* and Singh *et al.* both discuss the perception of quality and user-experience by the patients and clients, this experience presenting itself as the key focus and core of the NHS strategy instead of the service providers (Singh and Prasher, 2017; Bowers and Kiefe, 2002). This was more akin to business models that measure the impact of company structure and service on customer 'delight' and behavioural intentions. In short this can be summarised as how the experience of the customer had impacted their future behaviour and likelihood to return as a customer (Bendall-Lyon and Powers, 2004; Rust and Oliver, 1993). In order to develop strategies to achieve this goal within the NHS it is necessary to understand the cause, variations, definitions, and drivers of quality care; it is not possible to effectively measure quality of care without defining what formulates a quality care experience (Campbell *et al.*, 2001; Campbell, Roland and Buetow, 2000). The transformation in attitude within the human healthcare sector is supported by changes in policy which encourages the widespread adoption of quality measuring and improvement methods. Patient surveys have also been used to benchmark performance by measuring satisfaction with the care provided (Singh and Prasher, 2017).

Within veterinary services, defining quality care is complicated by the fact that the receiver of care, the animal, is not able to articulate their experience. Instead, it is a third party, often the owner, who employs the veterinary service and may pay the bill without personally receiving clinical care. Reported client satisfaction or analysis of complaints made against practices and practitioners is the common focus when defining quality care within organisations (Oxtoby *et al.*, 2015; Kinnison, May and Guile, 2014; Loomans *et al.*, 2008). Although this method does give some insight into the success and any potential problems with care being delivered, it will not provide a truly representative description on the quality of care delivered by a particular practice or practitioner. A much broader approach to quality monitoring and effective utilisation of a variety of quality improvement (QI) methods is required (Oxtoby *et al.*, 2015).

The problem with having a vague or conflicting definitions of what exactly quality care looks like in both human and animal healthcare is that it can cause confusion among practitioners and people trying to utilise QI within a service (de Jonge *et al.*, 2011). It becomes extremely difficult to even carry out the most simplistic QI intervention if it is not clear exactly what improvements the programme is attempting to address.

2.2 Defining and measuring quality improvement

Quality improvement in its most basic form hypothesises that the quality of goods and services is ultimately determined by the processes of design and delivery. Due to this ethos, the key focus of any QI method is understanding, managing, and improving work processes rather than correcting individual's mistakes after the event (Deming, 2018; Ishikawa, 1985). Post-event correction ends up being costly, time consuming, and detrimental to the entire production process. Analysing the root cause of the problem and making appropriate correction to the process can make any work process predictable; this allows for continuous improvement (Alexander and Hearld, 2009). There are however multiple definitions of quality improvement, and similar to describing quality care, quality improvement is not a static concept (Riley *et al.*, 2010).

Within the manufacturing industry where the quality improvement movement really began, there are many terms used to describe the process of improving quality: continuous quality improvement (CQI), quality improvement (QI), quality management (QM) and total quality control (TQC) (Al-Shdaifat, 2015). Despite the different names used, all of these methods follow the same basic principles: using a scientific, methodical, and controlled series of actions to continually improve a work process, the end goal being to

offer an improved standard of goods or services for the customer (Al-Shdaifat, 2015; Hearld *et al.*, 2008; Weiner *et al.*, 2006)

The working definition of QI discussed in this review describes QI methods as "a systematic and formal evaluation of a programme or system of care, administration or experience that is carried out with the intention of improving the quality of the service provided to the client and/or patient". This has been generated from various other definitions used in both healthcare literatures as well as manufacturing. The reason this definition was created by the author was to encompass all of the aspects of a healthcare and veterinary service whilst still meeting the definition of QC and keeping to the original theory of QI produced from the manufacturing industry. This definition is also simple enough to be understandable and explained to anyone even without a working knowledge of QI or what quality care is. Reeves and Bednor recognized the problems with overly complex definitions of quality improvement and identified that complex definitions resulted in alienation and disengagement among providers trying to implement these methods (Adam *et al.*, 1997; Reeves and Bednar, 1994). It is hoped that by using a concise and clear definition for the purpose of this review it will ensure that it is applicable and understandable to all.

2.3 History of quality improvement

2.3.1 Origins of QI

The earliest published document outlining QI methods in the context of manufacturing was, 'The principles of scientific management' written by Frederick. W. Taylor and published in 1919 (Taylor, 1919b). This framework outlined the effective use and organisation of the human work force to improve product quality during the manufacturing process. Although he did not label his framework as QI, it is still widely considered to be describing a QI process to progress production rates and product quality (Giannantonio and Hurley-Hanson, 2011; Taylor, 1919a).

The idea of product control through the manufacturing process to increase yield and profit margins was built upon by Dr. W. Shewhart in 1931 (Shewhart, 1931). A statistical method was developed that could be applied to manage the quality of product produced on the assembly line. Research conducted by Dr. Shewhart showed that variation within the production phase resulted in variation of the product manufactured which was detrimental to the entire manufacturing process (Varkey, Reller and Resar, 2007; Shewhart, 1980). Manufacturing companies picked up on this theory and in the mid-

1940's several companies began to utilise the idea of statistical methods as a quality control mechanism on a large scale in their production line. William Edwards Deming was an American engineer, statistician, professor, and management consultant employed by industrial leaders in Japan to increase the quality of product produced in their factories. Building upon Shewhart's ideas, Deming introduced the industry to the idea of quality control and management throughout the manufacturing process (Nadeem *et al.*, 2013; Nicolay *et al.*, 2011; Shewhart, 1980). Implementation of QI is credited with the rapid growth of the Japanese automobile industry post World War II, and the long-standing worldwide recognition of the high-quality product they have produced since (Varkey, Reller and Resar, 2007; Sambharya and Banerji, 2006).

After the success and prosperity of the Japanese factories attributed to quality control methods, other countries and businesses began to adopt the concept of improving quality through control and analysis of production methods. Quality control circles or groups started to appear in the workplace. A group of workers met regularly to discuss improvements and ideas relevant to any aspect of the workplace and present ideas to management leading to improved employee motivation and satisfaction (Wood, Hull and Azumi, 1983). This was the first step to looking not only to improve the quality of the product but also analyse and improve every aspect of the organisational process. The term Total Quality Management (TQM) was used for the first time in 1956 by Feigenbaum at an international conference on quality control in Tokyo (Kakuro, 2004; Feigenbaum, 1956). Having observed Japan's success using quality management and improvement methods, Western manufacturers began to employ the practices within their businesses. At this point the term TQM became a broad-spectrum term to encompass any and all quality focussed strategies, programmes, and techniques. Presently worldwide quality practices do vary; often this variation can even be seen within a single company due to the multinational nature of many corporations. Despite this disparity, all of these methods follow the same basic principles: using a scientific, methodical, and regulated series of actions to continually improve a work process, the end goal being to offer an improved standard of goods or services for the customer (Hearld *et al.*, 2008; Weiner *et al.*, 2006). Quality and QI continually appear as a top competitive priority within many companies globally due to their proven success at achieving desired goals, increasing efficiency, effectively managing resources, and reducing costs (Chen and Gayle, 2019; Chassin and Loeb, 2011; Lakhal, Pasin and Limam, 2006; Kakuro, 2004).

2.3.2 Origins of QI within healthcare

Quality improvement and evidence-based care in its most basic form can be seen to have been applied to healthcare as early as the 1850's. During the Crimean war, Florence Nightingale tested and demonstrated that basic sanitation and hygiene led to a significant decrease in mortality when caring for soldiers wounded on the frontlines (Kurowski *et al.*, 2015; Chun and Chao Bafford, 2014; Sheingold and Hahn, 2014; McDonald, 2001).

Ernest Amory Codman was another early pioneer of TQM in healthcare and is often referred to the 'father' of outcome management and measurement in medicine. From as early as 1913 he kept track of his patients via "End Result Cards": index cards that contained patient demographics, diagnoses, treatments, and outcomes. Codman believed that understanding why treatments were unsuccessful was the foundation for improving the care of future patients. In 1917 "A Study in Hospital Efficiency: As Demonstrated by the Case Report of First Five Years of Private Hospital" was published (Codman, 1917). Post publication the "end result system" became mainstream practice and formed a key aspect of the Hospitalization Standardization Program. This established minimum standards for all hospitals to meet regarding mortality and morbidity in patients (Berwick and Fox, 2016; Chun and Chao Bafford, 2014). Codman firmly believed that doctors could be enabled to make better decisions in clinical care through increased transparency from the industry as a whole on outcomes of treatments. His theories can still be seen in practice now (Mueller, 2019).

Avedis Donabedian in 1966 published what is possibly one of the first papers directly theorising that industrial models of QI could be utilised within the healthcare system to provide higher standards of care (Donabedian, 1966). Donabedian's paper came in response to several papers published in quick succession in the late 1950's and early 1960's, which examined the high mortality rates in hospitals across the United States. All were calling for a unified approach to healthcare across the world; however, at this point these papers were still at the 'identifying the problem stage', rather than necessarily suggesting a solution. Donabedian's paper not only suggested the potential utilisation of industrial quality control methods, but also acknowledged the problems with empirical measurement of quality care at that time, with the need for clear governance to enact change within organisations. Later Donabedian described the seven pillars of quality care in 1990: efficacy, effectiveness, efficiency, optimality, acceptability, legitimacy, and equity (Donabedian, 1990). In many ways these theories were ahead of their time in

viewing quality healthcare in this multidimensional way. It would be nearly a decade (early 2000) until the NHS and IOM published reports clearly outlining their failings to provide quality care as described by Donabedian's framework and begin to place measures to rectify this (Berwick and Fox, 2016).

The ideology behind QI methods being utilized and adapted for the healthcare setting can be linked to a need to gather data and measure the quality of care being delivered to patients. Within the medical healthcare sector, it was hoped that comparing performance among care providers and organisations would consequently encourage better performance and result in higher quality care for all patients. (Campbell, Roland and Buetow, 2000).

2.4 QI implementation within the UK health service

In 1948, the U.K. healthcare system changed forever with the creation of the National Health Service. Aneurin Bevan, the health minister at that time, is considered the father of this movement and change. By creating a non-cost (at the point of delivery of care) healthcare service, Bevan believed that free health care should accompany a redistribution of the wealth within the United Kingdom. Taxation of the working population to provide healthcare to those people in the community unable to provide for themselves formed a corner stone of the creation of the welfare state (Portillo, 1998). Whilst often viewed from a positive perspective, the creation of the NHS created a problem for policy makers in government. No longer was the quality of care received defined by how much the patient was able to pay, instead every citizen should receive the highest quality of care no matter what contribution to their cost of treatment they were able to make (Mays, Mulligan and Goodwin, 2000). Effective use of resources and distribution of funding became of paramount importance to the sustainability of the service as a whole (Morrell, 1998). In 1990 the Conservative government, led by Sir John Major, introduced drastic reforms to the way healthcare was delivered by hospitals, communities, and general practitioners. The ideology behind the reforms was stimulated in part by the increasing cost of the NHS. Changes in the population and a combination of technological and pharmaceutical advances had led to a rapid increase in the cost of maintaining the service and left little room for development. These reforms were the beginning of the clinical governance structure that now makes up the National Health Service. It was envisaged that Trust hospitals, each with a chairman and chief executive, would compete with each other in seeking contracts. This would lead to a reduction in costs and a drive to provide the highest

quality care possible, thus introducing the competitiveness of the private healthcare sector into a public organisation (Davies, Nutley and Mannion, 2000).

2.4.1 QI policy in the NHS

Quality improvement methods have now been engaged and recognised within policy documents in the National Health Service (NHS) for over two decades. They have been instigated to address a wide variety of issues, from resource management of facilities and equipment, financial management, right through to adaptations to the delivery of care and clinical innovations (Baily *et al.*, 2006). The idea of incorporating the quality of healthcare delivered into policy documents was not a new one. Thirty years previously Donabedian's first publication was on the issue of improving the quality of care in hospitals (Donabedian, 1966). In 1998, the UK Department of Health published, *'A first class service: quality in the new NHS'*, followed a year later by the U.S. Institute of Medicine's (IOM) report, *'To Err is Human'* (Institute of Medicine Committee on Quality of Healthcare in America, 2000; Department of Health, 1998). Both documents acted to galvanise the healthcare industry to recognise its below par performance and take steps to improve and examine the quality of care being delivered to patients (Hughes, 2008; Varkey, Reller and Resar, 2007; Weiner *et al.*, 2006). They highlighted the urgent need for an operational framework to enable effective clinical governance along with clear quality standards and methods for delivery, all of which were lacking in the current service. The national service framework laid out in the 'first class service' report was designed to set England as a world leader in providing patient centred quality care (Ham, Berwick and Dixon, 2016).

Quality improvement methods have now been engaged and recognised within policy documents in the NHS for over two decades. The motivation behind implementation of these methods is to establish a culture of self-reflective adjustment and continual development ultimately leading to improvements in the quality of care delivered to patients (Nadeem *et al.*, 2013; Plsek, 1999). Increasing demands for both funds, and ever higher standards of care have pushed forward the adaptation of several QI methods from industry (Leatherman *et al.*, 2016). These methods, designed to meet the specific needs and challenges of healthcare work, are both formally and informally being executed in multiple hospital Trusts and fields of expertise across the health service (Kaplan *et al.*, 2010; Baily *et al.*, 2006).

2.4.2 Types of QI used in the NHS

The QI methods currently engaged in healthcare exist in a variety of forms. Within the healthcare service there are four levels of the QI project identified by the Royal College of Physicians (RCP) Quality Improvement Hub (RCPQI), which are used to describe the complexity of the intervention being attempted (Dean, 2018; Royal College of Physicians, 2017).

- Large-scale change and population-level strategic changes
- Service design and improvement within and across pathways
- Process improvements within current services
- Day-to-day problem solving.

Due the rapid introduction and uptake of QI methods within healthcare there were deficiencies in training and understanding identified by several organisations involved, including the RCP, the Scottish Quality and Safety Fellowship programme, the Healthcare Foundation, and the Healthcare Quality Improvement Partnership (HQIP) (The Health foundation, 2016; HQIP, 2015). Together these organisations have tried to simplify the process of designing and executing a successful QI intervention in healthcare.

To be successfully implemented, a process needs to match and adapt to the multi-faceted context of healthcare (Rose, Kwong and Pang, 2016; Varkey, Reller and Resar, 2007). Attention needs to be paid to the particular features of the process or system being instigated, and it is also worth considering the actors who will be using the QI methods to ensure that the correct intervention is selected (Mortimer *et al.*, 2018). Skill set, workload and data analysis are all key aspects that affect the effectiveness of a method. Instigators may need different abilities to conduct QI depending on the scale of change and level of complexity of the project (Dean, 2018). When analysing the effectiveness of QI methods, success seems to primarily be based on a trial-and-error system to find the best improvement methods for the specific context of the problems identified (Shojania and Grimshaw, 2005).

There are three key questions to be asked before selecting which QI method is most appropriate to use on a project.

1. Which perspective are the result indicators reflecting?
2. Which aspect of healthcare system is being measured?
3. What evidence is available to be used?

The answer to these three questions will inform appropriate method selection.

The Healthcare Quality Improvement Partnership (HQIP) is an independent organisation led by the Academy of Medical Royal Colleges, The Royal College of Nursing, and National Voices, an organisation which represents doctors, nurses, and patients within the NHS. Established in April 2008, its goal is to promote quality in the medical profession and increase the impact that QI has on healthcare (HQIP, 2020). The HQIP QI handbook identifies twelve key QI methods (Table 1) best suited to utilisation within the health setting.

Table 1 - List of the different QI methods recommended by the HQIP in human healthcare as part of resources designed to assists medical professionals in identifying and conducting QI projects within their healthcare service (69).

QI Method	**Used To**
Clinical Audit	Check that clinical care delivered meets quality standards.
Plan Do Study Act cycle (PDSA)	Introduce and test potential QI on a small scale and asses its impact, building upon the learning from previous cycles in a structured way before wholesale implementation.
Model for Improvement	Decide upon, test and re-define the QI method best suited to the system being improved.
Lean / Six Sigma	Eliminate waste and redirect resources for QI ensuring upmost efficiency.
Performance Benchmarking	Drive QI though setting and achieving performance targets.
Healthcare Failure Models and Effect Analysis	Systematically evaluate the entire healthcare process to identify areas that could benefit from QI
Process Mapping	Map the patient journey to identify opportunities for improvement along the patients' journey of care.
Statistical Percentage Control	Measure and control process of care qualities against predetermined parameters
Root Cause Analysis	Systematically uncover the cause of events effecting quality to then be improved upon / eliminated.
Communication Tools	Improve quality of care through structured information exchange between practitioners / team members.
Technological Innovations	Automate processes and systems to ensure continuity of care to patients.
Decision Trees	Improve the quality and consistency of processes in healthcare through a systematic information organisation system.

The HQIP has produced clear guidance, information and training for QI which is evidence-based and utilises the findings of an international review of the literature on the use of QI in healthcare to inform their recommendations. The list of methods is not exhaustive or prescriptive; however, it is one of the most comprehensive summaries of QI methods currently applicable to the medical field.

As QI use has become more widespread and acknowledged as an effective way to monitor and improve care quality the amount of information available has increased (Dean, 2018). The difficulty currently for anyone looking to access information regarding QI methods in healthcare is the sheer volume of information and the often inconsistent and conflicting language, definitions, and classifications both in peer reviewed literature and reports.

The available literature has taken the approach of exploring the efficacy of specific QI methodologies within specific healthcare contexts, for example, Plan Do Study Act (PDSA) cycles in surgical healthcare (Nicolay *et al.*, 2011; Ingraham *et al.*, 2010; van Tiel *et al.*, 2006). Numerical QI methods, such as benchmarking of progress, have been shown to encourage better performance within teams, and subsequently a higher quality of care delivered to patients (Rose, Toews and Pang, 2016a; Varkey, Reller and Resar, 2007). Other papers take a broader system-wide approach to the analysis of QI models or collaborations; however, they often they fail to acknowledge the highly context-dependent nature of these methods. There is a significant degree of overlap between models, and this can present a challenge when implementing situation-specific implementation methodology and infrastructures. Without clear definitions of the type of system being described, discerning between each methodology becomes challenging. There are several methods of categorisation for QI used within the published literature; some focus on the data input that is analysed, others refer to the type of measurement produced. A significant amount of literature uses the actual process conducted when completing the methodology to define the type of QI being used, for example Total Quality Management (TQM), Rapid Change Cycle, Lean Thinking, Six Sigma, Continuous Quality Improvement (CQI) (Powell, Rushmer and Davies, 2009). Using these terms however could be characterized as jargon and pose a barrier to engagement with people unwilling to implement methodologies that seem complicated and lengthy.

The HQIP has produced twenty publications dedicated to QI methods' utilisation; however, the rigid categorisation and definition could be detrimental to increasing uptake from staff. Using technical and complex terms could leave people unwilling to implement methodologies that seem intricate and lengthy (Hughes, 2008). Conversely the rigid

definition creates a solid base of training and information available to all. Multiple investigations into what constitutes an effective QI intervention in the healthcare setting have found that success is often determined by the amount of 'buy in' and investment that can be garnered from the team carrying out the method (Taylor *et al.*, 2014; Shojania and Grimshaw, 2005; Hulscher, Laurant and Grol, 2003). The reality of any QI method applied to healthcare is that by nature it needs to be flexible, adaptive, and easy to carry out. Additionally, attention needs to be paid to the particular features of the process or system being evaluated, whilst also considering the practitioner who will be using the QI methods (Mortimer *et al.*, 2018). Skill sets of the staff, workload and data analysis requirements are all key aspects that affect the success of a method (Dean, 2018).

Ever increasing demands on both funds and staff along with greater standards of care expected from patients and management have pushed forward the adaptation of several QI methods to meet the specific needs and challenges of healthcare work (Leatherman *et al.*, 2016). These methods are both formally and informally being executed in multiple hospital trusts across the health service and have frequently been used as a key component of healthcare legislation set forward by various governments over the past two decades (Kaplan *et al.*, 2010; Baily *et al.*, 2006). The rationale for measuring quality and the improvement of quality in healthcare remains simple: good practice and in turn good performance when measured and reported, encourages likewise within the industry (Hughes, 2008).

By directly comparing the care provided to the established guidelines and benchmarks from evidenced based medicine (EBM), Trusts are provided with a baseline and the ability to track progress in quality of care delivered forwards and backwards over time through cycles of QI analysis. Reflective practice has become embedded within education and training programmes for both doctors and nurses who are training in the UK. This aids practitioners to solve their daily problematic situations. Using a continuous cycle of conscious thought processes to examine actions and experiences, practitioners can develop their decision making in practice and enhance clinical knowledge which can then be shared among colleagues (Ross, King and Firth, 2005; Mantzoukas and Jasper, 2004). This multifaceted definition of QC accounts for the multiple factors that impact the service delivered and is used by NHS National Quality Board "Five years forward review" (Field *et al.*, 2014).

2.5 Barriers to QI in healthcare:

Evidenced based medicine aims to impart the peer reviewed knowledge gained through research and study to healthcare professionals ensuring the clinical care delivered has undergone thorough evaluation (Shojania and Grimshaw, 2005). QI was adopted in part, as a means to address recurring problems in care delivered to patients that had either been identified but not addressed or went unidentified entirely. When used in conjunction with EBM, QI methods can be used to address the so called, 'knowing-to-doing' gap (Lohr, 2004). Both QI and EBM can be actioned and utilised in combination with each other within healthcare as a solution to a bigger problem, that is, once knowledge is gained on what to do and that knowledge is imparted to the profession, why is it that change is not implemented either effectively or at all?

By directly comparing the care provided to the established guidelines and benchmarks from EBM, Trusts are provided with a baseline and the ability to track progress in quality of care delivered forwards and backwards over time through cycles of QI analysis.

The introduction of quality improvement methods into the healthcare and veterinary care settings can be linked to a need to gather data and measure the quality of care being delivered to patients. Differentiating between a research study and QI project can prove difficult as both often involve the same basic process of identifying a problem and conducting a series of systematic process improvements and measurement of performance in cyclic comparison. QI carried out either among providers and organisations, or by individual actors within a practice, is conceptually the same protocol utilised in scientific research; however, there do exist some key differences between the two (Gregory, 2015; Shojania and Grimshaw, 2005; Plsek, 1999). Quality improvement, particularly in the field of healthcare, is considered an expectation by society and vital for clinical practice to continuously improve; often patients participate in QI initiatives as part of normal healthcare operations to benefit the care of others by improving the quality of care (Newhouse *et al.*, 2006). Conversely medical research is generally conducted separately of routine healthcare, and if human subjects are required, they are recruited, must give informed consent, and are defined as participants. All research involving human subjects requires review and approval by the Institutional Review Board (IRB) within an institution or Trust, however, currently a QI project using human subjects does not require this review (Gregory, 2015). True medical research certainly requires a much more rigid structure in place to be completed well and produce reliable, repeatable, and applicable results.

The differences and similarities between the two approaches can cause tension. The highly structured and often inflexible approach of academia conflicts in many ways with the quality improvement methods used, which must by their very nature be flexible to the situation they are applied to and must almost constantly change and adapt to the circumstances they are presented to (Young and McClean, 2008). Whilst QI projects do not generally follow the rigid structured approach that the research process does, they do require clearly defined aims and established measures of change to ensure that changes are the result of the improvement project and rigorously tested for maximum impact. Despite a sustained commitment to continual improvement of quality of care delivered within the NHS over the past twenty-five years (Walshe, 2009; Walshe and Offen, 2001; Scally and Donaldson, 1998), reviews examining the use of QI in the healthcare sector as a whole often report mixed levels of success. Ultimately the success or failure of QI models in published healthcare literature seems to be primarily based on a trial-and-error system to find the best improvement methods for the specific context of the problems identified (Shojania and Grimshaw, 2005).

Two early reviews of QI in the NHS both raised concerns over the apparent deficiency in the sustainability of changes introduced through QI analysis to upper-level management practices (Blumenthal and Kilo, 1998; Shortell, Bennett and Back, 1998). At the time the reviews took place however, there was a lack of published large-scale projects that may have contributed to this assertion. Young and McClean (Young and McClean, 2008) conducted a wide-ranging review of the use of the 'Lean Process' in healthcare. Their study identified, "the strong evidence of the activity of champions", acknowledging the individuals within a department that consistently made the concerted effort to measure and improve the quality of service delivered. Similar to findings in the two proceeding reviews, significantly lower success rates were seen in larger scale, organisational level changes that were attempted (Blumenthal and Kilo, 1998; Shortell, Bennett and Back, 1998). Subsequent reviews across the last decade have suggested that lower–level changes made by an individual or a small group are sustainable and often successful (Bastemeijer *et al.*, 2019; Irwin, Stokes and Marshall, 2019; Majeed *et al.*, 2018; Taylor *et al.*, 2014). In contrast, bigger projects have less than a 30% success rate in either initial implementation or achieving sustained improvements across different services or Trusts (Bastemeijer *et al.*, 2019; Irwin, Stokes and Marshall, 2019; Majeed *et al.*, 2018; Taylor *et al.*, 2014).

This deficiency in uptake and sustained change is often put down to one or more of the following factors: structural issues, human issues, and environmental context. The NHS is a combination of several complex organisations all with different goals, ethea, occupational groups, patients, and technological utilisation (Young and McClean, 2008; Portillo, 1998; Pollitt, 1996). For example, the problems incurred at a GP surgery will vary hugely to those in a large hospital setting, and even within hospital departments the challenges faced can be hugely specific to that particular setting. The Department of Health's report 'The NHS Plan' (The department of health, 2000) delivered in 2000 aimed to improve quality of care through two strands of change:

1. Emphasizing the use of a centralized command and control approach whereby the Department of Health will have the ultimate say over reform through national standards, league tables, inspection, and regulation.
2. Empowerment of front-line staff and organisations to give them ownership of their work and make them the driving force behind reform.

This slightly confused and contradictory approach is retrospectively viewed as largely counterproductive in the development of QI methods within the NHS (Greener and Powell, 2008; Eyres and Dewar, 2002). By putting emphasis on accountability to a higher power whilst simultaneously trying to give the freedom to staff to direct and lead change resulted in policy taking precedence over innovation and left staff disempowered.

The setting of national standards, targets and benchmarking as performance indicators has become a dominant paradigm applied to the NHS to address QI (Klein, 2010). The efficacy of implementing such measures is debated among academics and healthcare professionals alike. It is possible to find articles to both support and discourage the use of benchmarking and target achievement exercises from a higher governing power within the healthcare sector. One study by Boddy (2017) went so far as to suggest that the regimented implementation and enforcement of rigorous national standards, targets and benchmarking was encouraging "systemic psychopathy" at the highest levels of management within the NHS. The paper suggests the climate of fear, bullying and target-orientated management style was directly correlated to declining standards of patient care (Boddy, 2017). Undoubtedly this is an extreme point of view on this subject; however, Boddy is not alone in their concerns over the effect such measures have on patient care and employee wellbeing within healthcare (Lovaglio *et al.*, 2012; Northcott and Llewellyn, 2003).

The specific challenges of benchmarking strategies utilised in healthcare systems include case-mix fallacy[1], under-reporting of figures, comparison of noncomparable hospitals, selection bias, and possible implementation of inappropriate strategies for the development of quality care from incorrect benchmarking analyses (Lovaglio *et al.*, 2012; Pettengill and Vertrees, 1982). An example of the large-scale benchmarking strategies utilised in human healthcare is the Performance Assessment Framework (PAF) in the NHS. The PAF is a custom designed measuring and monitoring system employed by the Department of Health. It is designed to assist local NHS organisations keep track and maintain accountability for the service delivered by their Trust whilst still meeting central government's long-term objectives and targets (Department of Health, 2014). This resulted in a paradigm being created whereby managers were attempting to conform to the social norms and expectations of the patients treated by their service, whilst simultaneously attempting to meet the imposed performance indicators which were at times incompatible with each other (Chang, 2007). This provides another example where a one-size fits all approach was attempted and found to be insufficient to meet the variable nature of healthcare services. The PAF was however successfully used as a communication tool between central government and local Trusts, as well as providing a strategic management mechanism to generate performance information and highlight areas for change or examples of excellent practice.

The Royal College of Emergency Medicine implemented an assessment system within their training structure in 2016. This includes the specific requirement for trainees to complete a quality improvement project (Royal College of Emergency Medicine, 2020). Understanding is growing within the NHS around the idea that for successful implementation of any QI initiative inside knowledge is needed of the specific context of the system that is to be changed. Any person looking for successful QI implementation into these different settings and environments must be able to recognise the changing micro and meso-systems they will encounter and adapt methods accordingly. The motivation behind implementation of these methods is to establish a culture of self-reflective adjustment and continual improvement ultimately leading to improvements in the quality of care delivered to patients (Nadeem *et al.*, 2013; Plsek, 1999). Increasing demands for both funds, and ever higher standards of care have pushed forward the

[1] Observational studies evaluating healthcare services or interventions that compare groups or populations within a healthcare system often undergo a 'case-mix adjustment' which accounts for any imbalances between the groups being compared. Studies examining this adjustment have, however, shown that case-mix adjustment can make any present bias worse. The belief that this case-mix adjustment has to be made is referred to as a case-mix fallacy.

adaptation of several QI methods from industry (Leatherman *et al.*, 2016). These methods, designed to meet the specific needs and challenges of healthcare work, are both formally and informally being executed in multiple hospital Trusts and fields of expertise across the health service (Kaplan *et al.*, 2010; Baily *et al.*, 2006).

2.6 QI implementation within the veterinary industry

As with the NHS, the veterinary industry is complex and diverse, comprised of many sectors which in turn are organised into micro and meso systems of management with their own protocols and guidelines (Petitclerc, 2012). Quality improvement in a sector such as veterinary care requires the systematic application of scientific evidence and knowledge, and a wide variety of tools and methods applied in a personalised approach to each task (Batalden and Davidoff, 2007). When correctly utilised QI methods can assist to bridge the gap between practice and research, by providing translation from evidence-based medicine into clinical practice (Shojania and Grimshaw, 2005). In the same way that clinical practice guidelines are a way to translate the findings of research into useable useful information for practitioners, QI can provide those that are involved with the knowledge and skill to utilise EBVM through designing an intervention. The veterinary industry is behind the human healthcare sector as far as defining and adopting QI methods into everyday practice. Examples of many, although not all, can also be found in published veterinary research literature and conference proceedings and include clinical audit (Waine *et al.*, 2018a), checklists (McMillan, 2014), morbidity and mortality rounds (Pang, Rousseau-Blass and Pang, 2018), benchmarking (Frandsen, 2015), communication tools (Ward Jr., 2004), six sigma (Okpe and Kovach, 2017a) and significant event audit (Mosedale, 2017). Interestingly, some of these QI methods evidenced in veterinary literature do not feature specifically in the HQIP literature, for example checklists which are not clearly and singularly identified but instead their use is encouraged to ensure staff are correctly following each step of other QI methods identified.

Although these activities do appear in published literature, they are not generally identified and recognised as QI activities by professionals working in the sector (Rooke *et al.*, 2019). Since 2019 the charitable entity of the Royal College of Veterinary Surgeons (RCVS), RCVS Knowledge, has encouraged awareness and uptake of some aspects of the QI methods through practice guidelines and their information hub (R.C.V.S. Knowledge, 2017). RAND Europe were commissioned to investigate current use of QI methods within UK veterinary practice (RCVS Knowledge, 2020c). The report published in January 2020 comprised of data gathered from a national survey, focus groups, interviews with animal

caregivers and an in-depth literature review. A summarisation of the report stated that, "Though the veterinary professions have made progress in establishing some form of clinical governance, full-cycle quality improvement (QI) is not yet embedded in day-to-day work across the sector" (Hocking, Picken and Ling, 2020). RAND also made recommendations on how to firmly cement QI ideology within veterinary practice which included the need for better definitions of QI terms that specifically relate to veterinary practice which would reduce the current confusion within the profession surrounding terminology. Detailed interviews and / or focus groups with key demographic groups working in the veterinary industry were also suggested as these could determine exactly how QI could be effectively utilised in practice and what allowances would need to be made to give professionals time to carry out QI activities. The findings of this project also concurred with results from a separate study regarding, knowledge, understanding and use of QI in veterinary medicine run by the university of Nottingham and CVS Equine (Rooke *et al.*, 2019). With time and support from relevant governing bodies the veterinary sector could look to achieve similar widespread adoption of QI as in NHS.

Perhaps the best-known QI method used within veterinary medicine is clinical audit, first described in the context of veterinary practice in 1998 (Mosedale, 1998a). Formal clinical audit is a good example of a cyclic quality improvement process: good clinical audit cycles will address explicitly defined criteria that are directly linked to predetermined outcomes of interest (Rose, Toews and Pang, 2016a). The Royal College of Veterinary Surgeons mandates that clinics wishing to be part of their Practice Standards Scheme (PSS) must at a minimum have a system in place to monitor and discuss adverse events that occur (RCVS, 2018). Furthermore, all clinics wishing to attain veterinary hospital status must maintain and improve clinical standards (RCVS, 2018; R.C.V.S. Knowledge, 2017). Currently, however less than 60% of veterinary practices in the U.K are part of this scheme (RCVS, 2019). Anecdotally many clinics do carry out their own version of clinical audit and QI, and improvements may well be made or seen although the use of these methods is often unrecorded, and potentially carried out ineffectually or incorrectly due to a lack of specific research for the process in the context of veterinary medicine.

Benchmarking within veterinary medicine is certainly not as established as in human medicine, and the same level of information about the pitfalls and successes is not available. The lack of overarching government policy that collects and collates the benchmarking data and produces league tables in the NHS could be a reason for this. Many audit projects will occur internally within individual veterinary practices and corporate

groups with the information not shared beyond those organisations. The Royal Veterinary College (RVC) operates a central database called "the VetCompass programme" collecting anonymised clinical records from practices across the country for epidemiological research purposes (Royal Veterinary College, 2019). The University of Liverpool runs a similar scheme called the Small Animal Veterinary Surveillance Network (SAVSNET). Originally this was run in partnership with the British Small Animal Veterinary Association (BSAVA), however now it is managed totally by the University. The aim of the project is to produce a system that could be utilised to improve companion animal disease surveillance at local, regional, and national levels (University of Liverpool, 2020). This is achieved through using electronic health records (EHR) from veterinary practices and diagnostic laboratories across the UK that volunteer to submit their data. RCVS Knowledge also run "vetAUDIT", another anonymised central database collecting data on small animal neutering, canine cruciate procedures and antimicrobial resistance, the latter in collaboration with SAVSNET, which allows practices to assess their current standards with those reported by others (RCVS Knowledge, 2020a). There is evidence from studies utilising the SAVSNET database that there is reasonably good engagement when data are intended to be used for overall surveillance of population health. When the records could potentially be used to influence client decisions about where to have their pet treated, however, the desire to share may be reduced as competition for clients is likely to be high between practices and corporations. Ultimately the decision on whether to share information, particularly regarding clinical outcomes, is based on the final intended use of the project. It can be very easy to draw incorrect conclusions from a set of benchmarks without context, and for this reason benchmarking needs to be used carefully. That is not to assume that benchmarking cannot be successfully utilised in veterinary systems; benchmarking has been used successfully to encourage better performance within teams, and subsequently a higher quality of care or product delivered to patients (Rose, Toews and Pang, 2016b).

2.7 Prospective course of action

There are certainly equivalents that can be drawn from the research conducted related to the use of QI of human healthcare and applied to the establishment of QI in veterinary care. The recommended infrastructure needed for success has been laid out by numerous reviews and published papers, although the level of organisation regarding implementation and subsequent accomplishment of QI has varied across Trusts within the NHS (Dean, 2018). The variable level of success could in part be due to the historically

chaotic nature of the ever-changing structure of the governing bodies and organisations involved. In many ways the veterinary sector has an advantage over the NHS here; although the ‘supervisory structures’ and governing bodies are much more numerous within the veterinary sector, their powers are far more limited, which allows the scope for a much more individualised approach to QI implementation and wide-spread adoption. This is contrary and potentially more successful than the one size fits all approach taken by the NHS.

Chapter 3

Knowledge and understanding of QI methods within UK veterinary industry, a cross-sectional survey of UK professionals working in practice.

Abstract:

Background: QI refers to 'a systematic and formal evaluation of a programme or system of care, carried out with the intention of improving the quality of the service provided to the client and/or patient'. QI methods commonly used in healthcare include checklists, clinical audit, and critical incident analysis. Significant research has been conducted into the knowledge, understanding and subsequent implementation of QI methods in the human healthcare sector; however, there are limited examples of research into QI methods being employed in the veterinary industry and being termed as QI.

Aims: To gauge current knowledge, understanding and use of QI methods within UK veterinary practices.

Methods: Online questionnaire for professionals currently working in UK veterinary practices, distributed using snowball sampling. Descriptive data analysis (frequency percentages) was performed on results along with a Pearson's chi-square test statistical analysis on SPSS.

Results: Two hundred and four fully completed responses were received from clinical veterinary surgeons (66), clinical directors/practice owners (28), administrators (18), registered veterinary nurses (40), practice managers (10), receptionists (27), technicians/nursing assistants and interns (15). All species groups and practice types were represented. Overall, 69.6% (142/204) had heard of QI methods; 9.3% (19/204) rated their knowledge and understanding as "good" (highest category option). Thirty-point four percent (60/204) stated they had received training in one or more QI methods. The most commonly cited barrier to implementation of QI was "lack of time" (29.5%, 160/543), followed by "lack of understanding" (21%, 114/543).

Conclusions: Although the veterinary industry has been taking steps to implement QI into practice, this survey shows there is still a knowledge gap especially surrounding the reason these activities are carried out. Respondents stated they would be receptive to training and QI in their practices, but more education is needed.

3.1 Introduction

Awareness of QI has increased within the veterinary sector over the last ten years, in no small part due to the increasing number of publications and educational resources relating to key QI methods and tools, such as clinical audit (Waine *et al.*, 2018a), checklists (McMillan, 2014), morbidity and mortality rounds (Pang, Rousseau-Blass and Pang, 2018) and benchmarking (Frandsen, 2015). When correctly utilized, QI methods can also assist in bridging the gap between practice and research, by providing translation from evidence-based medicine (EBM) into clinical practice (Shojania and Grimshaw, 2005; Bellamy, 1999). Studies have found the level of success for any QI initiatives in human healthcare directly correlates to the amount of 'buy-in', understanding and involvement of the professionals that will be using QI methods and tools in practice (Zoutman and Ford, 2017a; Versteeg *et al.*, 2012; Pronovost, 2011; Chin *et al.*, 2008; LM Schouten, 2008; Ovretveit *et al.*, 2002). The same is true when looking at application of QI initiatives in veterinary medicine, although veterinary care is complicated by the fact that the receiver of the clinical care (the animal) is not the person who experiences the service provided by the veterinary practice, but the animal owner (Spitznagel *et al.*, 2022; Quain, Mullan and Ward, 2021). Veterinary professionals need not only to advocate effectively for their patient (the animal), but they also need to match this with the needs, wishes and financial restrictions of the animal owner (Wayner and Heinke, 2006). A key aspect of providing the highest quality care to patients is the ability to monitor and evaluate the systems and methods of care delivery in practice, even if they are going well, to facilitate continuing improvements and growth. Maintenance of already high standards and constantly seeking improvement are as important in QI and providing QC as improving systems that are inadequate or 'failing'(The Health foundation, 2016; Raven *et al.*, 2011; Baily *et al.*, 2006). The flexible nature of QI methods makes them perfectly suited to the multifaceted nature of veterinary care teams (Rooke *et al.*, 2021b).

Many individual veterinary practices or corporations have developed their own methods to evaluate performance, outcome, and client satisfaction. Some of these are mandated and guided by The Royal College of Veterinary Surgeons (RCVS) through their Practice Standards Scheme (RCVS, 2018). Current knowledge and published research of QI methods within the veterinary sector is sporadic. Even those activities that would be identifiable as QI within veterinary practice are not routinely recognised or termed as QI. The charitable entity of the RCVS, RCVS Knowledge, has encouraged awareness and uptake of some aspects of the QI methods through their information hub and research

conducted through 2020 and 2021 (Hocking, Picken and Ling, 2020; RCVS Knowledge, 2020d). The successful implementation of QI in any industry has been shown to aid establishment of a self- reflective and continual improvement culture ultimately leading to improvement in the quality of care delivered to patient / clients (Ham, Berwick and Dixon, 2016; Mazzocato *et al.*, 2010). There are some studies that examine specific QI methods and tools such as clinical audit in farm animal practices (Waine et al., 2018b; Waine, 2017; Waine and Reinoga, 2017), checklists (Daodu *et al.*, 2019; Ward *et al.*, 2019; Cray *et al.*, 2018; Bergstrom, Dimopoulou and Eldh, 2016) and M&M rounds (Kieffer and Mueller, 2018; Pang, Rousseau-Blass and Pang, 2018; Powell, 2015) however, a study examining either QI methodology as a whole or examining the knowledge and use of QI across the whole practice team does not currently exist. By gauging current knowledge and use of QI methods from participants in this study, it will be easier to determine barriers that exist surrounding the implementation of QI in veterinary practice.

Aims:

- To gauge current knowledge and opinion of QI methods from a wide variety of veterinary professionals (including vets, veterinary nurses, receptionists, administrators, interns, and auxiliary staff)

Objectives:

- Create a cross sectional questionnaire to be distributed to professionals currently working in the UK veterinary sector.
- Evaluate current use and prevalent barriers to the use of QI in UK veterinary sector
- To compare knowledge and use of QI across different groups of veterinary professionals currently working in the UK veterinary sector

3.2 Materials & Methods

3.2.1 Questionnaire design:

An online cross-sectional questionnaire was created for distribution to a target population of professionals (vets, veterinary nurses, receptionists, administrators, interns, and auxiliary staff), currently working within the veterinary industry (Appendix A- example of initial survey draft). This consisted of professionals working within the UK veterinary sector and aimed to cover a full range of species treated, including: species (small animals, equine, farm, exotics); type of practice (first opinion, referral, university, ambulatory); and job role currently held by participants (veterinary clinicians, registered veterinary

nurses, clinical directors, practice owners, administrators, practice managers, receptionists, interns, students, and nursing assistants/technicians).

The survey was designed, piloted, and distributed on onlinesurvey.ac.uk, and was released on the 21st of March 2019 and closed 15th July 2019. The survey platform allowed researchers to keep track of completed responses and to send reminders to any participants that had only partially completed the survey before the closing date.

The questions were devised using the British Medical Journal (BMJ) questionnaire design framework for healthcare research[2], as outlined by Boynton et al. (2004). This framework was chosen to ensure validity and produce the highest quality data possible (Boynton and Greenhalgh, 2004). All questions were compulsory except the final page and participants were required to provide some answer (even if it was "not applicable/N/A") before they could move on in the survey. Questions were predominantly formatted as multiple choice, but also included scale and rank (question 9.1, 9.2). All multiple-choice questions included an option for 'Other' which would prompt participants to type their own response into a free text box. Questions 4, 5, 6, 7a, 10a, 15 and 12 they could choose 18) allowed participants to select as many options as they wanted that were applicable to their practice or themselves. Six sections were originally created to fulfil the aims and objectives of the study.

- Introduction to quality improvement and aims and objectives of study and researcher contact information.
- Section 1: Demographic information of participant regarding current job role and background in veterinary sector.
- Section 2: Current knowledge and understanding of clinical governance and quality improvement in relation to participant's current job role.
- Section 3: Knowledge and understanding of clinical audit in the veterinary sector.
- Section 4: Opinions on future information and education regarding quality improvement in the veterinary sector.
- Closing page: Thanks, and researcher contact information.

[2] This framework is designed to assist healthcare researchers to produce a questionnaire that will gather worthwhile and generalisable data regarding opinion, attitudes, and experiences within the healthcare system from both professionals and patients. The framework produced by these authors was produced by following the NICE (National Institute for Clinical Excellence) questionnaire methodology guideline template that is used extensively by those gathering questionnaire data within the human healthcare system.

To produce quantitative data and allow for statistical testing, the majority of questions were closed, however some free text responses were included to enable respondents to explain their answers (Polgar and Thomas, 2011; Rattray and Jones, 2007). It was necessary to allow respondents to select more than one answer for some questions, for example, type of work performed, or animal treated by practice. The structure of the questionnaire and the questions contained in it were created by Freya Rooke (FR) and edited/pre-tested by the research team Dr. Marnie Brennan (MB), Dr. John Burford (JB), Professor Sarah Freeman (SF), Dr. Tim Mair (TM) and Dr. Jo Suthers (JS)

To test and refine content and wording of questions, a pilot study was conducted for one month involving employees from an equine hospital where all the target demographic groups could be accessed (Table 2). After this period, feedback was gathered from participants regarding the language used in the questions, order, and format of the questionnaire. At this stage the published literature and research questions posed at the beginning of this study were revisited to ensure that the questions asked and therefore the data gathered were relatable to current and up to date research. Through this process the survey was refined ready for distribution. Questions that had <80% completion on the pilot were considered for removal or amendment. Deletion of items was carried out using both pilot response feedback and Priest et al's (1995) scale of endorsement; any alterations proposed had to have consensus from all authors before any changes were made (Priest, Thomas and Bond, 1995).

Table 2 - List of participants that took part in the pilot survey gathering information on knowledge and understanding of QI in the veterinary sector. The pilot was distributed to employees at a single veterinary practice to gather data on the usability of the survey and wording of questions before wider distribution.

Participant job role	**Number of participants**
Clinical veterinary surgeon	2
Clinical director / practice owner	1
Administrator	2
Receptionist	1
Veterinary technician	1
Veterinary nurse	3
Other	1

The final study contained four sections that met the research questions but were condensed down from the pilot study due to feedback saying the questionnaire was too long (Appendix B):

- Introduction to quality improvement and aims and objectives of study.
- Section 1: Demographic information of participant regarding current job role and background in veterinary sector.
- Section 2: Participants knowledge on clinical governance and quality improvement methods, and opinions on their use in veterinary practice.
- Closing page: Thanks, and researcher contact information.

3.2.2 Questionnaire distribution

To reach a maximum variation purposive sample of the targeted population, several different distribution channels were utilised. This included using email contacts[3], social media advertisement[4], Centre for Evidence-based Veterinary Medicine newsletter and word of mouth. Participants were encouraged to engage in snowball sampling by sharing the survey with colleagues and other professionals in their circle to complete. The process for data collection was approved by the Committee for Animal Research and Ethics at the School of Veterinary Medicine and Science, University of Nottingham.

3.2.3 Analysis

Post data collection, the raw questionnaire data was downloaded from the survey platform and exported into Microsoft Excel (Microsoft Corporation, 2018). At this point, data cleaning was performed to check and remove any incomplete responses and ensure that each participant had only completed the survey once using the respondents' IP addresses and other data fields. Descriptive data analysis was performed on the quantitative results and frequencies and percentages calculated.

3.3 Results

3.3.1 Demographics

Two hundred and four participants provided complete responses to all the survey questions; any participant that had failed to complete all the mandatory required questions or submit the survey as required on the final page was discounted from analysis. Participants had a wide variety of job roles in veterinary practice (Table 3). Respondents

[3] The list of email recipients to send over the survey link was compiled of contacts from CVS veterinary group, Centre for Evidence-based Veterinary Medicine (CEVM).

[4] The survey was advertised on selected social media platforms including Facebook (CEVM Facebook page, RCVS Knowledge Facebook page, Veterinary nurses UK, Veterinary receptionists, and Personal Facebook profiles to achieve maximum coverage possible.

that listed their job role as 'other' specified technician (4), nursing assistant (6), student (3), veterinary investigation officer (1) and career break (1).

In total, 204 complete responses were submitted;or some questions multiple responses from one participant were possible. In the results gathered all types of practice were represented with most based in first opinion practice (49.6%, 180/204) and treating small animals (35.2%, 114/204). 'Other' types of practice were specified as charity (2.4%, 5/204), out of hours emergency / critical care (1.9%, 4/204), and poultry consultancy and diagnostics (0.4%, 1/204).

More than half of participants (142/204) worked in practices that were part of the RCVS practice standards scheme (PSS). Three of the five accreditation levels were represented by participants in the results: core (14/142), general practice (50/142) and veterinary hospital (78/142).

Table 3 - Demographic breakdown of the veterinary professional population (n = 204) that completed the questionnaire on the knowledge and use of quality improvement methods in UK veterinary practices. Participants were contacted using snowball sampling and emails sent to practices recruiting participants for this work. Nb. For questions delineated by ± respondents could select more than one option. For the question delineated by * the number of respondents was 106 which reflected [state why here].

Current Job Role:	**Number of respondents selecting this option (%)**
Clinical veterinary surgeon	66/204 (32.4%)
Registered veterinary nurse (RVN)	40/204 (19.6%)
Clinical director / Practice owner	28/204 (13.7%)
Receptionist / Client care team	27/204 (13.2%)
Administrator	18/204 (8.8%)
Practice manager	10/204 (4.9%)
Other	15/204 (7.4%)
Highest level of qualification:	
GCSE (General Certificate of Secondary Education)	11/204 (5.4%)
A-Levels	7/204 (3.4%)
Foundation degree	11/204 (5.4%)
Bachelors degree	90/204 (44.1%)
Postgraduate (Inc. certificates)	44/204 (21.6%)
VN (veterinary nursing) diploma (level 3)	22/204 (10.8%)

NVQ (national vocational qualification)	9/204 (4.4%)
Other	9/204 (4.4%)
No formal qualifications (NFQ)	1/204 (0.5%)
Practice part of R.C.V.S PSS:	
Yes	143/204 (70%)
No	34/204 (16.7%)
Unknown	27/204 (13.3%)
Type of work performed at practice:±	
First opinion	180/204 (88.23%)
Referral	105/204 (51.47%)
University	11/204 (5.39%)
Ambulatory	78/204 (38.24%)
Other	10/204 (4.90%)
Type of animal treated by practice:±	
Small animals	114/204 55.88%)
Equine	105/204 (51.47%)
Exotics	57/204 (27.94%)
Farm	43/204 (21.08%)
Other	5/204 (2.45%)
Animal primarily treated by responding vet/vet nurse:*	
Equine	35/106 (33%)
Small mammals (rabbits, guinea pigs, hamsters etc)	4 /106 (3.7%)
Dogs / cats	53/106 (50%)
Lizards	2/106 (1.8%)
Farm animals	11/106 (10.3%)
Poultry	1/106 (0.9%)

3.3.2 Knowledge and understanding of quality improvement:

More respondents had heard of QI methods (69.6%, 142/204) than had not (30.4%, 62/204); more than 50% of every group except receptionists and those in the ‘other’ group stated they had prior knowledge of QI methods (Table 4). A high proportion of both clinical directors/practice owners and practice managers had heard of QI, and a low percentage of receptionists and those in the ‘other’ group had heard about QI.

Table 4 - Results stratified by job role and answering whether the participants had or had not heard of quality improvement methods prior to undertaking this survey and reading the information page located on the first page of the survey.

Job Role	Have heard of QI (%)	Have not heard of QI (%)
Clinical veterinary surgeons (n=66)	51 (77.3%)	15 (22.7%)
Registered veterinary Nurses (n=40)	27 (67.5%)	13 (32.5%)
Clinical directors / practice owners (n=28)	26 (92.8%)	2 (7.2%)
Receptionist / client care team (n=27)	11 (40.7%)	16 (59.3%)
Administrator (n=18)	11 (61.2%)	7 (38.8%)
Practice manager (n=10)	8 (80%)	2 (20%)
Other (n=15)	7 (46.7%)	8 (53.3%)

Only 9.3% (19/204) of respondents rated their knowledge as 'good' (the highest possible rating), 21.6% (44/204) stated they had limited knowledge of QI and 22.5% (46/204) had never heard of or used QI (Figure 2). This trend could also be seen when answers were broken down into the demographic job role groups (Table 4).

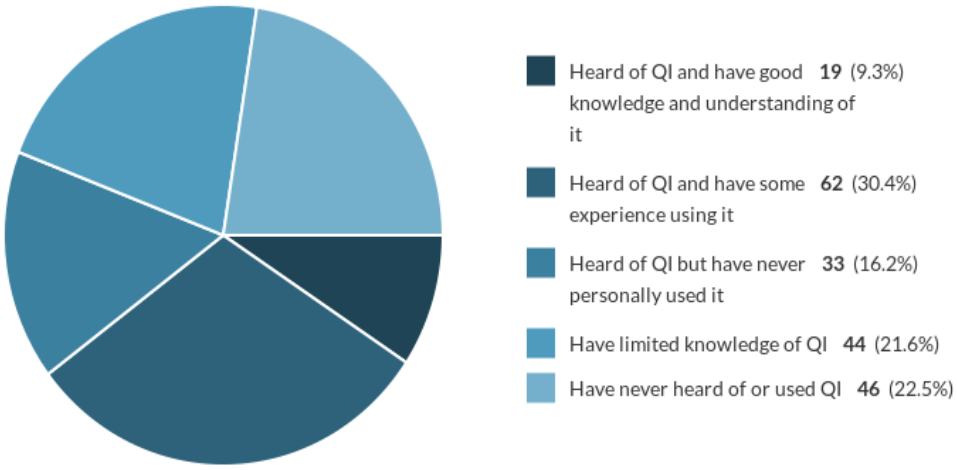

Figure 2 - Pie chart showing how participants of a survey of veterinary professionals rated their knowledge, understanding and use of QI methods.

Rating their understanding of the clinical audit process in the context of veterinary practice (1=low and 10=high), 50% of participants self-rated their understanding as four or less. An equal number of participants identified their understanding as 9 to 10 (high) and correspondingly 1 to 2 (low) when self-rating their understanding of why clinical audit

process is used within veterinary practice. The ordinal data[5] for both questions (Table 6 and 7) identified the wide-ranging levels of understanding present among the professionals completing this questionnaire.

Table 5 - Table displaying data from a survey of veterinary professional's understanding of QI, table shows participants self-rating their understanding of the clinical audit process in the context of veterinary practice 1 defined and "poor understanding" and 10 defined as "excellent understanding".

Rank value	Count
1 = low	33
2	14
3	15
4	17
5	23
6	18
7	28
8	28
9	12
10 = high	15

Ordinal data of results

IQR 1st	3.0
Median	5
IQR 3rd	8.0

Table 6 – Table displaying data from a survey of veterinary professional's understanding of QI, table shows participants self-rating their understanding of why the clinical audit process was used in veterinary medicine. 1 defined and "poor understanding" and 10 defined as 'excellent understanding'

Rank value	Count
1 = low	31
2	13
3	13
4	16
5	12
6	14
7	26
8	36
9	18
10 = high	23

Ordinal data of results

IQR 1st	3.0
Median	5
IQR 3rd	8.0

[5] Ordinal data is classified into categories within a variable that have a natural rank order, however, the distances between the categories are uneven or unknown. In this context 1 was representative of poor understanding and 10 represented excellent understanding, but the numbers between were up to individual interpretation.

3.3.3 Barriers to QI implementation in veterinary practice

Lack of time to undertake QI was the most frequently selected barrier, with 160 participants (29.5%) selecting it. Every barrier choice offered was selected at least once except "other" (Figure 3). This was further categorised to show which were the commonly selected barriers for each job role identified (figure 4). Over 50% of every demographic job role group and 100% of clinical directors/ practice owners noted, "Lack of time to undertake QI" as a barrier to QI, this unanimous recognition of a barrier was not seen in the other barriers listed (Table 8). Participants in an office role (administration and receptionist) raised prominent concerns over support and guidance from superiors as well as colleagues more so than other groups.

Contrastingly those working in a more clinical roles (RVNs and veterinary surgeons) regarded both a "*lack of understanding"* and a *"fear of reprimand for a mistake"* as leading barriers to uptake (Figure 4).

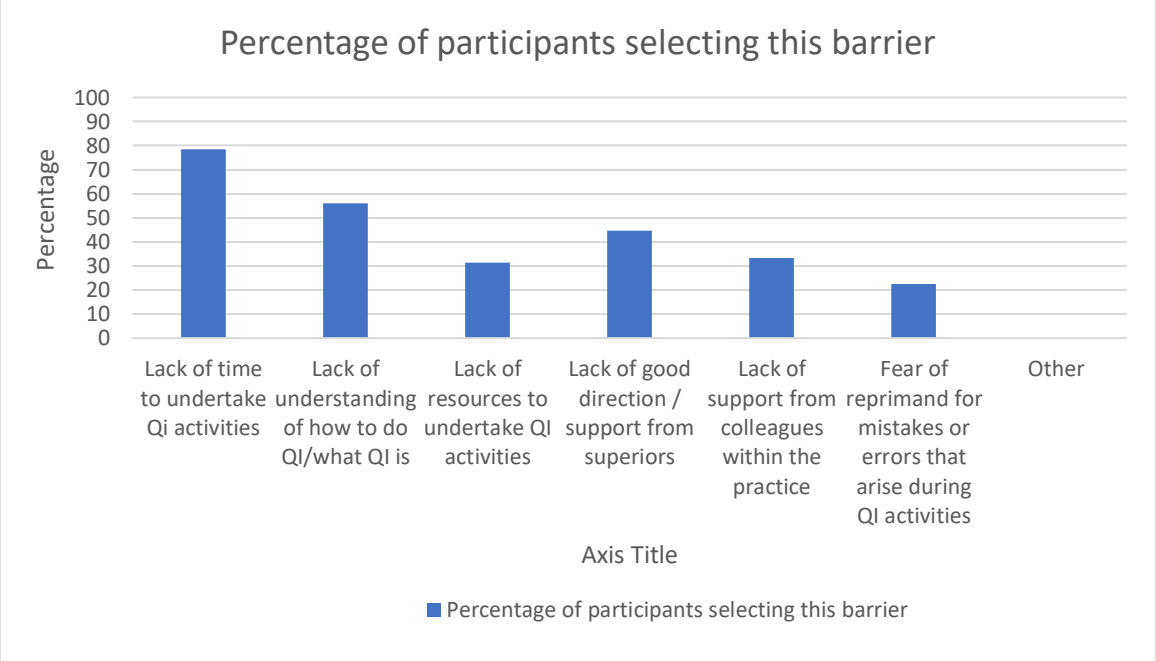

Figure 3 - Opinions of all participants on the perceived barriers to successfully implementing / undertaking QI activities in veterinary practice. Nb. Participants were able to select more than one option for this section but could only select each option.

Table 7 - Table display the percentage and number of participants that selected each barrier to successful implementation of QI listed. Nb. The groups are organised by demographic job role as noted by every participant at the start of the survey investigating knowledge and understanding of QI by veterinary professional working in the UK veterinary sector.

Barrier	**Lack of time**	**Lack of understanding**	**Lack of resources**	**Lack of direction / support from superiors**	**Lak of support from colleagues**	**Fear of reprimand for mistakes**
Vet (66 participants)	90.91% (60)	56.06% (37)	30.30% (20)	43.94% (29)	33.33% (22)	31.82% (21)
RVN (40 participants)	70% (28)	52.5% (21)	17.5% (7)	37.5% (15)	32.5% (13)	27.5% (11)
Clinical director / practice owner (28 participants)	100% (28)	53.57% (15)	46.43% (13)	28.57% (8)	35.715 (10)	7.14% (2)
Practice manager (10 participants)	60% (6)	40% (4)	20% (2)	30% (3)	40% (4)	30% (3)
Receptionist / client care (27 participants)	59.26% (16)	70.37% (19)	29.63% (8)	66.67% (18)	29.63% (8)	18.52% (5)
Administrator (18 participants)	66.67% (12)	44.44% (8)	61.11% (11)	50% (9)	22.22% (4)	11.11% (2)
Other (15 participants)	66.67% (10)	66.67% (10)	20% (3)	60% (9)	46.67% (7)	13.33% (2)

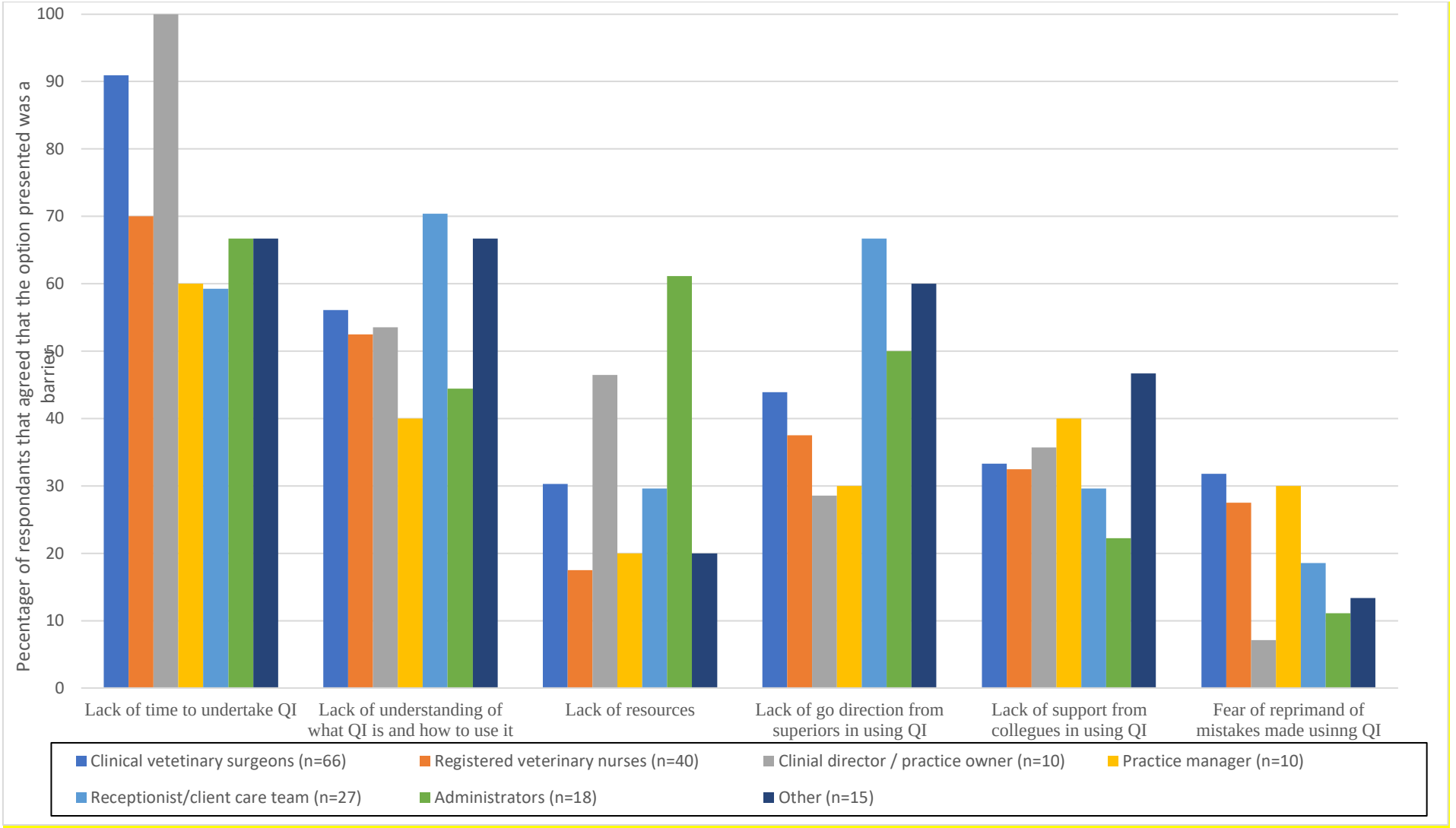

Figure 4 - Bar graph shows the perceived barriers identified by each demographic job role group participating in the questionnaire that examines the knowledge and use of QI methods within the UK veterinary sector. Nb. Chart show the frequency percentages each barrier was selected by the different demographic job groups – participants were able to select multiple barriers for this question if they felt it fitted with their opinion. 100% is represented by the total number of times a barrier s selected in the entire survey not the number of people present in each demographic group.

3.3.4 Preferred methods of training and information dissemination

When asked about training, 144 (69.6%) participants had not received any QI specific training or education. Those that had received training (n=61), had been trained via CPD (continuing professional development) focussed QI (50.8%, 31/61), informal training by a colleague (26.2%, 16/61), as part of a degree (16.3%, 10/61), and specific in-house training at their practice (11.4%, 7/61). Educational resources included sessions/seminars attended through conferences and congress (ECVS, BEVA, SPVS, Vet CPD, VDS), Certificate in Advanced Veterinary Practice (CertAVP), self-directed CPD using RCVS Knowledge materials available online as well as three participants who had received CPD and training through a previous job-role in the NHS.

Participant opinions on QI training methods and information dissemination regarding QI in the veterinary profession showed that a popular training / education method were short CPD workshop sessions delivered by external professionals (n=99/ 18.4%) and practical QI sessions on QI relevant to their current job (n=99/18.4%) (Figure 5).

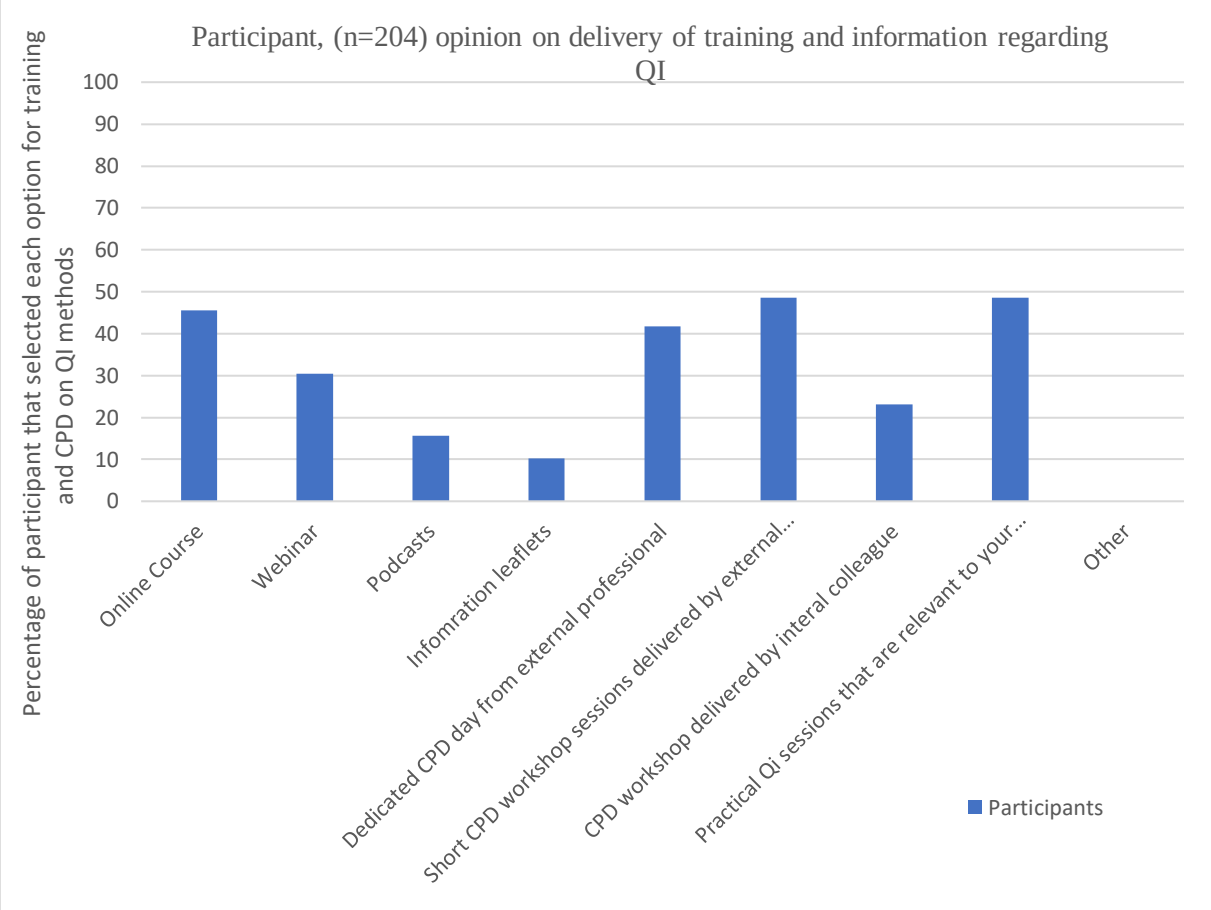

Figure 5 Chart displaying participants' (n = 204) opinions on how they would like to receive training and information on QI relevant to their job role and practice. Nb. participants were able to select more than one option.

There were minimal differences noted between the different job roles and preferred choice of QI training methods (Table 8). Professionals preferred training activities or days that would be held in a group and offer ‘protected time’ for example CPD days or workshops, over training methods that required participants to complete in their own time / at their convenience for example online courses or podcasts. All groups preferred training to be delivered by an external professional versus an internal trained colleague except for the clinical directors / practice owner group.

Table 8 - Answers to participant opinions on best way to receive training and educational resources specifically surrounding QI in the veterinary sector. Nb. Question asked question 12 "*if you were to receive training on QI relevant to your job role within your practice, how would you like this to be delivered?"*, participants could select multiple options from eight provided.

Job role (number of participants fulfilling this role)	**Online course**	**Webinar**	**Podcasts**	**Information leaflets**	**Dedicated CPD day from external professional**	**Short CPD workshop delivered by external professional**	**CPD workshop delivered by internal trained colleague**	**Practical sessions on QI that are specific and relevant to current job role**
Receptionist (28)	14	5	6	5	11	17	5	11
Other (15)	8	3	0	2	7	6	5	10
Veterinary nurse (40)	18	15	3	2	17	18	10	17
Veterinary surgeon (66)	29	19	16	5	28	30	12	34
Clinical director / practice owner (28)	12	13	3	3	11	9	9	10
Administrator (18)	8	2	1	1	6	12	5	12
Practice manager (10)	4	4	0	1	5	3	3	6

3.4 Discussion

This study was a first step into investigating the current knowledge and use of QI methodology in UK veterinary practice; at the time the study was conducted, it was the first of its kind. Due to a lack of clear literature available specifically relating to use of QI methods in veterinary practice it was important to gain insight from professionals working in the sector how these methods were viewed and utilised currently. The wide diversity of participants recruited, across a variety of job roles, practices and expertise give a snapshot of opinion and use of QI methods within veterinary practices in the United Kingdom.

3.4.1 Study limitations

This study used an online questionnaire with a cross-sectional selection of participants. This methodology provided an objective means to collect inferences and information on a population's knowledge, current practice, and opinions regarding a specific subject (Solomon, 2019; Boynton and Greenhalgh, 2004). A cross-sectional survey is a valid method to gather data on the opinions of participants that fall into a broad population at a specific point in time regarding a specific subject (Andrade, 2020). It was decided that a survey study design was the most appropriate and convenient for the target population, working in a busy time critical job role. Although certain members of the target population are easily accessible (vets, practice managers and veterinary nurses) others were more difficult to contact directly. So, for this reason, it was decided that snowball sampling would be the most effective method to access all job demographics within a practice through those participants already selected and with access to other possible participants (Emerson, 2015). Whilst the use of questionnaires as a means of data collection is well established, the advantages and disadvantages are keenly debated in published literature (Rice *et al.*, 2017; Jones *et al.*, 2008; Michaelidou and Dibb, 2006; Boruchovitch and Schall, 1999). The disadvantages of using the questionnaire methodology include the potential of a low response rate and associated bias from the population you do reach, because those who do respond may not be representative of the population you are targeting. This can be combatted with careful selection and specific targeting of desired population. Kaplowitz *et al.* (Kaplowitz, Hadlock and Levine, 2004) noted in their research that response rates to online surveys were increasing as online surveys became the 'normal' form of questionnaire research over paper forms. It was felt by the researcher that although online surveys and snowball sampling were not without potential disadvantages, ease of data collection, automatic input of data into analysis software and

the ability to reach a variety of participants outweighed the potential drawbacks and made these appropriate methods for the study in question (Solomon, 2019; Shih and Fan, 2008; Kaplowitz, Hadlock and Levine, 2004; Couper, 2000).

Although all of the targeted demographic groups were reached, there were significantly more participants that identified their practice as first opinion (49.6%, 180/204) and small animals (35.2%, 114/204). Those that held clinical job roles were also represented in greater numbers (clinical veterinary surgeons - 32.4% and registered veterinary nurses – 19.6%) than those in non-clinical roles. However, this could be representative of the UK veterinary population where clinical staff are represented in a greater number than non-clinical. RCVS do not require receptionists, administrators, practice managers or practice owners to specifically register with them and do not state the specific job roles that nurses, and veterinary surgeons hold within their practice; for example, a veterinary nurse working as a practice manager or a veterinary surgeon who is also a practice owner (RCVS, 2017). Because of this it is hard to gauge whether the demographics in this survey are representative of the wider UK veterinary practice demographics. All these factors could lead to bias within the results. It is possible that those who work in the same role (even within different veterinary practices) have had similar experiences and as such these experiences could come through strongly within the results leading to bias (RCVS, 2017). However, the respondents' information given does align with the most recent published data from the Royal College of Veterinary Surgeons (RCVS) in 2018 that showed 43.6% (1,526 of 3,157) of practices registered with the PSS scheme were small animal general practice (first opinion). Because of all of these factors and the limited data that exists in some areas, it is not possible to make any generalised assumptions from the data gathered by this population in regard to the UK veterinary sector as a whole. In order to gather data that better represents the UK veterinary professional population separate surveys could have been created for each demographic group. This specific targeting could have achieved a greater response from those groups that were identified as underrepresented (receptionists, auxiliary staff and administrators). The distribution of surveys in a more specific manner would have also potentially achieved better response rates from these groups, for example Facebook groups exist for only veterinary receptionists and technicians to join. This technique of targeted sampling would have also assisted to combat some of the limitations of snowball sampling, for example professionals only passing the survey information onto those within their social or professional circles which anecdotally would be those holding similar roles within practice to themselves. At the

time of recruitment, it was difficult for the researcher to gain access to the specialised Facebook groups to advertise the survey information. It was felt whilst designing the study that the time taken to create and analyse individual surveys for each professional demographic group would not necessarily alter the data gathered in a significant manner. Retrospectively knowing the key differences present in the opinions and experiences of each group this approach could have in fact been beneficial and would be recommended for future research to consider this targeted manner of questioning and recruitment.

3.4.2 Knowledge of QI does exist however, there is disparity in the knowledge and training undertaken by professionals.

This survey shows that there is still a knowledge gap among all professional groups with few participants feeling confident of their knowledge or how to effectively use these methods. The results also showed a disparity between those participants holding clinical versus non-clinical roles within a veterinary practice. QI has been shown to have the potential to be successfully utilised in both clinical and non-clinical roles within human healthcare (Burrows, 2019; Meehan *et al.*, 2009). Despite this, those participants holding what would be categorised as primarily non-clinical roles (receptionists and administrators) were the lowest percentages of participants who had heard of QI, with less than 50% of receptionists having heard of QI at all. The key to engaging participating members of staff in QI activities has been studied extensively within human healthcare. A review by Anderson et al. (2020) of contextual factors relating to quality improvement initiatives in human healthcare revealed the large impact that contextual training and information has across all stages of QI in healthcare (Coles *et al.*, 2020). By clearly understanding the characteristics and circumstances surrounding the need and use of QI methods within a department or practice, potential barriers and complications that could be encountered during the process can be targeted (Ye *et al.*, 2020; Donnelly, 2017; Flynn and Hartfield, 2016; Pronovost, 2011). The findings of Anderson et al's. (2020) study can be used to help guide researchers to a process to increase engagement from all veterinary staff in QI activities.

It is important to acknowledge this connection between job role and understanding of QI, as all factors contributing to the evident knowledge gap across and between veterinary staff need to be recognised in order to effectively address it. Engagement across all job roles is possible, as demonstrated within the NHS. It is important that the mechanisms of implementation need to be specific, fluid, and flexible in their nature to appeal to and be

relatable to potential contributors in a QI study for this to happen. Sometimes this information will need to be adapted to different people to reflect their role within the project and system of care. Providing correct information that is relatable and relevant to veterinary medicine specifically alongside clear leadership and direction are vital for successful use of QI methods. Similar to human healthcare those working within the system of veterinary care are best placed to lead and participate in proposed QI activities and guide the outcomes (Flynn and Hartfield, 2016; Nadeem *et al.*, 2013).

3.4.3 Lack of a unified approach to QI education in veterinary medicine

The knowledge gap observed between those holding different job roles within a practice could also be linked to the results regarding training and education in QI. Respondents stated clearly that they would be receptive to training and QI in their practices, but very few had received specific training in these methods at the time of the survey. Continuing professional development (CPD) is a mandated activity for veterinarians and nurses to maintain and enhance their capability to perform competently in their chosen practice area, as well as to acquire new knowledge and skill sets over their career. If structured and specific CPD resources existed relating to QI, this would be a key component in disseminating information to veterinary stakeholders, particularly nurses and clinicians. There are no such mandates on CPD for other job roles in veterinary practice, although individual practices and organisations may have their own requirements of their staff (Gates *et al.*, 2021; Short *et al.*, 2011). Although CPD is not obligated, receptionists, administrators and practice owners were equally as interested in training and education on QI methods.

The participants who could identify that they had received specific QI training and education contributors outlined where they received training about QI previously. Many people identified the Royal College of Veterinary Surgeon's (RCVS) Certificate in Advanced Veterinary Practice (CertAVP) as the source of their knowledge and training in QI methods. Some had attended corporate training days specifically aimed at introducing QI methods into their practice and a small number had brought their knowledge and training across from human healthcare where they had worked in a previous role. This demonstrates that the profession has made a start in continued education on QI, however, when participants rated their confidence in the use of QI in practice, only nineteen respondents stated that they have good knowledge of QI and were confident using it. This shows that although information and training does exist, much more needs to be done to

both guarantee that all members of a veterinary practice have access to it and that it is fit for the purpose it is intended. The effectiveness of the limited specific QI training available to professionals is currently un-measured, with even those that have received specific training rating their confidence in QI methods as low. This would perhaps indicate that either the information is not being disseminated in a way that is clear and relatable to veterinary professionals or that there is a lack of veterinary specific information and training available to practitioners. By ensuring there is continuity to both the training delivered and, in the information given to the professionals the full benefit of QI can be achieved in veterinary practice.

3.4.4 The barriers to successful implementation of QI in veterinary practice

The barriers identified in relation to the uptake of QI methods correspond with results from studies examining barriers to uptake of QI in human healthcare (Herman, Weiss and Thomson, 2020; Ye *et al.*, 2020; Thor *et al.*, 2007). Ye *et al.* (2020) identified two categories and ten key of barriers to implementation of QI in human healthcare

- Practice-related barriers:
    - Lack of time and staff
    - Lack of buy-in / engagement
    - Staff turnover
    - Electronic health record related issues
    - Workflow issues
    - Other
- Implementation-related barriers
    - Technical issues
    - Lack of guidance
    - Lack of reimbursement
    - Lack of language diversity of intervention materials

Utilising this information would be beneficial for QI implementation in veterinary practice going forwards, as this study suggests that human and veterinary healthcare share many of the same stresses and strains that could pose a barrier to successful uptake of QI methods by mainstream practice. The human sector readily accepts and has taken steps to address these barriers, and the results from these studies have many aspects that are translatable to veterinary practice.

3.4.4.1 Practice related barriers

Both human healthcare and veterinary healthcare are fast paced industries and because of this time is a premium for those that work in these sectors. Lack of time to undertake QI activities was the most commonly reported perceived barrier to QI implementation when all job roles were combined. Analysing the opinions of the various job roles represented in the data showed that all clinical directors/practice owners recognised this barrier and whilst no other group reached this unanimous opinion, every group noted "lack of time to undertake QI" with over 50% agreement in each group. This means that over half of every single demographic group recognised time as a significant barrier to implementation of QI no matter what their individual job was within the practice. This agreement was not seen for any other barrier in this questionnaire. As time critical, high stress industries, both veterinary and human healthcare have a high incidence of burnout[6] from people working in those sectors. When examining factors that lead to burnout and poor mental health within veterinary professionals, implications of a high workload, full daily schedules of work and ever-increasing administration tasks taking time away from clinical care all feature as highly prominent factors (Andela, 2020; Lloyd and Campion, 2017; Gardner and Hini, 2011). It is likely that professionals from a variety of job roles could view the structured introduction of QI methods as another "box ticking exercise" that will take up even more time in their busy work schedules. Whilst it is vital that this barrier is recognised along with those it links to (high staff turnover and work-flow issues), research shows that although in the beginning QI projects can be time consuming, the potential benefits of completing quality analysis include decreasing irrelevant work tasks, reducing complication rates and increasing productivity actually moderates staff workload and means that their time is spent completing relevant, effective and beneficial tasks (Stausmire and Ulrich, 2015; Alexander and Hearld, 2011; James, 2002).

3.4.4.2 Implementation-related barriers

Effective communication and common language have been linked in several studies to the successful implementation of QI initiatives in human healthcare (Cooper *et al.*, 2015; Reed *et al.*, 2014; Shamji *et al.*, 2014). Improving communication and language

[6] Burnout refers to as an 'unintentional end point of a career' for certain individuals who are exposed to chronic stress within their working environment. Burnout is not always permanent however if it is not managed, has been shown to have a negative effect on the mental and physical well-being of those it affects, disrupting not only their professional life but also their personal life (Maslach, Schaufeli and Leiter, 2003).

surrounding QI methods could help to resolve barriers, such as lack of language diversity of intervention materials, and subsequently lack of buy-in or engagement.

Once established, this clear and common language needs to be effectively disseminated and distributed to all stakeholders participating in QI activities. This is done through effective training; the Healthcare Quality Improvement Partnership (HQIP) is an independent organisation solely dedicated to the education and development of quality improvement within the NHS. The HQIP has produced learning resources and documentation that identifies twelve key QI methods best suited to healthcare settings. This has been instrumental in helping establish common QI language to within the NHS (HQIP, 2015, 2020). As it currently stands, there is no universally accepted collection of definitions existing that describe the QI terms specifically relating to veterinary practice. Producing this terminology and assimilating it into one place would make training accessible, as well as creating a forum where knowledge could be shared among professionals. Clarity is also still needed around the QI methods that will be the most valuable to help veterinary professionals monitor the delivery of quality of care and support constant improvements and innovations within veterinary medicine. Technical issues and lack of reimbursement for participation are barriers noted within human healthcare literature (Ye et al., 2020; Szymczak, 2018; Zoutman and Ford, 2017a).

Although all participants raised concerns over communication and understanding of QI activities, ‘lack of support and guidance from superiors and colleagues’ and ‘lack of resources’ feature most prominently among staff that deal regularly with electronic record keeping such as administrators and receptionists. Contrastingly, those working in a more practical / clinical role (RVN and veterinary surgeons) regarded both “lack of understanding” and “fear of reprimand for mistakes” as leading barriers to uptake. This differentiation between barriers to clinical employee’s use of QI and non-clinical employee’s use of QI is possibly not unique to veterinary practice, although there are limited human studies examining barriers with this specific demographic breakdown.

No matter what the barrier, successful application of QI in any healthcare setting, human or veterinary, is a science. Literature relating to the implementation of QI in human healthcare shows that the successful projects require sound evidence and consensus among the leaders of a project as the effectiveness and goals of the specific QI method being engaged (Speculand, 2012; Pronovost, 2011; Pronovost, Berenholtz and Needham, 2008; Grol, n.d.). By tackling each barrier noted carefully and with consideration for the difference attributed to each demographic professional group, veterinary practice could

benefit highly from the organised and systematic use of QI to measure and improve quality of care and subsequently the welfare of the animals (Coles *et al.*, 2020; Greenspan *et al.*, 2020).

3.4.5 Future work

It is undoubtable that the uptake of these methods is nowhere near as established in veterinary practice as it is in the NHS, where there has been sustained commitment by successive governments over a period of 40+ years to integrate QI methods into everyday healthcare practices (Rooke *et al.*, 2021b). The rationale for measuring quality and the improvement of quality in healthcare is simple and universal: good practice and in turn good performance when measured and reported, encourages similar behaviours within the industry (Hughes *et al.*, 2018). With time and support from relevant governing bodies, the veterinary sector could look to achieve similar widespread adoption of QI as in the NHS where QI has been part of governance, education, and legislation for over two decades (Leatherman *et al.*, 2016; Kaplan *et al.*, 2010, 2012; Baily *et al.*, 2006). It is difficult to fully assess from a survey the nuances and individual situations of every participant and workplace. The results from this study do show an inconsistency between how confident different professionals groups feel in their ability to identify and use QI methods. A more qualitative method such as interviews or focus groups could help to further address the differences noted and go towards quantifying and exploring some of the results of this survey on a more detailed level not possible with this methodology.

3.5 Conclusion

Although the veterinary industry has been taking steps to implement QI into practice there is still more to be done. There is still a knowledge gap among professionals, with few feeling confident of their knowledge or how to effectively use these methods. Although it is difficult to fully address how extensive or far reaching this disparity in knowledge may be, the results from this survey certainly show differences between professional groups and their basic baseline knowledge of these methods. Respondents stated they would be receptive to training and QI in their practices, but very few had, at the time of the survey, received specific training in these methods. Those that had were primarily engaged in a clinical job role, giving the impression of an inequality in training and information opportunities to all working in practice. Anecdotal evidence shows that terminology is causing confusion among professionals with some practices using specific QI methods that are not being recognised or termed as QI. All job roles will play a key role in taking

these methods into mainstream veterinary culture and the individual needs and stressors of each job role needs to be considered for barriers to QI to be successfully addressed. There is willingness among the profession to engage these methods in everyday practice; however, barriers need addressing for this goal to come to fruition.

Chapter 4

The perceptions of quality veterinary care (QVC) and QI from different professionals within a UK equine referral hospital.

Abstract:

Background: Quality improvement (QI) is a series of methods used commonly within several industries including human healthcare, aviation, and education, to assure quality of product/ service as well as track and control work systems. Little work has previously been carried out in the veterinary industry to examine the perceptions of either quality care or QI within staff groups in a veterinary practice. The aims of this study were to explore the perceptions of quality care and QI, and gauge current use of QI from the perspective of different veterinary practice staff groups.

Methods: A series of focus groups was conducted at a busy equine referral hospital based in the south-west of England. Five audio-recorded focus groups (with ambulatory vets, hospital clinicians, receptionists/client care team, administration, and veterinary nurse groups) were conducted following a scripted outline of topics. The data sets gathered were transcribed and analysed using thematic analysis (NVivo).

Results: There were a total of eighteen participants across the focus groups, with a duration of three hours and thirty minutes. Thematic analysis identified twenty-eight themes and five over-arching global themes. The five global themes were: quality veterinary care (QVC), communication, the future implementation of QI in veterinary practice, barriers to QI, and impact of practice infrastructure on QI. There was one important theme identified, that did not fit into the five global themes: "the well-being of veterinary professionals".

Conclusion: This study identified some of the key challenges and impact of QI in veterinary practice. Identifying the similarities or differences between the different professional groups will help focus on the unique qualities and challenges presented by implementing QI in veterinary practice. Documenting these challenges enables targeted QI specific to veterinary practice and addresses how QI is best implemented in an equine veterinary setting. Veterinary professionals are open to developing and using QI methods in practice however more information, guidance and direction is needed for this to be successful.

4.1 Introduction:

The primary aim for any healthcare system, be it for humans or animals, is to provide a patient centred, high quality service. Providing the highest quality veterinary care (QVC) often requires a balancing act. The client or owner's financial capacity as well as their wishes and emotions must be considered, whilst also meeting the animal's clinical and welfare needs. Quality care is a term frequently used in both the human and veterinary healthcare literature, but often has little explanation or definition attached to it. The Institute of Medicine (IOM) defines quality in relation to healthcare as the *"degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge."*(Atkinson *et al.*, 2010; Hughes, 2008). Whilst this definition is commonly used in the literature and transferable to veterinary care, it does not consider the diverging conceptions of quality that may present for different stakeholders within the healthcare system, or individual conceptions of a "successful outcome through treatment" from both care givers and receivers (Kötter *et al.*, 2013; Campbell, Shield and Rogers, 2004). For instance, patients may wish for different health outcomes than doctors, health care managers, or politicians; this distinction and difference in opinion have important implications for the measurement of quality in any healthcare setting (Durieux *et al.*, 2004). Although there are many similarities between veterinary care and human healthcare, there are also important differences. Providing and monitoring QVC is complex since the receiver of care (the animal) is not able to articulate their experience. Instead, a third party (often the owner) employs the service and pays the bill without personally receiving clinical care in a competitive commercial market (Oxtoby *et al.*, 2015). Veterinarian: client interaction is recognised as key to providing quality veterinary care, as is maintaining client satisfaction even though the client is not the receiver of care (Moreau, 2004, 2005, 2006, 2007; Kurtz, 2006a; Ward Jr., 2004).

The question of how to measure and improve the quality of care delivered in a healthcare setting is also a complex one. The human health service in the UK has been applying QI methods informally in the form of outcome management and measurement since 1918 (Mueller, 2019; Chun and Chao Bafford, 2014; Codman, 1917). When successfully employed, QI methods can assist to bridge the gap between practice and research, as demonstrated by evaluation of a number of initiatives used by the National Health Service (NHS) (Care Quality Commisson, 2018; Baily *et al.*, 2006; Shojania and Grimshaw,

2005). Interest in developing quality improvement (QI) systems specifically tailored to the veterinary industry has increased in the last three years and is backed by the Royal College of Veterinary Surgeons (R.C.V.S. Knowledge, 2017). Uptake of 'QI' however has been slow and sporadic in the veterinary sector. There is anecdotal evidence that many clinics and individual professionals do carry out their own version of QI (Rooke *et al.*, 2019, 2021b), but the use of these methods is mostly unrecorded or not shared, even if improvements are seen.

The UK wide questionnaire completed prior to this study showed that there was inequality in the level of knowledge and education offered to people working in different job roles within the veterinary sector (Chapter 3). This study conducted in-depth focus groups at a veterinary practice in order to better identify the specific capacities and deficiencies of different groups of workers within a veterinary practice, as well as gauge current use of the QI methodology within different departments

Aims:

- To ascertain the expectations and meanings of QVC and QI, and how these are currently employed within an equine hospital setting.

Objectives:

- To assemble different groups of professionals to discuss their experiences of QI in their job role in a focus group setting.
- To analyse and examine the specific barriers relating to QI implementation in equine veterinary practice.
- To investigate whether the barriers to QI implementation vary across different job roles in equine veterinary practice.
- To gauge interest from the professional groups within a practice in partaking QI activities within their job role.

4.2 Materials and Methods

4.2.1 Study design

A series of focus groups were conducted at a multi-disciplinary equine practice consisting of both ambulatory units and a tertiary referral hospital in England. Five audio-recorded focus groups of veterinary professionals were conducted over the course of three days (25^{th} – 27^{th} June 2019).

The focus group facilitator had ten years' experience owning horses, two degrees specific to equine science and research and had worked for four years in equine practice and two different equine hospitals, both as a laboratory assistant and a specialist surgical technician. A strong background in QI theory and use facilitated purposeful direction of the discussions, whilst also understanding the intricacies of a busy equine hospital and the culture that goes with it.

4.2.2 Topic Guide:

A semi-structured interview topic guide consisting of three sections was created following a review of the available literature (Appendix C). Each section covered eight different key subjects that reflected the study aim (Table 10) and was created informed by previous research findings and utilising similar studies conducted in the human healthcare sector. This topic guide was used to moderate the focus group discussions and aid the deliberative discussion approach [7] of data collection. The suggested questions for the facilitator to lead with were specifically designed to be open ended and non-leading to encourage participants the maximum freedom to control the course of the discussion.

Table 9 - A table showing the three sections and eight subjects covered in each focus group from a qualitative study of the understanding and use of QI methods by veterinary professional teams from a UK equine referral hospital. A full example of the topic guide used in the focus groups can be found in the appendices

Topic Headings
Key concepts to be discussed:
• Quality veterinary care (QVC) • Quality improvement (QI)
In-Depth:
• Responsibility for QI and QVC • Education regarding QI • Access to QI training and resources • Current use and individual involvement in QI in practice
Closing Questions:
• Future use of QI in veterinary practice • Barriers to QI implementation in veterinary practice

[7] Deliberative discussion is the process of informing and discussing the topic of interest with focus groups participants to ensure that all participants are voluntarily engaged and able to present a full opinion on the topic in question (Rothwell, Anderson and Botkin, 2015).

Prior to beginning data collection, the topic guide was reviewed by members of the Centre for Evidence-based Veterinary Medicine (CEVM) of the School of Veterinary Medicine and Science at The University of Nottingham. Alterations were made after this process to make the guide less prescriptive and avoid controlling the discussion too closely. A pilot focus group (n=4 participants) was held with practicing vets at The University of Nottingham to test the functionality of the topic guide, gauge any prompts that may be needed, and to ensure estimation of running time was correct.

4.2.3 Participants:

All participants were invited to attend the focus group from a practice wide email sent to all staff in the job groups requiring analysis. Participation was entirely voluntary; all participants were told that a minimum of three participants were required per focus group session and where possible the groups were scheduled to fit with work rotas to allow maximum participation. Participants were emailed an information sheet giving a basic outline to the topic and purpose of the study, and a consent form (Appendix D). Along with the written consent given by all participants, every participant was required to verbally give their consent at the beginning of the recording at the start of the session. Each group was assembled according to their job role at the practice and did not include any senior management figures. The five professional groups represented were: ambulatory veterinarians, registered veterinary nurses (RVN), receptionists / client care team, administrators, and hospital veterinary clinicians. It was optional for participants to give their job title and specific responsibilities either verbally or on the consent/information form. Many chose to do so however this information was later redacted to protect identity of participants.

4.2.4 Data collection

The focus groups were digitally recorded on two identical Dictaphones placed at opposite ends of the table to record all aspects of conversation and all participants. One hour was allocated for each focus group based on findings from the pilot study.

4.2.5 Data analysis method

The data were analysed using a framework analysis approach as described by Braun and Clarke (Braun and Clarke, 2006). The raw audio data collected were transcribed verbatim from audio files (.mp3) into a word document by the author. Familiarisation with the data set was achieved by typing the recorded information and by reading the transcripts in their

entirety several times and pairing these with the observational notes taken during the focus group. The aim was to immerse in the details and get a sense of the audio results as a whole before breaking the transcriptions into sections to be further analysed.

The next stage identified a thematic framework by handwriting memos in the margin of the transcripts in the form of short phrases, ideas or concepts arising from the texts and field notes. This initiated the development of formative ideas into what would be later categorised as ‘codes’.

The third stage comprised of indexing and coding the data in more detail, common words and ideas were attached to pieces of text within the transcription. The dialogue transcripts were imported into the qualitative analysis software NVivo 12 (QSR International, Melbourne, Australia). Specific phrases and quotes within the transcripts were coded using the ‘node’ feature on the programme which produced a ‘master list’ of child codes (Appendix E) spanning all five transcripts. This process was repeated three times on every transcript until it was felt that all relevant information had been assigned a child code.

4.2.5.1 Double coding

Following this process, portions of transcript from all five focus groups were independently assessed by a multi-disciplinary coding team comprising of three researchers (Dr. John Burford, Prof. Sarah Freeman, and Dr. Marnie Brennan). Discussing the codes across the research team led to refinement of codes and preliminary ideas about themes as well as the opportunity to discuss coding disagreements resulting in a refined coding system (Berends and Johnston, 2009).

4.2.5.2 Further analysis

Following the double coding process and concluding discussion among the research team, the list of codes produced was ‘cleaned’. The master code list was checked for repeated codes, and codes that that contained similar data and covered related subjects within the data set were merged. Descriptions added to all final child codes and this process created a parent and child codes list with relations between the codes displayed. The parent codes that shared similar topics or subjects were grouped together and colour coded. Global themes were then created by combining themes together that covered aligned topics, the global themes best exhibit the key findings from this research.

4.3 Results

4.3.1 Participants

A total of eighteen veterinary professionals participated; five job roles were represented, and by chance there was wide variation between participants' individual skill sets, experiences in veterinary practice and length of service at the practice they currently worked at. It was important that within each job role group different subspecialties, levels of experience, training and qualification were represented (Table 11).

Table 10- Table listing the job roles represented within the five focus groups conducted. Column two details specific specialities and experience in practice of participants if stated on consent form.

Job Role	**Identifier (for transcription purposes) and specific job role held at practice/specialism.**
Registered veterinary nurse	• Nurse and pharmacy manager • Nurse and imaging specialist • Nurse • Nurse • Head Nurse
Hospital clinician	• Medicine specialist • Diagnostic imaging specialist • Equine surgical and dentistry specialist • Equine surgical specialist
Ambulatory vets	• Ambulatory assistant (qualified vet) • Clinical director for ambulatory vets • Ambulatory assistant (qualified vet)
Administrators	• Practice administrator specialising in health and safety and training • Marketing and event manager • Human resources, accounting, and complaints
Receptionists	• Head receptionist • Receptionist • Receptionist

4.3.2 Global Themes

The key findings of these focus groups were collated and categorised from 860 original 'child codes' (Figure 6).

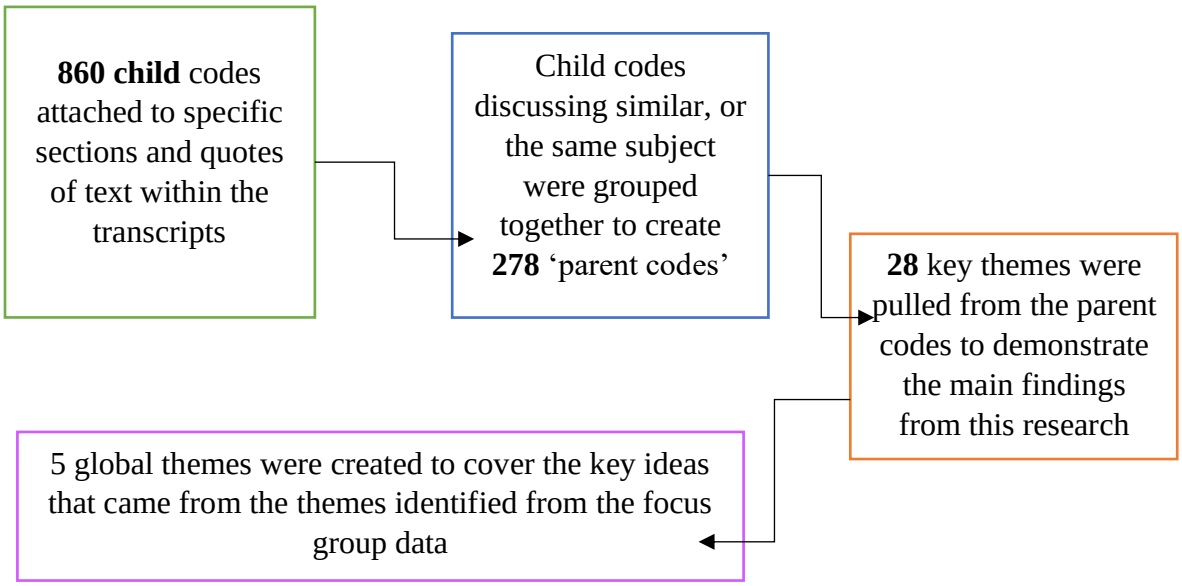

Figure 6 - Flow chart to demonstrate the process of creating the themes and global themes from the codes assigned to specific words and quotes from the transcripts of the focus groups.

These child codes can be summarised through the five global (Figure 7) and one stand-alone theme that could not be further consolidated into any of the global themes due to the unique area it covered and discussion points within it. The global themes that aligned with the key aims of this thesis are documented and analysed below, along with the participant quotes and key themes that encompass the global topic described. It was not uncommon for many different codes and themes to fall into multiple global themes. This was due primarily to the overlap that exists between the global themes and the organic nature of the discussions that occurred in the focus groups. The stand-alone theme is not covered in depth as although insightful it was not felt that it aligned well with the aims and objectives of this study or the wider thesis.

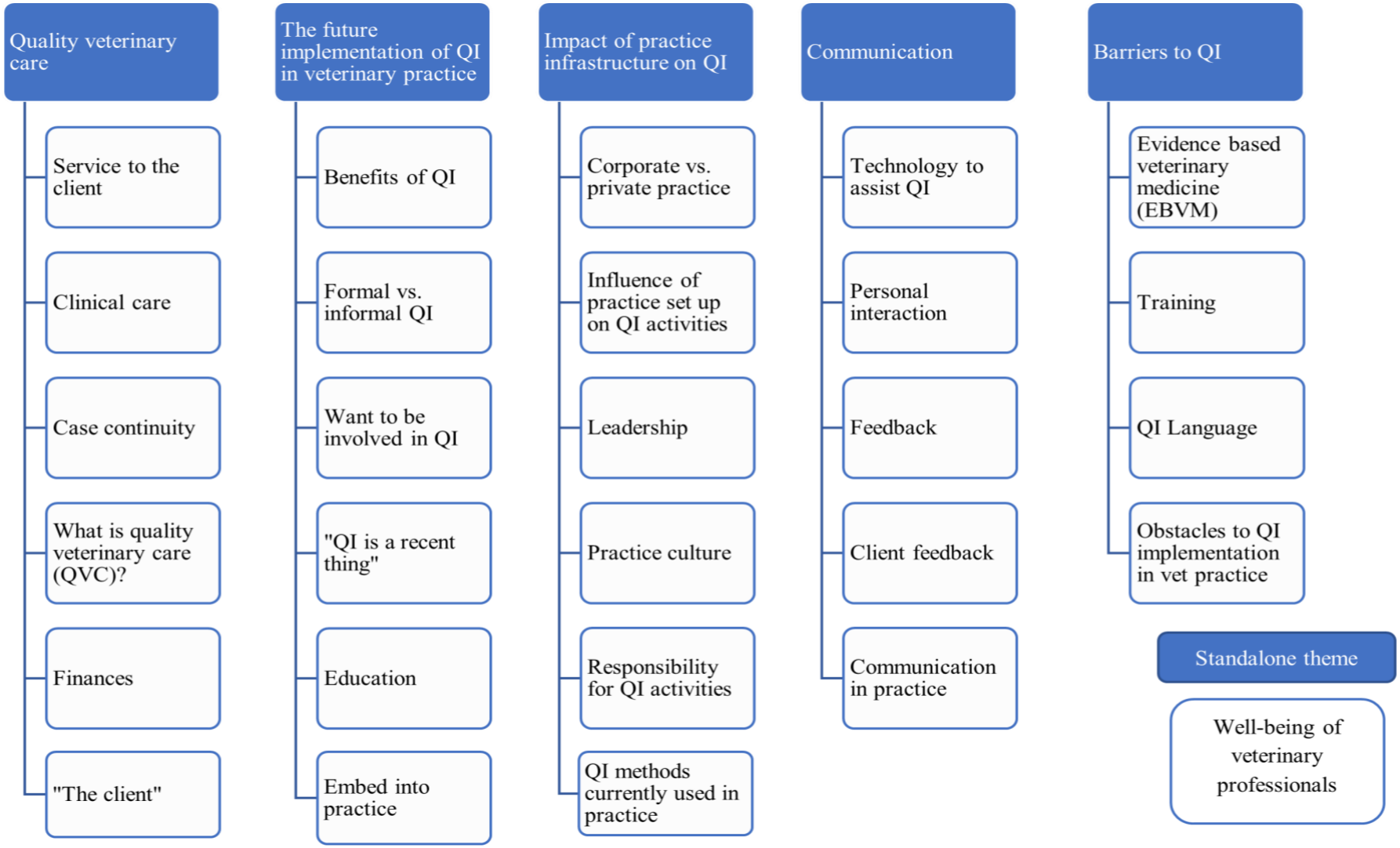

Figure 7 Diagram displaying the five global themes resulting from this research, and the twenty-seven corresponding key themes assigned to each global theme. One key theme was unable to be assigned to a global theme through the analysis and as such it is represented as a stand-alone theme – 'the well-being of veterinary professionals'

4.3.3 Quality veterinary care

4.3.3.1 What is quality veterinary care?

Particularly prominent in the findings of this study were the themes of quality veterinary care which agreed with the findings of Chapter 3 in the contrasts existing between the views and opinions of different veterinary professionals regarding QVC. Asking participants to explore and identify what QVC was formed the biggest part of the global theme 'quality veterinary care' (QVC). The key areas that formed this discussion were: giving a 'total package' of gold standard care, team responsibility for providing QVC and looking to improve and maintain high quality care.

Admin 1: *"For me its providing that gold standard of care, they want the best the horses, and they expect ** (redacted)** to deliver that"*

AV3: *"A good prompt service to the client, and good level of clinical care"*

When discussing what QVC meant to them, nearly all participants spoke about the need for constant improvement and monitoring of quality care; however, quality improvement methods were not mentioned or spoken about by name in any of the groups. Every group spoke about highest quality care being a comprehensive combination of a variety of factors, coming together to form a 'package' of gold standard care. This package of gold standard looked slightly different to each group and seemed to be heavily based on their job role within the practice and the nature of their interaction with the clients.

4.3.3.2 Service to the client and "the client"

There was a clear distinction in the group discussions between client care and patient care. that is clinical care provided to the animal on behalf of the owner and care provided to the client to enhance their experience at the veterinary practice.

Admin 3: *"It is definitely about making them (the clients) feel nurtured and cared for, as much as it's about caring for their horse"*

RVN1: *"Well it's giving our patients the best standard of care that we can, isn't it?"*

Service to the client and "the client" were identified and discussed in depth within the administrators and receptionists' groups (non-clinical veterinary professionals). They were clearly able to identify the relationship association between contented clients and

good business/making money and could pinpoint clearly how their action could help lead to a happy client.

Rec. 2 *"Ensuring the client goes away having had the best client experience that they possibly could have had from our practice"*

The participants who held a more clinically focussed job role (veterinarians and nurses) also discussed the impact of 'the client' on the quality of care and service they provide, however, this view of the client tended to be more internally focussed, many people in these groups identified the fact that clients can, on occasion, limit and restrain the professional's ability to perform the best job they can.

HC1 *"Looking after an animal to the best of your facilities, abilities and sadly, client finances"*

These themes also covered the delicate balancing act of client and vet communication, exploring the importance of making the client feel valued and that their horse is 'number 1' and keeping to the constraints sometimes placed on clinical staff by the clients themselves.

AV2: *"Quality veterinary care to me is the best clinical care you can provide given the financial constraints of client and the client you are dealing with. I mean obviously degrees of care do depend on the client's financial situation. You do the best you can with the money you've got and what the client will allow you to do."*

Non-clinical staff were very open about the 'starring role' veterinarians play in the minds of clients, but how time constraints of the job placed upon the vets can hamper efforts to make all clients feel valued and important. Receptionists and administrators reported that these restrictions can make it impossible for vets to achieve the level of service that clients desire, without additional support of others within the practice.

Admin 1: *"It has to be the vet that does it, the clients want interaction with vets directly either over the phone or in person, we just assist to facilitate that because the vets don't have time."*

The emphasis of team effort to provide high-quality veterinary care and service to the client came through very strongly within those groups that work in client facing roles such as administrators, receptionist, and nurses. All of these groups clearly vocalised the view that veterinarians were often portrayed as the face and voice of the practice, however that they could not perform the task of client care alone, that they required a dedicated team behind them to be able to provide excellent quality care.

4.3.3.3 Finances

Finances had a dual role in participant's ideas around QVC. Both the financial constraints of the animal's owner/keeper/bill payer and the financial expectations from management were raised regarding QVC. These financial constraints included the expectation of management for vets to make a certain amount of money for the practice, but particularly for the nurses this subject was also discussed in terms of staffing and the inequality of staffing levels within the practice.

Admin3: *"… and they (management) can't get their heads round that it's not about not wanting to collect money (from clients) but that what they were asking us to do was a very difficult thing that was going to meet a lot of resistance and bad feeling from a lot of people that it affects"*

RVN1: *"They (management) like to make sure the vets are going to make their money, before they commit to giving us more nursing staff"*

RVN4: *"It's like obviously everything has to be financially driven, but really it should be patient driven too. It's all about finding that balance between the two."*

4.3.4 The future implementation of QI in veterinary practice

Few participants were able to give a clear answer when asked to describe what QI is or give examples of how they use it, even when provided with a brief description and definition of what it is.

Rec3: "*Well currently we are having staffing issues but that probably has nothing to do with what you're trying to look at. *laughs**"

AV2: "*I'm going to guess and say evidenced based medicine? *questioning* If that helps, is that good start??"*

RVN3: *"I guess like admitting that, yeah, like nothing is ever perfect. *looks around group for affirmation*"*

Every group however was able to have productive discussions around how QI could be effectively implemented into veterinary medicine and what the potential impact could be, including examples of QI currently being utilised at the practice in question. The reflective nature of QI was discussed frequently along with the need for proactive change and monitoring.

RVN1: *"It would be good to have those discussions proactively though because at the moment it feels like nothing gets changed until something has gone wrong."*

HC3: *"I mean in my opinion it (QI) should be embedded in all practices and practice standards schemes and professional development things."*

Admin 3: *"I think QI could definitely help this industry become more reflective, I know we *indicates group present* are guilty of becoming too relaxed about it and waiting for problems or complaints to happen before we do anything."*

Another stakeholder group which was highlighted by the nurses was client involvement in QI and the huge benefits gained by the practices. This multi-stakeholder involvement would ensure that all experiences and perspectives of the care process were represented, and it was felt that currently this did not happen regularly.

RVN1: *"The clients would need to have an input really, wouldn't they? Like to get that outside perspective. Just SOME client's input you know, would be beneficial but like we never even ask, you just need that sort of outside perspective to bring in some fresh ideas."*

4.3.4.1 Benefits of QI

Both hospital clinicians, ambulatory vets, and nurses (clinical groups) felt that a key benefit to QI was the empowerment of all staff to influence and implement changes within the practice. Whilst it is encouraging that several groups taking part could identify that some staff lacked the ability to feel empowered within their work. Few staff could recognise the conditions within their practice that led to the feelings of powerlessness among certain groups.

AV1: *"It could provide kind of like a security blanket to both staff and management, knowing that the evaluation is there in a positive way."*

HC3: *"Using the information from QI to inform changes in practice to get better results for everyone, but in a blame-free way."*

RVN4: *"I wouldn't have any idea whether the reception staff have any access to any CPD or anything though, I doubt they would even want it. *laughs*"*

4.3.4.2 QI currently used in practice and formal *versus* informal QI

Whilst discussing the current and future implementation of QI methods into veterinary practice it was important to identify any methods currently being used and differentiate between formal QI and informal QI. Whilst not every member of staff in the groups examined by this study was directly involved with the QI methods used in the practice, they were all aware that audit happened and had at some point read the results of an internal audit. Both clinical audit and Morbidity and Mortality (M&M) rounds were agreed by contributors to be examples of formal and organised QI method used in their practice.

The results showed that even in groups regularly participating in clinical audit and using clinical audit data (vets and vet nurses), there was still disparity and confusion over exactly how to best carry out an audit and what to do with data once they had been collected. It also became clear that not every member of the veterinary team was actively invited or able to participate in these activities. The topics covered particularly in the M&M meetings were predominantly applicable to the hospital-based clinicians rather than the ambulatory practitioners and nurses out on the road.

AV2: *"We do keep saying we need more ambulatory ones (cases) included in M&M rounds."*

HS2: *"I had a meeting the other day with some of the nurses and they didn't even know we did M&M rounds."*

4.3.4.3 Embedding QI into practice, "Want to be involved in QI" and Education of QI

The three key themes of embedding QI into practice, education of QI and "want to be involved in QI" all closely interconnected with each other in the discussions from participants. When sharing ideas of how best QI could be embedded in veterinary practice, a strong theme was the combination of encouragement and enforcement of the use of these

methods. Participants admitted that without a little of both, it would be hard to change the ways of working that had been established in some veterinary practices for a very long time. The idea of changing this long-standing culture to fully embrace QI methods came through in all of the groups. No one mentioned it would be impossible to implement change on a large scale to practices, but that it was important to take note of the scale of change to culture and practices that implementation would require.

AV2: *"If you want to improve veterinary care across the whole UK rather than on a practice-by-practice basis you need a carrot and a stick – a big stick."*

Admin3: *"To make a change like that it would have to be a very slow shift in culture, it's not the sort of thing you can just, "Bam", implement one day and expect compliance."*

Many people, particularly in the hospital clinician and ambulatory vet groups, felt that the best way to implement changes and make QI methods more 'mainstream' in veterinary practice was to make them a mandated part of both education for newly qualified vets and nurses and the Practice Standards Scheme. Whilst limited veterinary specific resources for QI methods currently exist, those that do are produced almost exclusively by RCVS Knowledge (RCVS Knowledge, 2020e, 2020a, 2020d) however, no participants referenced these resources by name or could definitively answer where they would go to look for further guidance or information on QI methods. This shows that even those aware of QI methods in veterinary practice are not familiar with how to advance their knowledge or where to go for support.

HS4 *"If you look at how it's being done in the medical profession (QI), it's part of peoples training, so if you're becoming a nurse or a doctor or a care assistant you level up your QI knowledge and training as you go up. The level you're at dictate your QI involvement, it's an intrinsic part of everyone's training."*

No participants had received specific training on QI. Those that regularly used the QI methods currently utilised by their practice (M&M rounds and clinical audit) were confident to discuss their personal experiences; however, no-one explicitly identified that they had received specific training even in these methods. Again, there was an admitted disparity between the different groups and the continued professional development (CPD) training available to them or that they felt they were allowed to take.

RVN 1: *"To be honest I've never not had a CPD approved. I've always been able to go but I wouldn't say we are exactly actively encouraged to do it."*

Admin 3: "*It's become very vet heavy, and vet focussed now. Obviously, the vets are very important because without them we wouldn't have a service, but all the CPD, all the Moodle stuff, 90% is all for vets and the only admin stuff is based around the negative stuff like collecting debt."*

Rec 1: *"It would probably benefit all of us to do some of the training on the CPD database from our corporation, but the allowance just isn't there for us to even look into it."*

4.3.5 Communication

Both vet: client communication and inter-professional communication were recognised as being a hugely important aspect of veterinary practice. Within client communication participants discussed the changing landscape of client and colleague communication due to technological advances. Technology to assist QI, personal interaction, feedback, and client feedback also appeared in this global theme.

RVN 2: *"To be honest it can be quite a double-edged sword because people think it's more personal than it is and then expect something from social media that we can't give them. We get messages all the time, like people will message on the weekend or late at night. There's a picture sent to you with, "Oh do you think this is normal?"*

Admin 2: *"So yeah, there isn't any substitute for that face-on-face contact. Social media has its place but it's not to replace face-to face interaction."*

Inter and intra-professional communication, including between different service areas e.g. hospital and ambulatory veterinarians, was strongly highlighted within the groups. All discussed the idea of peer review from within the practice and the sense of comradery that came from being able to share ideas and experiences with those that work within the same field as them.

AV3: *"If you don't get on with your peers you won't get any peer review: QI in ambulatory practice, if you don't get on with your colleagues it 'aint gunna work'."*

Some participants felt that communication between different professional groups was somewhat lacking and noted how this could negatively impact attempts to integrate QI into their particular practice and ultimately the client experience.

AV3: *"It's a communication thing, isn't it? Like it's so much easier to communicate with other people that you like and trust than with people who you feel might end up undermining you."*

Admin 3: *"I've produced these year-end summaries of what the majority of our complaints have been, and communication always seems to come out as the highest thing."*

4.3.6 Impact of practice infrastructure on QI

4.3.6.1 Practice culture, impact of practice set up on QI activities in corporate practices.

The theme of practice culture generally centred around ways that the participants viewed their particular practice as "dysfunctional". The professionals in the study identified long-standing and established aspects of veterinary medicine practice could pose a barrier to effective implementation of QI in veterinary medicine.

RVN1: *"That's the big thing in equine, isn't it? We've done it one way for so long we don't like change."*

HS1: *"I think often you think you have a system or process in place and actually it's not working but change is big and it's scary."*

There were identifiable, logistical issues existing within the practice that negatively impacted the organisation and therefore the implementation of the QI currently used in practice.

HC3: *"There are some intrinsic inefficiencies within the system that make collecting the data, recording it, analysing it really, really slow and cumbersome."*

Admin 1: *"I think to be fair if you gave the qualified nurses the information, they could do it and you know, there's all this talk about up-skilling your nurses but then it's whether they would see it as up-skilling opportunity or as a burden to add to their workload. I guess it depends on the individual, essentially the vets just don't have time."*

Practice culture was identified as a potential positive influence on QI. This included how the ethos of good and open communication both within smaller factions of staff (e.g., the ambulatory vets), and within the practice as a whole, can encourage a no-blame and learning culture that would nurture and encourage improvement and innovation.

AV1: *"We have quite an open and non-judgemental practice and I think we try quite hard to maintain that."*

There were important differences noted when participants made comparisons between their individual situations at the practice and other members of staff. For example, it was highlighted that often there is a lack of appreciation for others who work in a different job role, and that some members of staff felt excluded from certain activities, either because they were not being made applicable to their job role (ambulatory vets at M&M rounds) or they simply were not thought of at all (nurses at M&M rounds). This theme around practice culture highlighted where teamwork could be fragmented and divided in practice, and that more work is needed to adjust practice culture than just educating staff on the benefits and uses of QI.

Admin3: *"We ask receptionists to do so much and yet the other clinical staff just don't get it, they view it as they just sit there and answer the phones, they don't see the hundreds of questions they get and the knowledge they need."*

4.3.7 Barriers to QI

Barriers to QI was a recurring theme across all the focus groups; however, many participants struggled to explicitly identify the points and comments they were making as barriers to QI methods. This interpretation of participant's comments was made by the researcher when analysing the data. A majority of the barriers to QI noted by participants related to communication difficulties directly related to the practice structure and hierarchy.

4.3.7.1 EBVM, training and QI language

Evidenced based veterinary medicine (EBVM) was recognised by those participants in a clinical role as hugely important to providing and monitoring quality care. There were however limitations to EBVM and training that currently existed both in this practice and were identified in the veterinary sector as a whole.

AV2: "*I think the point about the available information is right up there with needs to be addressed first as there just isn't the published literature available to us (ambulatory vets) like there is to surgeons or hospital clinicians in certain disciplines, you know?"*

It was generally agreed by all groups that not every team member had equal access to training, education, and resources.

Admin 3: *"I don't think enough time or resources are given currently to you 'shop floor/window staff' like the receptionists."*

Lack of specific training and inconsistencies in training that were provided for certain groups led to discrepancies in practice and also common language deficiencies between groups.

Admin 1: *"If you take clinical audit or whatever we call it, clinical governance? Anyway, whatever it is, if you take that and term it as something else then it all gets lost in the jargon and no one understands it."*

HC2: "*If we're talking about standardising terminology and if we're saying that a lot of places are doing this just under a different name, it's a lot more motivational to say, 'Look, you are doing this, we just need to tweak a few things to bring it all in a line with each other', than saying, 'You need to start doing this'."*

4.4 Discussion

There were many noted similarities and comparisons to be made between the five identified global themes that came out of this research. Numerous codes and child codes were presented into more than one theme, and this integration of codes into different themes shows the complex nature of the question being asked. The five global themes identified best represent the key findings of this work and the categorisation of the codes has allowed for a majority of opinions and philosophies to be represented in the results of this study. Quality veterinary care and communication represent a contemporary view of the challenges veterinary practices are experiencing and processes involved in implementing QI methods. Contrastingly, the impact of practice infrastructure, barriers to QI and "how can QI in veterinary practice happen?" all focus on the future implementation of these methods and how the industry may need to change to successfully adopt these methods.

4.4.1 Methodology

Focus group discussions are a qualitative research method suitable for exploring the beliefs, behaviours, or attitudes of individuals (Rabiee, 2004). This method is especially useful for understudied topics and for explorative research questions. Focus groups provide a unique and effective modality for capturing in-depth data about a topic of interest determined by the researcher (Morgan, 1996); however, the ability to capture quality data from the participants is also dependent on how knowledgeable the participants are on the topic of the discussion (Kitzinger, 1995).

A single hospital environment was chosen for the research because all demographic groups could be accessed, and there would be some continuity between participants experiences within the practice so responses could be compared to each other. A deliberative discussion method was used to plan and gather data from the professionals working at the practice. Deliberative discussion is a conceptual framework for how discussions should be structured to gather higher quality data based on four premises (Fishkin and Luskin, 2005):

1. Participants should be informed of the subjects in order to make accurate statements.
2. Any information presented to participant groups should be comprehensive, balanced and incorporate both the pros and cons of the topic of interest.
3. The discussion must include individuals who are voluntarily engaged in the discussion,
4. Any statements made should be evaluated on their merit and not the person talking.

When structured using these fundamental principles, focus groups are particularly effective at engaging discussion from people who may feel that they have 'nothing to say' as the discussion generated from other participants encourages their own involvement (Kitzinger, 1995). It was hoped that traditionally difficult to reach groups such as receptionists and administrators would benefit from this process. Every group was given a short information document prior to data collection. This was done to ensure that as far as possible every participant began the study with a similar base level of knowledge on the subject. This was to further encourage full participation in discussions by all that took part.

Thematic framework analysis is a data analytical process which involves several distinct, though highly interconnected stages. The six key stages are: familiarization with data;

identifying an applicable thematic framework; indexing data; charting data; mapping data; interpretation of results. The other distinctive aspect of framework analysis is that it uses a thematic approach by identifying patterns from the transcript data, consequently allowing themes to develop from the narratives of research participants as well as the research questions. For this reason, it was the appropriate method to use for this study, allowing the flexibility to be guided by the data collected as well as the research questions in the topic guide (Ritchie and Spencer, 1994).

4.4.1.1 Limitations

Although focus groups are a recognised qualitative research method there are also several limitations associated with using this method of data collection. One potential issue can be the very group dynamic being analysed; some participants will always be more dominant over others and this effect can greatly influence the data collected. It is the job of the moderator to examine the group dynamic presented to them and guide the discussion in a way that enables all members of the group to contribute freely (Smithson, 2000) and to engage in open and frank discussions. To combat this, any members of the upper management system within the practice were specifically excluded from the groups. It has been shown that group environments can in fact help to facilitate discussion particularly on 'taboo' subjects, allowing participants to air feelings that may not be mainstream in their practice but common among their group (Hollander, 2004; Webb and Kevern, 2001). Due to the time constraints of the project it was not possible to evenly spread out the different focus groups and allow the facilitator ample time to complete and write up their field notes between each group. Ideally the researcher would allow 24 hours between each group to ensure that field notes are recorded with accuracy and minimal bias. It is possible that partiality could become a facilitator limitation if the groups are conducted too closely together. The facilitator was aware of this factor and as such took steps such as short break in between groups and quick write ups of field notes to ensure one group was fully finished before beginning another.

Another limitation of this methodology is the fact that it is difficult to include non-verbal cues into the transcriptions; the subtle interactions between both the participants and the moderator can give deeper insight into the comments made (Staaveren *et al.*, 2019; Moore, McKee and McLoughlin, 2015). To combat this, detailed notes were taken during the focus groups describing the interactions and body language shown by the participants. These notes were used by the key researcher when transcribing audio, especially in the

situation where a joke was being made or a participant was being sarcastic. The note provided the nuances that are not possible to attain from only audio. Critical reflexivity and acknowledgement of the limitations discussed here were incorporated into the analysis and write up of the data. All of these factors will affect the way in which questions to participants are phrased, the development of the group dynamic as each focus group progresses, and the interpretation of the results made by researchers.

4.4.2 QVC and communication

The global themes of QVC and communication both share a relationship both in the comments made by participants and the key findings made after analysis of results. Literature on defining QVC is scarce and, as identified by this study, definitions of the term QVC can be multifaceted and mean different things to different professionals. This global theme included participants identifying the different types of clients they dealt with, and how the service and treatments they provided would differ to meet the needs and expectations of the client and horse in front of them. It highlighted the wide variety of clients that are dealt with at a referral equine practice, and the many different concepts of QVC that exists from the clients dealt with. Repeated studies have shown that if a client feels their wishes, needs and opinions are valued by their veterinarian they are more likely to comply with directions or recommendations given to them (Hughes *et al.*, 2018; Grand *et al.*, 2013; Abood, 2007; Humble, 1994). This emphasises the extreme flexibility required from these professional groups to meet the varying needs and expectation of clients as well as fulfilling their own internal gauge of exactly what a 'good job' is; but also, the importance of effective communication between different groups of workers at the practice in order to deliver quality care. Interestingly, no group factored in the importance of animal welfare as an aspect of quality care. This appeared to be viewed as a separate or unspecified issue but perhaps could be due to a terminology difference between group facilitator and professional participants. To provide QVC to different clients and meet the welfare and clinical needs of the animal presented seems to be a delicate balancing act for professionals. This study has shown that whether the clients realise it or not this recognition and affirmation of their views and wishes for their pets does not come solely from the veterinarians or even from the clinical staff alone. The non-clinical staff were also aware of the client's needs and the clear role that plays in delivering QVC. The difference noted between the groups regarding the opposing aspects of QVC is important. Both represent equally important characteristics but neither the clinical nor non-clinical groups seemed to be aware of the aspects of QVC experienced by colleagues.

Interestingly, preventative medicine was highlighted by all as a vital component for providing a high-quality veterinary care package. This aspect of clinical care was strongly cited by the receptionists, who arguably have the least contact with actual animals but may have more of a role in assisting with the preventive care aspects than many people think through promotion and selling of animal healthcare plans. Belshaw *et al.* published a series of papers in 2018 examining this complex area of veterinary medicine (Belshaw *et al.*, 2018a, 2018c, 2018b). Historically, preventative medicine consultations in small animal practice lack standardisation, and client satisfaction with their experience of preventative veterinary medicine is dependent on a wide variety of factors (Belshaw, 2017). This unintended variation could be analysed and reduced by using QI methods, as has been done in human medicine to improve patient care pathways from general practice to hospital consultations(Singh and Prasher, 2017). The results from this study would suggest that unlike other papers examining only the veterinary surgeon performing the preventative medicine consult, receptionists or client care team members could also have a key role to play in this area. This is just one example of how practice infrastructure and communication between different job roles will play a huge role in the implementation of QI in veterinary practice. The importance of preventative medicine in veterinary medicine and client relations is not wholly new as detailed by Bard *et al.* 2017 (Bard et al., 2017). This paper theorised that the preventative health programmes run by many practices and corporations could be a gateway to improving client/practice communication. These schemes could be used as a means to stay in contact with clients and maintain their custom which back up the findings of Belshaw *et al.* and other papers examining this area of veterinary medicine (Belshaw *et al.*, 2018a, 2018c, 2018b; Fawcett, 2018; Belshaw, 2017; Lewis, 2017; McMurray and Boysen, 2017; Okpe and Kovach, 2017b; Benedict, 1967).

The proposed benefits that QI methods could bring included the opportunity for open discussion and evaluation of performance and care. Some team members spoke about how QI could provide them with a security blanket to reflect on their own work and an open forum for communicative discussion between different groups. This open and blame-free discussion was something that participants identified does not necessarily happen regularly now. This was not viewed as an issue isolated to the practice, they worked at but was regarded by some as a more widespread issue throughout the industry. This would imply that in the area of frank and open discussion and communication with colleagues and senior members of staff, the veterinary sector potentially has some work to do to

improve in this area. Cooper *et al.* (2015) highlighted the importance of effective communication between both practitioners looking to implement a QI method but also between all participants who the QI initiatives would affect (Cooper *et al.*, 2015). Without effective communication between teams QI initiates often failed to gain traction and sustain long-lasting changes. Implementation of any change in a complex team-oriented system such a veterinary medicine or human healthcare requires careful planning and successful execution relies on intimate knowledge of the area of change which can only come from speaking to those that know it best. These teams need to be interdisciplinary with each aspect of the area for improvement represented. There are numerous frameworks and methods available in published research in the human medical field that could assist veterinary professionals with making these changes and improving this area including: a mentor-based education strategy (Copley and Ingram C, 2020), a framework of structured training and implementation of methods (Wandersman, Chien and Katz, 2012) and creating health care quality teams to engage and oversee quality monitoring and improvement.

Without a fully incorporative picture of what QVC in veterinary practice is for all stake holders including the client themselves it will be hard to fully embrace and successfully use QI effectively. These findings reinforce the concept that to truly provide excellent quality veterinary care, every member of the practice needs to be involved and aware of what QVC entails and requires for each different job role. For this to happen it appears that not only will some practices need to significantly change their internal infrastructure and communication methods between professional groups, but also practices need to be able to identify and account for their clients' views of high-quality care and experience they have at the practice. When discussing what QVC meant to them, nearly all participants spoke about the need for constant improvement and monitoring of quality care; however, quality improvement methods were not mentioned or spoken about by name. When specific examples were given of improvements in quality care that participants would like to see, few participants seemed to be confident in their knowledge or ability to plan or make these changes.

Without being able to clearly identify what high-quality care is, how can a practice look to improve the quality of their care? By integrating all members of the veterinary team and their varied experiences and opinions into the discussion around quality care and how

to improve it, the clients and animals can receive a holistic all-around experience of high-quality veterinary care.

4.4.3 Future implementation of QI in veterinary practice, impact of practice infrastructure on QI and barriers to QI

Even in human healthcare where QI is far more established, it can be challenging to design a guaranteed effective QI intervention (Bosch *et al.*, 2007; Flottorp and Oxman, 2003). Most of the current research and theories in this area emphasize the importance of acknowledgement and insight into possible barriers to implementation for the development of effective interventions (Grol and Grimshaw, 2003). Ideally, any barrier analysis applicable to the project and scenario being implemented should be used to guide the selection of the QI intervention. To this author's knowledge, this is the first research conducted specifically analysing potential barriers that could prevent successful implementation of QI in veterinary practice. By analysing the process that development of QI methods has undergone in human healthcare, this appears to be a vital step in the development of QI in veterinary medicine.

An important point made was that QI methods need to become part of everyone's day, not an extra chore to be completed, or a tick box exercise to done and not really thought about. Professionals needed to understand the benefits that these methods can bring and use them efficiently and effectively to see those benefits. In an industry where time is already a premium for most people, the introduction of anything that will take up more needs to be carefully and thoughtfully considered. Research into the execution and uptake of QI in the NHS has shown that these methods are most successfully implemented with low–level changes made by individuals or a small group of actors in their specific area of work (Donnelly, 2017; Øvretveit, 2014). The NHS, like the veterinary care sector, is comprised of a series of complex multifaceted microsystems and mesosystems, with different goals, ethos, occupational groups, patients, and technologies used (Young and McClean, 2008; Portillo, 1998; Pollitt, 1996).

Whilst each focus group could identify factors such as lack of clarity, lack of engagement and lack of standardisation of QI activities as issues that existed either within their service or the practice few people had constructive ideas of how best these could be resolved. This could be due to a perceived lack of opportunity felt by the groups, with many feeling unable to suggest and innovate new ideas and changes to improve or monitor the quality

of care delivered. This lack of empowerment from staff is potentially one of the most prominent barriers to implementation of QI projects in veterinary medicine.

QI methods have been found in human hospital settings to increase the successful uptake of innovative thinking, techniques, or technologies (Grol and Grimshaw, 2003). The systematic approach of design, test, and implementation that QI delivers gives professionals a basis to examine data collected over time and drive improvements using evidence-based results. All of this allows staff involved in QI projects to experience autonomy for innovating meaningful change within their own team. Inevitably, a process like QI starts with testing small scale changes (Dixon-Woods *et al.*, 2011). To best address poor levels of empowerment and motivation towards improvement projects in human healthcare, it has been found to be beneficial to establish QI working groups within a trust or hospital setting, that can co-ordinate projects and give agency to participants to have their ideas heard (Fath *et al.*, 2020; Care Quality Commisson, 2018). This creates a small group of motivated individuals that, with management's support, can create real change to their work or care environment. Each success will lead to increased confidence and engagement in their ability to innovate real change (Worsley, Webb and Vaux, 2016; Zarkali *et al.*, 2016).

QI promotes an agreed approach and the use of protocols within care services, allowing all team members to input their role in the care process (Dean, 2018; Donnelly, 2017; Øvretveit, 2014). This process also helps to develop and build these protocols to be inclusive of all team member's individual experience and expertise, encouraging empowerment and helping staff to feel valued. Correct and precise planning, involving all members of the team conducting the QI intervention, is vital to successful implementation and sustained change or improvements within both healthcare and the veterinary industry (Brown *et al.*, 2019; Starr *et al.*, 2016; Headrick *et al.*, 2015; Armstrong *et al.*, 2012; Boonyasai *et al.*, 2007; Varkey, Reller and Resar, 2007).

For this reason, it is important to ensure that practitioners are aware of the importance of utilising Evidenced-based Veterinary Medicine (EBVM) in all QI projects and decision-making. This is a process that human healthcare also went through in the late 1990's. Research on the effectiveness of various QI strategies noted that, rather than using scientific evidence and the transfer of research findings, the approach to QI taken or QI project implemented was often selected to keep in line with prevailing and current ways

of working and habits of a department (Brook *et al.*, 2004; Walker *et al.*, 2003; Grol, 1997). This practice of not using evidenced-based decision-making tools was in-part blamed for the low 'success' rates seen of QI projects in the NHS and for so few projects achieving the sustained change they strived for (Morganti *et al.*, 2012). Since this time, emphasis has been placed on the collaboration between peer-reviewed research findings (evidenced based working) and local knowledge and customs. By encouraging this close collaboration between quality leaders and researchers' success rates have greatly increased in local QI projects as well as increase in staff members using QI activities to improve and streamline the transfer of research findings into practice (Cox and Sandberg, 2018; Wandersman, Chien and Katz, 2012; Wandersman *et al.*, 2008; Akl *et al.*, 2007). Veterinary practice has similar struggles implementing EBVM into every-day practice and would also benefit from going through this process of development, education, and utilisation of EBVM through QI projects to see research better used (Curtis, 2020a; Arlt, 2016).

Another benefit of QI, highlighted by the nurses, was that client involvement in QI would be hugely beneficial to the practices. This multi-stakeholder involvement would ensure that all experiences and perspectives of the care process were represented, and it was felt that currently this didn't happen regularly (Hughes *et al.*, 2018; Coe, Adams and Bonnett, 2012). This is despite the fact that collaborative research into patient/client experience and opinion has repeatedly been shown in both human and veterinary medicine to be a hugely beneficial form of feedback and communication with clients as a key stakeholder in the industry (Vanyo *et al.*, 2018; Reed *et al.*, 2012; Alden, Hoa and Bhawuk, 2004).

Recent studies in medicine have shown that assigning specific Practice QI Facilitators will increase the likelihood of successful QI activities at the practice level (Ye et al., 2020; Practice Facilitators' and Leaders' Perspectives on a Facilitated Quality Improvement Program., n.d.). This increase is predominantly due to the reduction of several barriers identified in the focus groups that also present in human clinical settings, such as poor communication between different groups of professionals and allowing protected time to conduct QI projects/interventions. Even in cases where a specific QI lead is assigned, however, it is usually impossible for one person to take on the entire task of QI at a practice alone. Resolutions to the barriers noted by participants do exist, for example the formation of QI 'advisory boards' at the NHS local trust level seems to have alleviated the pressure put onto designated QI leads whilst also having the added benefit of encouraging buy-in

from teams and utilising the knowledge of the local system. In the focus groups conducted in this study, several participants showed interest and enthusiasm with the idea of fulfilling this role in their practice with the stipulation that whoever was given such a role would need protected time to carry out the work involved and would have to volunteer for the job. It was generally agreed that vets, being already short on time, and potentially with poor appreciation of the entire picture of quality care, would not be best placed to co-ordinate the QI efforts within the practice. It is worth noting that many techniques to carry-out QI methods in human medicine would need some alteration or adjustment to fit the unique work of veterinary practice, but the potential is there to transfer the extensive work done in human healthcare to address the barriers noted above.

In published literature, receptionists and nurses are commonly identified as feeling restricted and demoralised by their role in veterinary practice (Schoorman, Mayer and Davis, 2016; Salzsieder, 2008). In this research, however, neither of these groups self-identified themselves as such. Instead, it was other professional groups that particularly noted the lack of support and training available to these groups. It was commented that even within the limited QI activities currently occurring in the hospital (predominantly clinical audit and M&M rounds) certain groups of staff within the hospital are excluded from these and they are treated as solely veterinary clinician activities.

This omittance of several important groups to QI projects presents a barrier to successful implementation as repeatedly it has been shown that large scale 'buy-in' from the entire team is necessary to enact any long-term changes to practice. Veterinary practices can form cliques or divisions that make mobilisation and open communication difficult between different job roles and can create conflict in those who hold multiple roles within the practice (Ann and Linde, 2017; Kinnison, Guile and May, 2015). The research from human medicine, however, is quite clear: interdepartmental collaboration and input from the entire team is conducive to a successful QI project. This is another example illustrated by this study where the actual infrastructure of practice culture could be posing a significant barrier to successful implementation of QI in veterinary medicine. To improve the service provided and quality of care delivered takes effort from the entire team and all those involved in quality care along the customer and animal's journey through the hospital.

Inequality in training and education on QI methods was evident in participants of this study. All were provided with a short information booklet prior to starting the focus groups. For some participants this was the very first time they had heard the term QI. Despite all working in the same veterinary practice an agreed definition could not be reached for either QVC or QI through the focus group process, and several participants failed to provide an idea of a definition at all. If people working within the same practice cannot agree on familiar terminology for activities they are carrying out, then it is unlikely that true consistency can currently be occurring during these activities. In human medicine the HQIP produces resources to be used by professionals in healthcare that are specific to the role and QI activity they are attempting to carry out (HQIP, 2015). No such conclusive resource currently exists in veterinary medicine. There are limited resources available through RCVS Knowledge; however, those are not applicable to every member of the veterinary team and participants in these focus groups gave conflicting reviews on the usefulness of said resources. The development of a centralised terminology for both quality veterinary care and quality improvement could be hugely beneficial to the sector and help towards the development of training and CPD resources applicable to all members of a veterinary practice team.

The use of a variety of frameworks in other industries that use QI regularly (manufacturing, NHS, education *etcetera*) has been successful in increasing engagement from practitioners in QI projects as well as the variety of change ideas produced and implemented (Fath *et al.*, 2020; Wandersman *et al.*, 2008). In time, and by acknowledging the barriers identified by this and future studies, the veterinary sector can aim to achieve a similar level of development in QI education and planning structure benefitting from the work already completed in other sectors.

With limited scientific research into the process of QI in the context of veterinary medicine, and no national framework for professionals to follow, the methods currently used could potentially be being carried out incorrectly or unsuccessfully. This also reduces and limits engagement with QI activities if people are unable to clearly see the results of interventions (Rooke et al., 2019, 2020, 2021b). Effective QI implementation in veterinary care needs to be specific and in the context of the system that is to be changed. Ideally it should be completed by a person or group of people familiar with the system in question. By doing this they would be able to recognise the challenges they will encounter and adapt methods accordingly to meet the specific goal required.

The findings reported and discussed relate to the global themes identified. They provide an insight into veterinary professionals' opinions and experiences with QI and in the researcher's, opinion also provide the most relevant information to assist the widespread implementation of QI into veterinary medicine. Whilst these global themes do not encompass all of the topics discussed, they do capture the major elements that are most closely linked to the research questions posed by this study and hence, are used as the framework for this chapter.

4.5 Conclusion

Quality improvement activities have the potential the help veterinary professionals monitor, maintain, and improve quality care. The in-depth perspective provided by these focus groups on professionals' views, experiences and current use of QI and QVC provides vital suggestions on how these methods can be successfully incorporated and utilised in veterinary practice. The impact of job role on the views and opinions of QVC was clear in this study. Clinicians often felt they bore ultimate responsibility for cases which could explain their introspective view on quality care. Other staff viewed their role as supporting the vets which permitted a wider view of the processes involved, even viewing themselves as gatekeepers, who, through their work, allowed the veterinarians to provide quality clinical care to clients. Without specific focus on the unique qualities and challenges presented by veterinary practice, the potential benefits QI could bring will go unrealised. Veterinary professionals seem open to developing and using QI methods in practice; however, more information, guidance and direction is needed in order for this to be successful.

Chapter 5

"Coping under pressure" The adaptations of the UK veterinary sector to ensure the delivery of quality veterinary care during a pandemic and nationwide restrictions.

Abstract:

Introduction: The COVID-19 pandemic led to wide societal changes within nearly every country on the globe. Several control measures were introduced by the UK government to reduce the spread of the virus. The effect of all these measures on the veterinary profession was unprecedented and far-reaching. In order to continue to provide quality veterinary care (QVC) several adaptations needed to be made.

Aim: To assess the impact and adaptations made by UK veterinary practices over the course of a year in response to a global pandemic.

Methods: Three online, cross-sectional questionnaires were distributed to professionals working in UK veterinary practices during the pandemic. Participants commented on adaptations to eight areas of practice in response to the pandemic. Participants rated their levels of anxiety and stress throughout all surveys. Descriptive data analysis was performed on the results along with coding the qualitative data into themes.

Results: In survey one, 94% of participants noted changes to staffing levels, 86% had adopted aspects of telemedicine, 70% of participants had changed how they communicated internally, 64% reported that all routine, elective and non-urgent in-person appointments had been cancelled, whereas 94% of participants were still accepting/admitting emergency appointments. In Questionnaire Two, few practices updated their processes in response to new guidance released. One year on, a majority of participants reported they were now operating as before COVID in all areas except for visitors to the practice (18%) and routine appointments at the hospital/practice (27%). Participant-rated levels of work-related stress and anxiety were highest during the first survey and fell throughout the course of the study.

Conclusion: The COVID-19 pandemic undoubtably changed the way practices are run. There could be lasting changes both to the way practices conduct their veterinary care in the future and also changes in how practices plan to deliver care when in states of extreme stress. The staff that have worked throughout the pandemic. Further studies are required to fully assess if any of the changes noted in this study have been adopted by the sector long term and what impact that has had on the care delivered.

5.1 Introduction

The rapid and global spread of the COVID-19 virus led to widespread societal changes, within nearly every country on the globe. The World Health Organization (WHO) declared a pandemic on 12th March 2020 attributed to the SARS-CoV-2 virus of zoonotic origin that had successfully adapted to human-to-human transmission (World Health Organisation, 2020). There was variation among countries and governments in response to this unprecedented challenge; in the United Kingdom (UK), the Prime Minister announced a nationwide lockdown on 23rd March 2020 (Figure 8). The restrictions involved in this 'lockdown' policy necessitated changes to behaviour patterns in many industries including veterinary medicine (Gortázar and de la Fuente, 2020a). Self-isolation, maintenance of physical distancing from people not in your immediate household ('social distancing'), furlough schemes to ensure all but essential workers stayed at home, and mandatory movement restrictions were all essential to control the spread of the virus (Galea, Merchant and Lurie, 2020; Jarvis *et al.*, 2020; Mair *et al.*, 2020). The effect of all these measures on the veterinary sector (considered essential workers and generally exempt from the work from home order) was unprecedented and far-reaching. Teams had to adapt to ensure quality veterinary care (QVC) was still provided and communication maintained with clients, patients, and colleagues alike throughout the course of the pandemic. In July 2020, Gortazar and de la Fuente predicted three impacts of COVID-19 on the animal health field worldwide (Gortázar and de la Fuente, 2020b): there would be an immediate impact on animal health and wellbeing due to the sudden human confinement and inactivity; a medium to long-term effect of the upcoming economic crisis on farming and on veterinary services; and an increased attention to the public health implications of coronavirus infections in animals, both in farms (VanderWaal and Deen, 2018), companion animals (Shi *et al.*, 2020), and wildlife (Ferri and Lloyd-Evans, 2021). These predictions for the most part proved to be correct; due to longevity of the restrictions, the impact on veterinary medicine ended up being far more prominent and far-reaching than anyone at the time predicted.

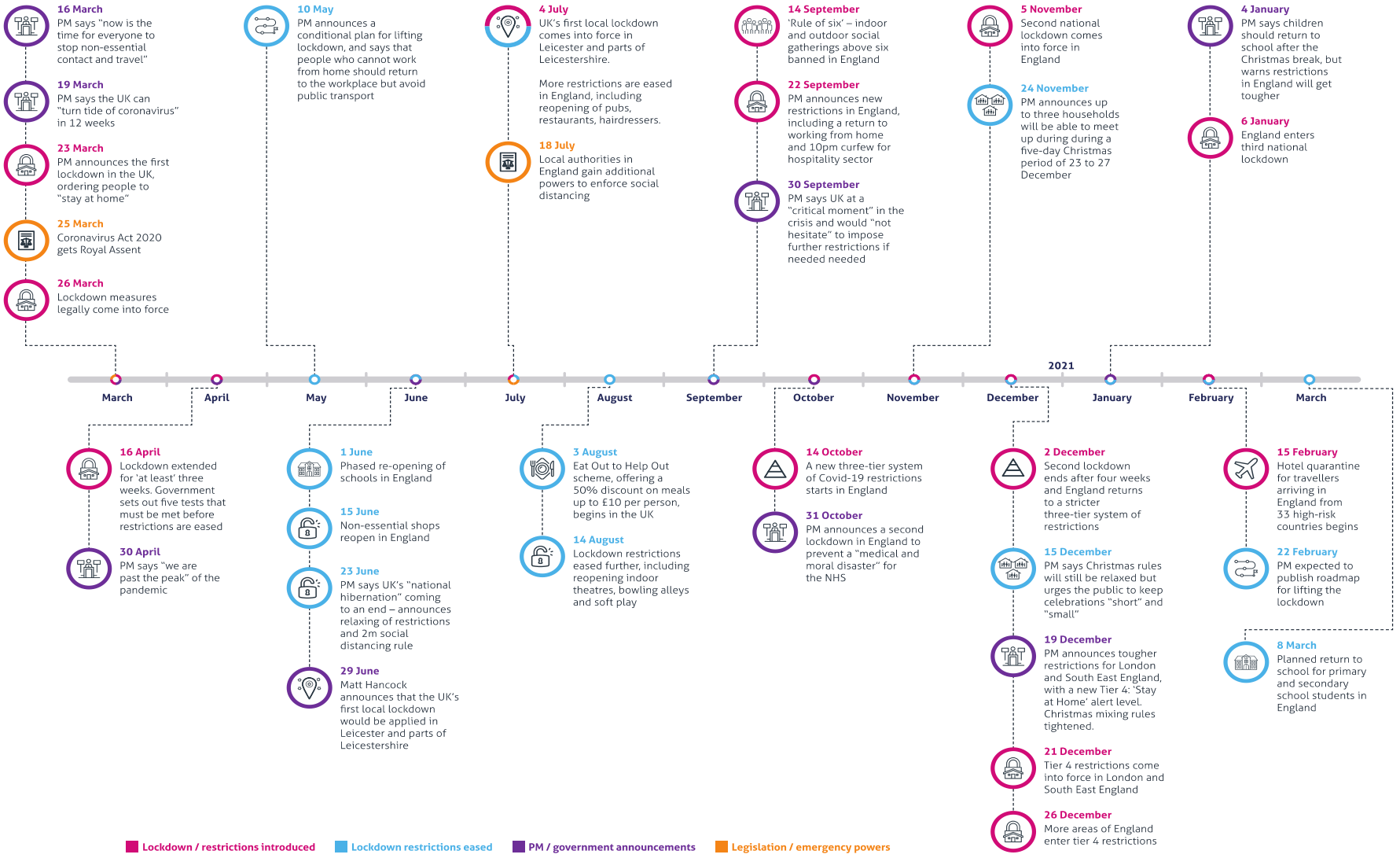

Figure 8 Comprehensive timeline of government restrictions, lockdowns and policy updates from March 2020 until March 2021, Source: Institute for Government Analysis (Institute for Government analysis, 2021)

Veterinarians as well as clients, often rate communication and information sharing as a key aspect of providing animal welfare, high-quality care, and meeting client/owner expectations (Kogan *et al.*, 2021; Frankel, 2006; Kurtz, 2006b). Existing literature in this area has three linked but separate themes: (a) client–veterinarian communication, (b) communication within a professional veterinarian team, and (c) training of veterinary communication skills (Pun, 2020). The COVID-19 pandemic effected every one of these aspects of veterinary communication, through both social distancing restrictions (refusing client entry to practice premises, maintaining the necessary 2m distance from colleagues), bio-security measures (face masks, and other personal protective equipment), and self-isolation (key members of teams having to isolate at home, being furloughed and work from home orders).

Whilst several studies and reports have been conducted and compiled focussing on the impact of COVID-19 related restrictions on the veterinary sector, all focus on one particular point of time in the COVID-19 pandemic and/or one specific aspect of veterinary industry; for example veterinary education (Islam and Alam, 2021; Routh *et al.*, 2021a), emergency veterinary hospital (Wiwanitkit, 2020), companion animal medicine (Singleton *et al.*, 2020), racehorse veterinary medicine (Butler *et al.*, 2021), or specific members of the professional veterinary community (Mair *et al.*, 2021), such as veterinary technicians (Rowe, 2021), surgeons (Sibley, 2021), or students (Routh *et al.*, 2021b) Nothing to date has been published specifically analysing the impact of care adaptation on the quality of veterinary care provided and the communication adaptations necessitated by this pandemic.

Aims

- To assess the impact and adaptations made by UK veterinary practices over the course of a year in response to a global pandemic.

Objectives

- Create a repeated cross-sectional questionnaire to be distributed to UK veterinary professionals during the COVID-19 pandemic.
- Investigate how the pandemic has changed communication within UK veterinary practices.
- Gauge the influence of the pandemic on workers' stress and anxiety levels over a period of time.

- Investigate how these factors impact quality care delivered to animals during the pandemic.
- Explore if any lasting changes remain beyond the initial lockdown phase of the pandemic.

5.2 Material and methods

5.2.1 Questionnaire design and participants

A series of three online, cross-sectional questionnaires were created to be distributed to a variety of professionals working in UK veterinary practices (vets, veterinary nurses, receptionists, administrators, interns, and auxiliary staff). The questionnaires were hosted and distributed on the platform Online Surveys (https://www.onlinesurveys.ac.uk, Jisc, Bristol, UK). The first questionnaire was released 26th March 2020 and closed 26th April 2020, the second questionnaire opened 27th May 2020 and closed 27th June 2020 while the third questionnaire opened 23rd August 2021 and closed 23rd September 2021. Although each questionnaire differed slightly with the exact questions asked, all followed a similar line of questioning allowing participant responses to be tracked throughout the duration of time analysed.

The target population of participants for the first questionnaire was professionals currently working within any UK veterinary practice. Practices were encouraged to only submit one response per practice when invited to take part. Individuals treating a range of species (to include small animals, equine, farm, exotics) and from varying practice backgrounds (first opinion, referral, university, ambulatory) were sought. Additionally, recruitment aimed to recruit respondents to reflect all different job families (veterinary clinicians, registered veterinary nurses, clinical directors, practice owners, administrators, practice managers, receptionists, interns, students, and nursing assistants/technicians). A snowball sampling method was used via email contacts, social media[8], the Centre for Evidence-based Veterinary Medicine (CEVM) newsletter and word of mouth. This was done to ensure that a maximum variation purposive sample was achieved (Sharma, 2017). The process

[8] Specific social media groups aimed at veterinary professionals were targeted for this with groups used including: veterinary nurse UK, veterinary women's group, veterinary receptionists, veterinary voices UK, veterinary sustainability forum, livestock vet bulletin, exotic vets UK, dog friendly UK, veterinary care assistants UK, CEVM Facebook page and twitter and RCVS Knowledge Facebook page and twitter.
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for data collection was approved by the Ethical Clinical Review Panel of the School of Veterinary Medicine and Science, University of Nottingham.

After completion of the first questionnaire participants were asked if they would consent to be contacted to complete a subsequent questionnaire at a later period in time. If they were happy to do this, they were asked to leave an email address and were contacted directly with the information and links for a second and third questionnaire.

5.2.1.1 Questionnaire One

Questionnaire One was released on the 26th of March 2020 and remained open for one month. The questions were predominantly formatted as closed yes/no questions (e.g: "Have there been changes to X in your practice in response to COVID-19?"). These closed questions were followed by a free text option for participants to detail specific changes that had occurred at their practice (Appendix F). The structure of the questionnaire and the questions contained in it were created by Freya Rooke and edited/pre-tested by the research team Dr. Marnie Brennan, Dr. John Burford, Professor Sarah Freeman, Dr Tim Mair and Jo Suthers.

Three sections were created within the questionnaire to fulfil the aims and objectives of the study. The first section of the questionnaire focussed on gathering key demographic information from the participants, primarily surrounding their current job role and the practice they worked in. This section also included questions relating to any changes implemented in response to the COVID-19 pandemic and the UK entering lockdown. Nine key areas / aspects of everyday practice were focussed on.

1. Changes to staffing levels (e.g., encouraging people to work from home if possible, and reducing the number of staff coming into the practice / hospital at any one time).
2. Client communication (including, but not limited to, the use of telemedicine and triaging appointments).
3. Internal communication (e.g., handover rounds or practice meetings).
4. Routine, non-emergency, outpatient appointments at the practice premises/hospital (vaccinations, ear cleaning, dentals).
5. Emergency outpatient appointments (e.g., wounds, fractures).
6. Ambulatory visits for routine and/or elective procedures (e.g., vaccinations, dentals, non-emergency lameness assessments).

7. Ambulatory visits for emergencies (e.g., euthanasia, uncontrolled bleeding, dystocia).
8. Visitors to the practice (e.g., non-permanent members of practice staff entering the building including clients, students, locum vets etc.).
9. Use of social media as a form of communication (e.g., Facebook posts or use of practice Twitter accounts).

The second section of the questionnaire was focussed on the impact of the COVID-19 pandemic on the mental health of workers in the veterinary sector. These questions focused on determining participants' work-related stress, level of anxiety in general and questioned how participants felt regarding job security.

The final section gave participants the opportunity to voice their views on what barriers they faced in delivering quality care to both emergency and routine cases at their place of work. These questions were deliberately vague and open to enable participants to leave their own comments and views.

5.2.1.2 Questionnaire Two

The second questionnaire was released to participants via email (only to those who agreed to participate in further research were included). Personalised email links for the questionnaire were sent to participants, with password and unique participant identity numbers attached to allow response tracking of individual participants.

This questionnaire was specifically released in conjunction with new guidance released by the Royal College of Veterinary Surgeons (RCVS) and the British Veterinary Association (BVA) on 9th April 2020 (RCVS, 2020a). The hope was that participants could recall and comment on any further changes that had happened in their practice since March 2020 relating to this document.

As with the first questionnaire, participants were asked explicitly if anything had changed at their practice following the updated guidance from BVA and the RCVS (Appendix G). The same eight key areas of practice were examined as in questionnaire one, omitting option 9; as it was not anticipated that answer to this area would have changed in the period of time between questionnaire one and two. Instead of open text boxes allowing participants to detail changes, they were asked to select one of five options that best described what was currently happening in what was currently happening in their practice:

1. Updated practices to match new guidelines.
2. Changes made but not due to the new guidelines released by RCVS/BVA.
3. No changes made (we were already doing what the new guidelines advise).
4. No changes made (we are not explicitly following the guidelines released).
5. Not applicable.

Participants then detailed if the barriers to delivering quality care had changed since the new guidance, and what their main means of communication with clients currently were. The final portion of this questionnaire again asked participants to rate their level of stress and anxiety (1-10) both at work and away from work. There was also the opportunity for participants to detail what they felt was leading to their stress and anxiety.

5.2.1.3 Questionnaire Three

The final phase of this study was released on the 23rd of August 2021, just over one year after the conclusion of the second round. The questionnaire was released to all participants who had completed the second round in June 2020. They were contacted first via email to gain consent for further participation.

For the final round, a system of multiple-choice questions was used as in questionnaire two. The same eight key areas of practice were questioned (Appendix H). In these eight areas participants were asked to select one of five options that best described what was currently happening in their practice in relation to the eight key areas:

1. Changes made and not updated since April 2020.
2. Changes made and updated periodically in accordance with government / RCVS guidance.
3. Changes made since April 2020 but now situation restored to pre COVID-19 practice.
4. No change at all in response to COVID-19.
5. Unsure of any changes that have or have not been made.

Finally, the professionals taking part were asked to reflect on their experiences over the last year and evaluate how their specific practice had handled staff morale and patient care during the pandemic. Each participant provided three examples of what they felt their practice had done well or that allowed them and their colleagues to continue to deliver high quality care despite the challenges caused. Participants then provided the top three

recommendations that they would make if they were asked to contribute to a guidance document for veterinary professionals on how to best handle a pandemic and continue to deliver excellent care.

5.2.2 Data analysis

After the conclusion of all three questionnaires, the results were downloaded from the questionnaire platform and imported into Microsoft Excel (Microsoft Corporation, 2018). Data cleaning was performed on the results of the first questionnaire to check and remove any incomplete responses and ensure that each participant had only completed the questionnaire once using IP addresses.

After cleaning the data sets from questionnaire one, descriptive data analysis was performed on the results from closed questions including frequencies and percentages. The free text qualitative data from those participants that noted particular changes to normal practice in the free text were coded and grouped into themes, sub-themes, and then global themes. This process involved identifying similar ideas and topics from within the rich, free-text data and grouping them to display common ideas voiced by the participant group. Enabling a depth to the data analysis and conclusion drawn that could not be gained from statistical analysis alone.

Cleaning the data for questionnaires two and three involved applying a unique ID number to each participant and grouping their answers for all three questionnaires into one Microsoft Excel spreadsheet. After this, responses to specific questions were selected to be analysed for longitudinal trends in the data set. These questions were specifically centred around the same eight areas of practice.

Numerical rating scale questions [9] were used to ask participants to self-rate their levels of work-related stress and general anxiety surrounding COVID-19. All of this longitudinal data was analysed descriptively using a combination of frequencies and figures that could be compared over the course of the three questionnaires. Qualitative analysis was also

[9] In rating scale questions (sometimes referred to as ordinal questions), the question displays a scale of answer options from any range (0 to 100, 1 to 10, etc.). The respondent selects the number that most accurately represents their response (Davies *et al.*, 2016).

performed on responses to the final section of questionnaire three examining lasting changes that had been made to individual veterinary practices post COVID-19.

5.3 Results

5.3.1 Demographic results

5.3.1.1 Questionnaire One demographics

Seventy complete responses were submitted. Most participants completing this questionnaire were clinical veterinary surgeons (n=33, 47.1%), who worked in small animal (n=41, 58.6%) first opinion practice (n=57, 81.4%) (Table 12). Other participants were student veterinary nurses, practice directors, imaging technicians, interns, and consultant surgical specialists. Other types of practice respondents worked in were emergency out of hours, export veterinary practice, specialist poultry service, and embryo transfer and equine reproduction services. Additional animals treated included wildlife, pigs, commercial poultry, and gamebirds.

5.3.1.2 Questionnaire Two demographics

Forty-six participants consented to be contacted for further follow up in questionnaire One. Eighteen second questionnaires were completed in full by the closing date. Clinical veterinarians, registered veterinary nurses, practice managers and clinical director/practice owners were represented in this sample (Table 12). All types of practice and animals treated were represented in this cohort except for university practice, but a majority came from small animal (n=10/24; 41.7%) and first opinion practice (n=14/24; 58.3%).

5.3.1.3 Questionnaire Three demographics

Eleven completed questionnaires were returned during the third round. The cohort was comprised of clinical veterinarians, registered veterinary nurses, practice managers and clinical director/practice owners. All types of practice and animals treated were represented in the cohort except for university practice, but a majority came from small animal (n=8/16; 50%) and first opinion (n=10/15;66.6%).

Table 11 –Participants' demographic information from those that provided a complete response to the first, second and third questionnaire examining the impact of COVID-19 on the provision of quality care in UK veterinary practice between May 2020 and June 2021. Nb. For type of work and type of animal treated, more than one answer could be given by each respondent therefore totals add up to more than the number of respondents**.**

Current Job Role:	**Number of respondents selecting this option (%) – n = 70 – Questionnaire one**	**Number of respondents selecting this option (%) – n = 18 – Questionnaire two**	**Number of respondents selecting this option (%) – n = 11 – Questionnaire three**
Clinical veterinary surgeon	33/70 (47.1%)	10/18 (55.6%)	7/11 (63.6%)
Registered veterinary nurse (RVN)	13/70 (18.6%)	2/18 (11.1%)	1/11 (9.1%)
Clinical director / Practice owner	11/70 (15.7%)	3/18 (16.7%)	1/11 (9.1%)
Receptionist / client care team	1/70 (1.4%)	0/18 (0%)	0/11 (0%)
Administrator	1/70 (1.4%)	0/18 (0%)	0/11 (0%)
Auxiliary staff (inc. grooms, technicians, nursing assistants	1/70 (1.4%)	0/18 (0%)	0/11 (0%)
Practice manager	5/70 (7.1%)	3/18 (16.7%)	2/11 (18.2%)
Other	5/70 (7.1%)	0/18 (0%)	0/11 (0%)
Type of work performed at practice:			
First opinion	57/70 (81.4%)	14/18 (77.8%)	10/11 (90.9%)
Referral	25/70 (35.7%)	6/18 (33.3%)	3/11 (27.3%)
University	1/70 (1.4%)	0/18 (0%)	0/11 (0%)
Ambulatory	16/70 (22.9%)	3/18 (16.7%)	1/11 (9.1%)
Other	5/70 (7.1%)	1/18 (5.6%)	1/11 (9.1%)
Type of animal treated by practice:			
Small animals	41/70 (58.6%)	10/18 (55.6%)	8/11 (72.7%)
Equine	28/70 (40%)	5/18 (27.8%)	1/11 (9.1%)
Exotics	11/70 (15.7%)	3/18 (16.7%)	3/11 (27.3%)
Farm	6/70 (8.6%)	2/18 (11.1%)	1/11 (9.1%)
Other	7/70 (10%)	4/18 (22.2%)	3/11 (27.3%)

5.3.2 Questionnaire One result analysis

The majority of participants noted that changes had occurred in the eight areas of practice specified. Participants stated whether any changes from what they considered 'normal practice' had occurred in these areas since the 4th of March 2020 in response to COVID-19.

5.3.2.1 Changes to staffing levels due to COVID-19

Ninety-four percent of participants (66/70) noted changes had been implemented to their staffing levels since 4 March 2020. Several scenarios and reasons for this change were detailed (Table 12).

Table 12 - Summary of the specific ways in which participant's practices had taken steps to change (reduce) staffing levels since 4 March 2020 in response to the COVID-19 pandemic. This survey was part of a larger study examining the adaptations made by the veterinary industry to adapt to the restriction put in place by the COVID-19 pandemic.

Specific examples describing how staff numbers have been reduced in practice	**Participant quote**
Reducing the number of staff coming into practice:	*"Vets are taking call from home, and unable to come to the clinic unless for meds or equipment. Skeleton admin staff split into 2 teams."*
Nonclinical staff working from home	*"Administrative staff working from home. Those nurses and care assistants not in the hospital working, doing work from home (e.g., CPD, research etc.)"*
Clinical staff only attending practice where absolutely necessary e.g., to pick up supplies	*"Vets are taking call from home, and unable to come to the clinic unless for meds or equipment."*
Removing other people from the practice premises that don't have to be there	*"No more students doing rotations which usually helps in the day to day running."* *"We've stopped all locums coming into the practice"*
Dividing remaining staff into 'work teams' and working off a rota to minimise contact with each other:	*"Split both large clinical & admin teams into two so hospital can still function.* *"Implemented rota so the separate teams do not cross over – handover done remotely."*
Increase in hours asked to work due to staff illness, furlough, or vulnerability	*"We were already very short staffed and lost another nurse due to childcare restrictions so running on minimal staff and all picking up the slack as no reduction in workload"*

5.3.2.2 Changes to client communication including triaging, telemedicine, and social distancing.

Eighty six percent (60/70) reported their practices had adopted aspects of telemedicine[10] (Figure 9).

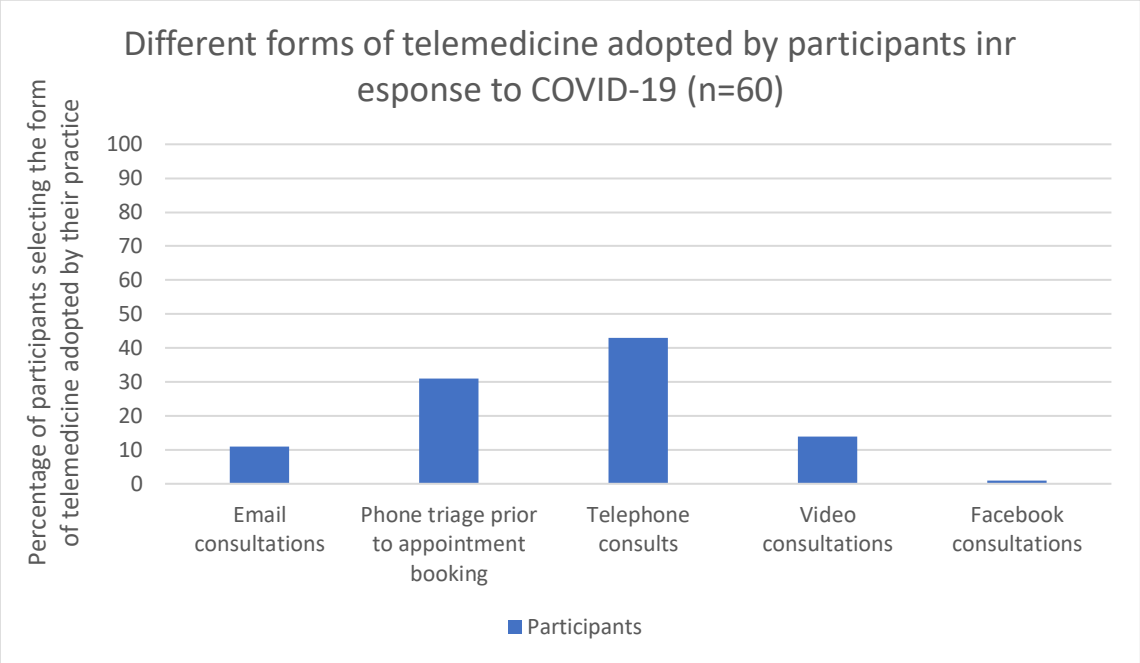

Figure 9 – Bar chart displaying the different forms of telemedicine adopted by participants practices in response to COVID-19 pandemic. Sixty participants stated they had adopted some form of telemedicine and five different forms were identified by name by these participants.

Participants were provided the option to specify the changes to client communication that had occurred in their practice. Six specific modifications to client communications were discussed by participants aside from the introduction of telemedicine (Table 13). Participants were also able to offer their personal opinion regarding the introduction of these different communication methods and client communication in general in the form of free text boxes from which quotes were drawn out and assigned themes.

[10] Telemedicine refers to the remote diagnosis and/or treatment of patients using telecommunication technology, including but not limited to; the telephone, live video applications (skype, teams etc), email and/or social media.

Table 13 Details given by participants of changes their practice had made in the area of client communication since 4th March 2020 in response the COVID-19 pandemic. Part of a larger study examining the adaptations made by the veterinary industry to adapt to the restriction put in place by the COVID-19 pandemic.

Specific detail describing changes to client communication within participant practices:	**Participant quote:**
Withdrawal of face–to-face contact with clients	*"Triage by vets of all calls initially then also risk assessment before considering if a visit or consultation at the clinic is required"* *"No face-to-face contact with clients. All communication done over the phone, including consultation (regardless of whether the animal is physically presented)"*
Posting medication / introducing contact free pick up	*"We are trying to use remote prescribing after telephone consultation if deemed acceptable."* *"Sorting delivery service for prescriptions for our elderly clients who can't get to us via public transport anymore"*
Communicating new protocols for admitting animal / face to face appointments with clients	*"Hospital protocol sent to clients, so they are aware of what to expect upon admission to the practice."* *"I'm sending out Mass emails about changes to our protocols and services sent out, social media campaigns and calls ahead for paperwork."*
Using social media to update clients of changes to practice rules and process	*"Using social media to discourage non urgent enquiries and make clients aware we are offering appointments via email as phone lines so busy."*
Offering telephone consultations but NOT telemedicine	*"More telephone consultations but telemedicine is the thin end of the wedge that we will not be able to pull back from so do not support"* *"We are trying to offer telemedicine, but our clients don't want to, or it becomes quick consult and patients still have to be seen*
Altering pricing / payment structure for cases that are seen and treated	*"We had to start charging for phone advice which we used to give free as good will, because it nearly all we're doing at the moment, and we need to keep the practice financially viable"*

5.3.2.3 Changes to internal communication either between colleagues and or managers/corporate directors

Over 70% of participants reported some change to the way they communicated internally, both with other members of staff and management. Email was the most commonly mentioned form of internal communication with 40% (28/70) having adopted this instead of face-to-face meetings, followed by WhatsApp groups 23% (16/70) and virtual team meetings 24% (17/70). Other changes to internal communication noted by participants can be seen in Table 14.

Table 14 - Showing details given by participants of changes their practice has made in the area of internal communication since 4/3/2020 in response the COVID-19 pandemic. Part of a larger study examining the adaptations made by the veterinary industry to adapt to the restriction put in place by the COVID-19 pandemic.

Specific detail describing changes to internal communication within participant practices:	**Participant quote**;
Social distancing protocols changing the way that practitioners can work together on the same animal.	*"It's hard because social distancing dictates we remain at least 2 metres away from each other but when you're trying to restrain an animal and treat it that just isn't possible and it's causing some tension management putting in these expectations that make it impossible for us to do our job!"*
Stopping rounds, face to face meetings or handovers	*"We're enforcing social distancing (stopping rounds in the morning and other unnecessary gathering of people)."* *"Microsoft Teams used to do electronic handovers/rounds so that remote team can also virtually attend"*
Creating practice group chats to communicate with each other	*"Our practice has set up group WhatsApp chats for communication between teams as we don't see each other now."* *"Messages on WhatsApp to inform all of nursing team plan & emails to support this with plans."*
Decrease in / poor communication from management / leadership	*"Staff have not been given a lot of freedom to implement rules with leadership being absent for days at a time it's very challenging."* *"A barrage of daily emails re: policy changes due to COVID-19 that no one understands and aren't implemented just complicates matters"*

Regular schedule of communication from management/directors on changes to advice/protocol	*"Weekly Zoom call for all staff on a Wednesday morning to summarise the past week and update on protocol for the week going forward."* *"Good internal communication. Line manager emails every day at least once a day and always happy to talk."*
Paper / printed guidance circulated to staff members	*"Guidelines, protocols, and information given in printouts, meetings and one to ones followed up with calls. Signs and biosecurity check points in the yards and clinics: personal cleaning equipment provided for all."*

5.3.2.4 Routine outpatient appointment (e.g., vaccinations, minor wounds, and other non-emergency procedures).

Forty-five participants (64%) reported that all routine, elective and non-urgent in-person appointments had been cancelled if already made, or that their practice had stopped taking such bookings completely. Nine (13%) participants identified that although their practice was limiting the number of such bookings that were being taken, they had not stopped seeing these patients at the time of the questionnaire and eleven (16%) participants reported no change at all in their practice's policy in dealing with routine, elective, and non-urgent cases. Five (7%) stated this question was not applicable to their practice.

5.3.2.5 Emergency/out of hours (OOH) outpatient appointments seen at practice/hospital premises.

For emergency patients seen at the practice/hospital premises, a smaller number of participants reported changes to their practice way of working since the pandemic. All participants whose practice would normally see or admit these patients stated that they had continued to do so (66/70, 94%). Forty-one of these sixty-six participants (59%) stated that although their practice was still admitting these patients there were changes to the process and protocols required to admit these patients (Table 15).

Table 15 - Details given by participants of changes their practice has made in the area of internal communication since 4/3/2020 in response the COVID-19 pandemic.

Specific detail describing changes to internal communication within participant practices:	**Participant quote;**
Patient will still be seen but only after remote (telephone or video) triage consult between practice and owner or referral vet	*"Our nurses will bring the animal into the surgery for vet to treat from the client in car park. Vet has previously spoken to client on phone and looked at photos been emailed by client or referring vet"*
Still admitting these cases but without an owner present and history/treatment discussed with owner remotely.	*"Our practice is still admitting the emergency / critical care cases but no owners on the premises now and all the history and treatment is discussed on the phone"*
Emergency OOH referral patients are admitted to practice but do not return to the referring practice until treatment is over.	*"As normal under conditions prescribed above. However sick patients do not go back to own practice, they stay until they are better or dead."*
Still accepting emergency clients but observe social distancing protocols and increased PPE when treating animal.	*"These clients are still seen, 2m space from client kept at all times. PPE worn when treating pet or in vicinity of owners"*

Twenty-five (35%) participants reported no change to the operation of their practice in the way these cases were dealt with and four (6%) stated that this question was not applicable to their practice.

5.3.2.6 Routine ambulatory appointments (routine and/or elective procedures and appointments seen away from the practice premises).

Not every practice offered ambulatory (off-site) appointment prior to the pandemic. Sixty-six practices did offer this service to clients and of these 32% (21/66) reported no change to how they handled or booked these appointments.

5.3.2.7 Emergency/out of hours (OOH) ambulatory appointments (emergency care provided away from the practice/hospital premises).

Thirty-nine respondents (56%) stated that they were still offering an emergency ambulatory service but with significant changes detailed (Figure 10). Six participants (8%)

were no longer offering this service but had previously. Twenty-one (30%) noted there was no change in this service within their practice and four (6%) reported this was not applicable to their practice.

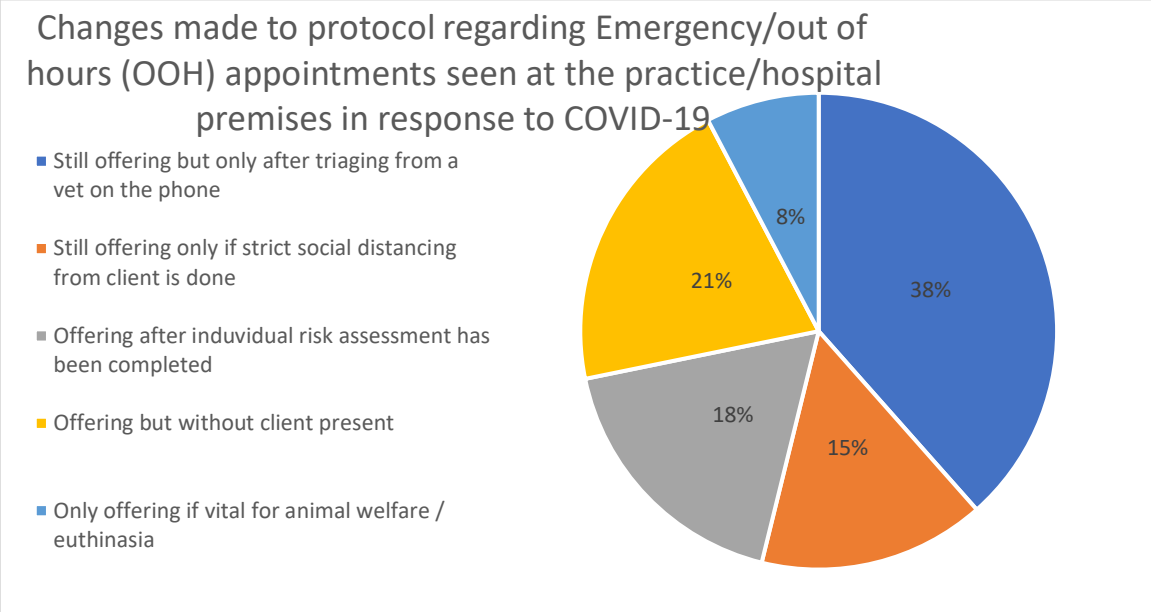

Figure 10 Pie chart displaying how the provision of emergency care available to emergency/OOH patients, seen away from the practice premises/hospital (ambulatory) has changed in response to COVID-19.

5.3.3 Questionnaire Two results.

The results of this questionnaire focussed on new guidance released by BVA on the 9th of April examining whether processes and protocols for the eight specific areas of practice had changed as a result (Table 17). For each of the eight possible changes, very few practices (minimum =0 , maximum = 3 and mode =1) updated working protocols to match the new guidance released by BVA. A majority of practices (minimum = 7, maximum = 17 and mode = 17) noted that changes had not been made because their processes and protocols were in line with the updated guidance released already.

5.3.4 Questionnaire Three results.

Participants were asked to consider the changes to the eight key areas of practice they had detailed in the prior two questionnaires. In questionnaire Three contributors commented on the duration of these changes made and whether any of the changes made as a result of COVID-19 has remained to become part of 'normal' practice. A majority of participating practices stated that although they had made additional changes since the last questionnaire in June 2020 (Table 16) their practice was now operating as before COVID-

19. The exception to this was in the areas “Changes to routine outpatient appointments (routine and/or elective appointments at practice/hospital”) and “Changes to visitors at the practice”, where a majority of practices stated that changes were made to their ‘normal’ protocol and these changes had remained since restrictions had lifted at the time of the questionnaire (August 2021).

Table 16 -Table of coded results for Questionnaire Two and Three, questions 2a-2h, regarding changes participant practices have made to their Covid-19 protocol in eight key areas of practice following updated guidance released by RCVS and BVA on April 9th, 2020 (survey two) and changes participants have noted at their practices in response to Covid-19 between April 2020, and August 2021.

In your current role at your veterinary practice, what changes have been implemented to the following eight areas in response to the COVID-19 pandemic:	**Questionnaire 2: Changes in response to new BVA guidance released in April 2020 - 18 participants**	**Questionnaire 3: Changes (if any) made in the areas described, between March 2020 and August 2021 - 11 participants**
Changes to staffing levels.	1 = 6%	1 = 0%
	2 = 44%	2= 27%
	3 = 39%	3 = 64%
	4 = 11%	4 = 9%
	5 = 0%	5 = 0%
Changes to client communication.	1 = 6%	1 = 0%
	2 = 22%	2 = 46%
	3 = 66%	3 = 46%
	4 = 0%	4 = 9%
	5 = 6%	5 = 0%
Changes to internal communication.	1 = 0%	1 = 18%
	2 = 16%	2 = 9%
	3 = 72%	3 = 64%
	4 = 6%	4 = 9%
	5 = 6%	5 = 0%
Changes to routine and/or elective appointments at practice /hospital.	1 = 22%	1 = 9%
	2 = 0%	2 = 36%
	3 = 50%	3 = 27%
	4 = 17%	4 = 18%
	5 = 11%	5 = 9%
Changes to emergency appointments at practice/hospital.	1 = 0%	1 = 9%
	2 = 0%	2 = 9%
	3 = 94%	3 = 64%
	4 = 0%	4 = 9%
	5 = 6%	5 = 9%

Changes to routine/elective appointments performed away from practice/hospital (ambulatory).	1 = 6%	1 = 18%
	2 = 0%	2 = 9%
	3 = 55%	3 = 46%
	4 = 11%	4 =9%
	5 = 28%	5 = 18%
Changes to emergency appointments performed away from practice/hospital (ambulatory).	1 = 6%	1 = 18%
	2 = 0%	2 = 9%
	3 = 60%	3 = 46%
	4 = 17%	4 = 9%
	5 = 17%	5 = 18%
Changes to visitors to the practice/hospital.	1 = 6%	1 = 27%
	2 = 0%	2 = 55%
	3 = 94%	3 = 18%
	4 = 0%	4 = 0%
	5 = 0%	4 = 0%

Codes for Questionnaire Two, question, 2a-2h.

1	Updated practices to match new guidance
2	Changes made but not due to the new guidance released
3	No change (we were already doing what the new guidance recommends)
4	No change (we are not following the guidance)
5	Not applicable (to our practice or the guidance released)

Codes for Questionnaire Three, questions 2a-2h:

1	Changes made and not updated throughout the pandemic; changes still being used currently in practice.
2	Changes made and updated periodically in accordance with government/RCVS/BVA guidance and still currently used.
3	Changes made since April 2020 (release of Questionnaire Two) but now (August 2021) operating as before COVID-19.
4	No change at all in response to COVID-19, still operating as before pandemic.
5	Unsure of changes that have or have not been made in my practice

5.3.5 Barriers to delivering quality veterinary care (QVC) across three questionnaires.

5.3.5.1 Questionnaire One

One hundred and twenty-seven free text answers were given to questions around barriers to delivering quality care (sixty-three for routine cases, sixty-four for emergency cases). These free text answers were organised into 29 codes and five key themes (Table 17).

Table 17 - Five key themes derived from the free text answers participants provided detailing the barriers they have encountered in the process of providing quality veterinary care since the COVID-19 pandemic.

Key Theme:	**Participant quote;**
Client attitude and behaviour.	*"Some of our clients are threatening they will go elsewhere due to the restrictions we have put in place. It's upsetting and stressful when we are just following the guidelines as all practices should be."*.
Restrictions put in place are preventing me from doing a 'good job'.	*"I feel I am being encouraged to basically use my best judgement on a lot of cases rather than see the animal in person or being able to have a proper conversation with the client which just isn't right"*.
Industry infrastructure / practice resource limitations.	*"Lab turnaround for results has been terribly slow since the pandemic".* *"We're struggling to get hold of basic medication, food and oxygen which is affecting the service we can provide"*.
Client communication limitations.	*"It's really to keep providing the service we did, even the little things, my default when someone is upset is to offer them a cup of tea, but I can't really do that at the moment – makes me feel a bit useless in a lot of situations"*.
Co-worker/management communication.	*"Communication between the different teams working has been hard to co-ordinate, and if I'm honest I do feel it is affecting the continuity of care we are able to offer"*.

5.3.5.2 Questionnaire Two

Fourteen (14/18, 78%) participants reported no change to the barriers they were encountering to delivering QVC in comparison with the last questionnaire. Those that did feel these barriers had changed generally reported an influx of cases that initially would not have been emergency cases. Instead, patients waiting a long time to see a vet had become emergencies and were leaving practice staff feeling stretched.

"We are seeing more animals now that previously we classified as non-urgent care, but they have become urgent due to not being seen weeks ago which is stressful"

"What we now consider urgent, or emergency care has expanded so there are many more cases to see than previously and its ever increasing"

5.3.5.3 Questionnaire Three

Participants reflected upon things that could have been done differently professionally by themselves or by their practice as a whole to reduce the impact of these barriers during the course of the pandemic.

"Considering not furloughing majority of the team, patient care over saving the practice money. This was supported with the increase of client complaints over lack of comms."

"We should have extended the length of our appointment times. We needed more staff but were unable to recruit them."

"Recruit another two vets if we would have had to foresight as we experienced a huge increase in demand over the pandemic."

"More support staff to help the vets, and less focus on getting as many cases (profit) through the door as we can."

"We could have enabled virtual consulting, developed a better system of medication delivery to clients, and having more staff would have certainly helped."

Eleven participants (100%) felt that on reflection they could note things that the industry as a whole could have been done differently to optimise the quality of care delivered to patients over the course of the pandemic. All participants also felt that they should have

the opportunity to contribute to guidance on how the industry could handle future high-pressure situations and continue to provide the highest quality care.

"The public seemed to be unaware of the difficulties we went through, more obvious publishing of our restrictions to help the community understand."

"Been quicker to respond with creative solutions to the obstacles, being more flexible and open to change."

"RCVS and DEFRA to work to address the shortage of vets - it has added a lot of pressure to people still in the profession."

"Better guidance on how to effectively use telemedicine."

"As previously mentioned, the industry needs to value staff over profit. They just overbook appointments with no view for "catch-up time", case study, research, not even lunch breaks."

5.3.6 What went well? Positive changes to veterinary practice during the pandemic.

In questionnaire Three, participants had the opportunity to give their opinion on what their practice and the wider industry had done well to cope under the pressure created by the COVID-19 pandemic. Eleven participants noted twenty-four examples of things they felt their practice did very well during the pandemic to continue providing QVC to their clients. Seventy-nine percent (19/24) of these examples were new protocols or actions that were not done prior to COVID-19. Of these positive actions 47% (9/19) were expected to remain in use post pandemic. Examples of these positive actions included:

"Using our outside space to administer vaccinations"

"An increase of respect between colleagues in our practice and an improvement in the rapport between veterinary surgeons and RVN's"

"Greater clinical freedom during the pandemic to prioritise our patients to be seen through the use of triage and telemedicine"

Over half of participants (7/11, 63%) noted that their veterinary practices had provided adequate mental health support to help staff during the COVID-19 pandemic.

5.3.7 Participant levels of stress and anxiety through the course of three questionnaires.

In all three questionnaires conducted the participants were asked to self-rate both their level of work-related stress at the time of taking the questionnaire and their level of anxiety surrounding COVID-19. In questionnaire One (March 2020) 71.4% (50/70) rated their work-related stress as six or above (Figure 11), and 74.2% (52/70) participants rated their COVID-19 anxiety as six or above (Figure 12).

In questionnaire Two (May 2020) 50% (9/18) of participants rated their work-related stress levels at six or above (Figure 11). Regarding anxiety surrounding the COVID-19 pandemic, 55.5% (10/18) of participants rated their COVID anxiety as six or above at the time of taking the questionnaire (Figure 12).

In questionnaire Three (August 2021) 54% (6/11) of participants rated their work-related stress levels at six or above at the time of taking the questionnaire (Figure 11). Regarding anxiety surrounding the COVID-19 pandemic, 27.3% (3/11) of participants rated their COVID anxiety at six or above (Figure 12).

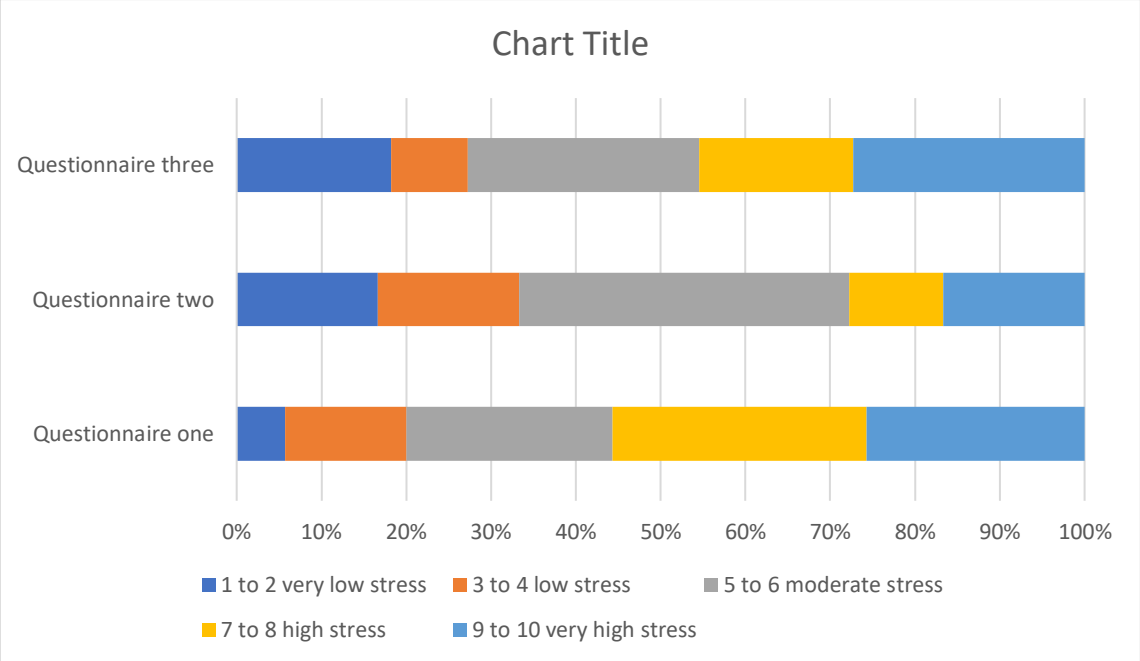

Figure 11 - Bar chart displaying data veterinary professionals gave when asked to self-rate their current levels of work-related stress (1=low, 10=high) at the time of taking each questionnaire (March 2020 through to August 2021) throughout the course of the COVID-19 pandemic.

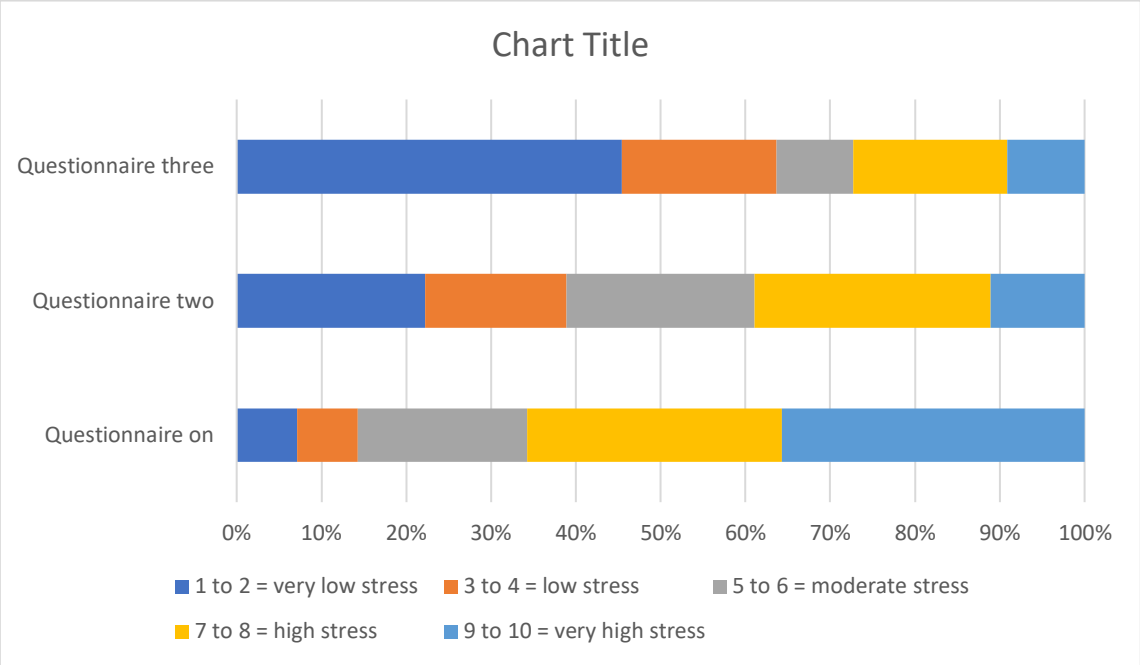

Figure 12 – Bar chart displaying data veterinary professionals gave when asked to self-rate their current levels of COVID-19 related anxiety (1=low, 10=high) at the time of taking each questionnaire (March 2020 through to August 2021) throughout the course of the COVID-19 pandemic.

5.4 Discussion.

This longitudinal study evaluated the impact of the COVID-19 pandemic from when restrictions had just started to be implemented, through to the point that restrictions were lifted. The key findings from this study were that the COVID-19 pandemic presented a number of novel barriers to veterinary professionals looking to provide QVC. Specifically, staff felt COVID-19 restrictions prevented them doing a good job, COVID-19 caused communication changes and difficulties both between colleagues and with clients, and client attitude and behaviour were also a prevalent barrier. Staff work-related stress and anxiety remained high throughout the study, but many participants did report that their practices had provided adequate mental health support. There were significant adaptations made to a majority of those practices featured, in all of the eight key areas explored. Some of these adaptations remained in place even after COVID-19 restrictions were lifted.

5.4.1 Limitations of study.

Limitations for this study included that the data collected was self-reported by participants, and over the course of a year. This could lead to the possibility of self-reporting bias, and poor continuity between questionnaire data due to relying on participants to remember previous answers given.

Subjects in online questionnaires have been shown to report higher levels of anxiety or poor mood versus face-to-face methods of data collection (Donker *et al.*, 2011). This could have led to bias within the data gathered regarding stress and anxiety levels through the course of the study period.

Whilst every effort was made to limit participation to one person per veterinary practice, this relied both on communication between those within the same practice to nominate one person to take part and also on participants using their work email address for the researchers to check that there were not multiple entries from one practice. Three participants used their personal email address during the course of this study so it was not possible to check from which practice these people worked for. Willingness to participate in this study might have been higher among subjects who were currently suffering from a reduction of their mental well-being associated with their job role and exacerbated by barriers from the pandemic and social measures in place.
It is also important to note that some participants were either working from home or currently on furlough during this study (particularly questionnaire one and two) and as such may not have been fully aware of all changes that had occurred that their practice for the staff remaining on site.

The cohort number reduced throughout the course of the data collection; therefore, any results should be interpreted as representative of those participating in the study rather than the profession as a whole. This was to be expected as this data was collected at a time of great uncertainty and stress for a majority of participants and also at a time that veterinary practices were under a large amount of strain (Sadler, 2022; Fathke, Rao and Salman, 2020; Global animal health association., Health for animals. and Global healthcare communications consultancy Pegasus., 2020). A few participants reported being placed on furlough at the time of taking the first and second questionnaire and perhaps a drop in participation could be linked to a reduction in restrictions and those previously on furlough returning to work meaning less free time available to participate. Despite methodological challenges, this study gives an insight into some of the challenges and adaptations made by those working on the front line of the veterinary sector throughout the course of the COVID-19 pandemic in the UK.

5.4.2 Barriers to quality care during COVID-19 and things to improve upon.

Every individual vet practice and veterinary professional may experience different barriers to providing their client's quality care. In Chapter Three and Four, barriers relating to providing QVC and QI in practice were discussed in detail between professional groups. These include the type of work they perform, the clients and patients they primarily see and the practice they work in. Similarities were found largely due to the fact that participants all worked at the same practice (Chapter Four); however, as expected each group and individual did have separate experiences and opinions on this subject. Due to the specificity and individuality of each person's experience regarding barriers to QVC and QI, generic research experienced by the veterinary sector and proven methods to address these are limited. Those papers that do examine this area generally focus on barriers to clients accessing veterinary care, rather than what could prevent veterinary practices from providing the highest quality care (Quain, Ward and Mullan, 2021; LaVallee, Mueller and McCobb, 2017). Questionnaires used in this study explicitly asked participants to note new barriers they had encountered in their daily work since the pandemic, and again periodically through the subsequent questionnaires. Barriers created by client conduct and client communication have been noted by previous studies, however these did not relate specifically to the scenario created by COVID-19. In Chapter Four veterinary surgeons in particular discussed the limitations clients can cause to providing what the vets would perceives as QVC. It is clear that stresses and strains of client/vet communication and interaction are not a new phenominom brought about by the pandemic.It is not unreasonable to assume that the stresses and strains of navigating veterinary care during the pandemic and even the general climate of stress experienced by most during this time period exacerbated these issues further for many.

Participants spoke about the stress of navigating telemedicine and email communication as a primary form of client communication without having had proper training or guidance on how to effectively do this. Vets were not the only profession to experience these difficulties in the early days of the pandemic. Human healthcare workers and educators also had to swiftly adapt to providing their service in a novel way that they had previously not done (Greiwe, 2022; Sari and Nayır, 2020). Within the NHS QI methods were used at this time to evaluate the process of using telemedicine in practice and assess and adapt processes for maximum effectiveness (Rosenthal *et al.*, 2021). Use of these methods identified telemedicine related delays and disruptions to care, and tested solutions to these barrier to deliver effective, quality care for patients (Jen, Bui and Leonard, 2021). Unlike

the NHS which has a long-established structure and framework of QI methods embedded into practice the veterinary profession does not generally have access to these tools and many are lacking the proper knowledge in how to correctly use them. The regular use of QI methods in conjunction with the expertise of specially formed QI teams helped the health services of many countries to assess and adapt their telemedicine protocols during the COVID-19 period (Thakker *et al.*, 2022). The veterinary sector could have also benefitted from the information and feedback gathered from an effective QI project analysing the use of telemedicine if it was readily available to them at the time. This knowledge and information would have almost certainly removed some of the confusion and disruption surrounding the implementation of this care method in practice. Whilst telemedicine is unlikely in the immediate future to replace face-to-face care, fully in either the human or veterinary care sectors, there are undoubtable benefits as well as barriers (Lanevschi-Pietersma *et al.*, 2011). It is important to note that now is the time to be analysing the use of this care method should it ever have to be implemented again. This can be done via QI projects and interventions that will result in a veterinary industry that is better prepared for its use and informed on the most effective way to use it.

Alongside communication, published research acknowledges the impact of client (animal owner/keeper) involvement in care carried out on the animal. Evaluating the literature that does exist in this field of service provision within the veterinary sector shows that important variables within this veterinarian, veterinary practice and client triad are client involvement in care, trust, communication, and vet-client relationship (Pyatt *et al.*, 2021; Coe, Adams and Bonnett, 2012; Shaw *et al.*, 2008, 2012). This is akin to the model used by the NHS that places high value on patient participation in their care received from professionals (Stokoe, Elizabeth. Sikveland, Rein O. Symonds, 2016; Coulter, A. Elwyn, 2002; Crawford *et al.*, 2002). Evaluating the literature that does exist in this field of service provision within the veterinary sector shows that important variables within this veterinarian, veterinary practice, and client triad, are client involvement in care (Pyatt *et al.*, 2021; Coe, Adams and Bonnett, 2012; Shaw *et al.*, 2008, 2012). Trust, communication, and a positive vet-client relationship has a role to play and can act as a basis for client satisfaction in the veterinary service they receive (Pyatt *et al.*, 2021; Grand *et al.*, 2013; American Animal Hospital Association, 2009). The pandemic and restrictions put in place to control the spread of the COVID-19 virus halted the ability of veterinary professionals to provide this client involvement and vet-client interaction in the way they had traditionally been able to. Face-to-face consultations were stopped by many practices

in order to keep staff and clients safe and avoid cross transmittance (Global animal health association., Health for animals. and Global healthcare communications consultancy Pegasus., 2020). Telemedicine became a necessity for many practices in order to continue to provide a service to their clients whilst keeping staff safe; however, some sectors of veterinary practice found this difficult to implement (Robinson, Mason and Alexander, 2021). Veterinary medicine is by its nature a hands-on profession. It is possible to treat some animals remotely and using technology, but that is not possible for all cases. Social distancing without doubt disrupted the efficient work model usually employed by veterinary practices (Manktelow, 2022; PDSA, 2021). Veterinary staff need to be fully trained on how to effectively use telemedicine for the benefits to be realised, and the barriers not become obstacles to quality care (Massin Teller and Moberly, 2020; Roca and Mccarthy, 2019). It is understandable that this could not occur in the very early days of the pandemic. However, over eighty percent of participants did report that their practice was implementing some form of telemedicine, and it is positive that no participants in the later questionnaires noted telemedicine with regards to client communication as a prominent barrier to their work. This might indicate proactive work on the part of the management to get their staff trained as well as clients acclimatising to this new way of working or alternatively could also be indicative of the staff acclimatising to a new way of communicating and treating patients through the use of telemedicine.

Other barriers identified were more unique to the early days of the COVID-19 pandemic, such as infrastructure limitations (due to donating equipment to human hospitals) and the social distancing protocols making work hard, particularly for those vets working with farm animals and equids. Social distancing made it necessary for practitioners that would have previously worked with a colleague, particularly in large animal / equine practice, to navigate difficult and occasionally dangerous work alone without assistance. The barriers reported in this study, specific to COVID-19 restrictions were very much in line with other studies examining veterinary care during COVID-19 (Quain, Mullan and Ward, 2021; Quain, Ward and Mullan, 2021). Quain et al. reported that barriers relating to COVID-19 restrictions such as social distancing posed not only ethically challenging situations to the professionals involved, but also directly impacted their ability to do what was considered a ‘good job’(Quain, Ward and Mullan, 2021). The results of this study and the free-text answers provided would agree with these findings.

Some of the barriers noted existed pre COVID-19, and some were novel to the situation at the time of data collection. Not every participant explicitly stated which barriers were new since the pandemic began, exacerbated by the pandemic or novel to the pandemic restrictions in place. The barriers that presented due to the restrictions, such as a build-up of non-urgent cases which in time became urgent, put increased strain on emergency and OOH provision. These barriers that professionals felt prevented them being able to provide the highest quality care could have been prevented with proactive flexible planning and protocols in place . QI methods have been shown to assist organisations in fully evaluating not only the impact of event on their processes and protocols but also the potential future impact these could have (Ahn *et al.*, 2021; Dean, 2018; Donnelly, 2017; Müllern and Nordin, 2012; Lee and Nelder, 1998). Key driver diagrams[11] and other framework methods are an invaluable, flexible, tool used regularly in the NHS and other industries to provide their staff with an adaptable planning tool to modify their work process, monitor the effect and re-evaluate changes as they come (Saghari, Rahmani and Budinská, 2022).

When participants were asked to comment on what could have been done to better help them provide QVC in time of extreme stress and pressure, several suggestions revolved around improved foresight with plans and processes enacted by both practice management and the industry as a whole. Along with this, participants wanted better flexibility to allow them to adapt to the ever-changing situation the participants were faced with. In situations where there is limited historic data and results to draw upon, a robust and well conducted QI project can provide professionals with the vital data needed in order to effectively prioritise caseloads. The iterative nature of any QI study would provide veterinary staff the evidence based flexibility to adapt their processes and protocols in times of stress and high levels of change. The very nature of QI would help provide groups of professionals working in practice a wide scope of all the activities occurring and help to sign post potential areas of concern. It may also prevent adverse incidents or mistakes which was another concern spoken about by several participants.

[11] Driver diagrams are structured charts, designed to assist in planning and reaching an improvement goal/aim using a logical set of high-level factors (primary drivers) that you need to influence to achieve the goal. The diagrams also show the specific activities that would act on factors and details whom should be responsible for what actions in a project.

Few of the barriers reported would have been new to the veterinary professionals taking part in these questionnaires. For example, the veterinary sector has been experiencing a recruitment and retention problem since 2019 when it was placed on UK's Shortage Occupation List (Hagen *et al.,* 2020). The increased pressure of experiencing all or a lot of these barriers simultaneously, along with numerous other stressors at the time of the questionnaire would have made navigating these barriers challenging for staff. Whilst some participants felt that their practice had adequately planned and supported their staff through this process, this was not true for all participants. There needs to be better standardisation and sharing of 'what went well' during the COVID-19 pandemic to assist practices in being better prepared to provide the highest quality care during times of extreme stress on the sector.

5.4.3 The impact of COVID-19 on the mental health and wellbeing of veterinary professionals.

Undoubtably the COVID-19 pandemic was a time of extreme stress and anxiety for the participants; however, there were also some positive messages from this study. Over half of the participants (7/11, 63%) noted that their veterinary practices had provided adequate mental health support to help contributors over the last year during the COVID-19 pandemic. This is encouraging as the veterinary sector is currently experiencing a mental health crisis, but there is still work to be done. In 2020, Bartram reported that veterinarians are four times more likely than the general population, and twice as likely as other healthcare professionals, to commit suicide (Bartram and Baldwin, 2010). Research has shown that those closely affected by pandemics can show symptoms of post traumatic disorders, anxiety, and depression both during and after the fact (Carmassi *et al.*, 2022; Franzoi *et al.,* 2021). Reported levels of work-related stress did decrease in the months between questionnaire one (April 2020) and questionnaire two (June 2020). A year later when questionnaire three was conducted, those reporting high levels of stress (6 or above) had increased by 4%, but this finding should be considered in the light of the low numbers of participants in the later questionnaires. Veterinary medicine would not be the only industry still feeling the after-effects of COVID-19; many studies report needing to accept and adapt to a 'new normal' in the post pandemic world, such as those seen in tourism(Benjamin, Dillette and Alderman, 2020) industry (Kane *et al.*, 2021), education (Xiao, 2021; Bierbooms *et al.*, 2020), healthcare (Bierbooms *et al.*, 2020) and also veterinary medicine (Grubb, 2021).

5.4.4 Changes to team dynamics and the changing landscape of veterinary medicine as a results of COVID-19.

The full effect of COVID-19 on the veterinary sector needs to be completely assessed in order for the lasting effects to be monitored and measured. Howe et al. (2021) suggests that fully acknowledging and exploring the extensive changes experienced in other sectors during the pandemic could allow individuals working within these sectors to adapt better to a rapidly changing landscape and even result in improved efficacy and products (Howe *et al.*, 2021). Participants reported that several changes made in response to the pandemic and subsequent restrictions that are still being implemented in their practice are viewed in a positive light. For example, the use of telemedicine and triage by trained professionals allowed veterinary professionals greater clinical autonomy over cases seen and enabled them to better prioritise their time. An increase and improvement in inter-team communication was reported, particularly between different professional groups within the veterinary practice despite the removal of face-to-face communication in some places. Communication is a core skill required to deliver veterinary care (Russell *et al.*, 2022). Repeated reports and studies have demonstrated communication to be one of a number of key professional skills, leading to beneficial care outcomes (Coe, Adams and Bonnett, 2012; Shaw *et al.*, 2008; Lewis and Klausner, 2003). Research into communication within veterinary medicine primarily focuses on observed, taught, and mandated communication methods, taking little consideration for novel communication methods such as those utilised during the pandemic (Russell *et al.*, 2022). Recognising and encouraging the innovative methods of communication could potentially lead to improved outcomes and a happier workplace for many veterinary practices, particularly given the reported improvement people feel in communication within their practice. Understanding of communication successes and struggles, will help the profession mitigate the risk poor communication poses to clinical outcomes in all situations.

5.5 Conclusion.

Changes in working practice as a result of COVID-19 emphasised the flexibility required from those within the veterinary sector regarding approach to providing quality care. Adaptability to the challenges presented by the pandemic was vital to maintain the highest standards of care and ensure staff safety. Whilst some practices already had the infrastructure in place to cope with the stresses placed upon them, not all of them did. This questionnaire highlights changes in both external and internal workings that participant practices underwent over the period of time of this study. The veterinary sector can

develop strategies to aid resilience in times of extreme stress. The implementation of a strong framework of regular appraisal of the quality-of-care process' (QI) would ensure all staff are familiar with regular review of their systems of care. COVID restrictions required constant evaluation and adaptations however few staff felt prepared or equipped for this. Longer term studies are required to determine whether changes brought in to continue the provision of quality care during COVID-19 will be changes that are adopted in the long term by the sector.

Chapter 6

Developing consensus for definitions of key veterinary-specific quality improvement terms: an eDelphi-study method

Abstract

Introduction: Quality improvement (QI) methods are a continuous process of iterative tests to improve the quality of a service or product. Using common language has been linked to the successful implementation of QI in human healthcare.

Aims: This study aimed to create and identify veterinary specific definitions that best represented QI and QVC terms associated with UK veterinary practice. This was achieved via a consensus-based approach that would produce a glossary of terms that were useable and specifically relatable to professionals working in veterinary medicine.

Methods: A four-round modified eDelphi process with a panel of fifty UK veterinary practice stakeholders (representing qualified veterinary surgeons, clinical directors / practice owners, registered veterinary nurses, administrators, practice managers, receptionists/client care team and auxiliary staff) and pet owners was used to generate consensus. Definitions were both gathered from existing literature and developed by participants for a list of QI specific terms. The panel selected or suggested the definition they felt was the best fit of each term in each round. At the end of each round all participant's votes were collated. Consensus was reached if there was >70% agreement and terms were eliminated if there was <15% selection. It was not possible for any singular group to vote for the same term and reach consensus, eclipsing other job role's view point.

Results: Thirty-one panellists completed all three rounds of eDelphi; eight participant completed an optional feedback round. From fourteen terms, ten reached consensus, leaving four unresolved definitions. A majority of terms reached consensus with 90% new or amended definitions proposed by panel members.

Conclusions: Utilising definitions written in plain English, refined by stakeholders, will facilitate successful implementation of QI in veterinary healthcare. Not all terms achieved consensus highlighting a need for further research to enable successful integration of QI principles as seen in human healthcare.

6.1 Introduction

Continuous improvement in quality-of-care delivery is a key aspect of any healthcare service, whether it be for humans or animals. Quality improvement (QI) methods are a continuous process of iterative tests used to monitor and improve the quality of a service or product (Rooke *et al.*, 2021b). Providing the highest quality veterinary care is what all veterinary professionals strive to do; in veterinary care this can often require a balancing act between meeting the owner's financial resources and emotional needs whilst simultaneously striving to meet the animal's welfare and clinical needs. QI methods have been used within worldwide healthcare services, including the National Health Service (NHS), for over two decades to address a variety of issues and goals (Baily *et al.*, 2006; Portillo, 1998). When employed correctly they can provide a framework flexible enough to cope with the complicated systems involved in healthcare but supportive enough to assist professionals to provide the very best care and continue to improve even upon good performance (Mortimer *et al.*, 2018; Petitclerc, 2012). QI initiatives do exist within veterinary medicine; however, their use is sporadic and not as established in mainstream practice culture as in human medicine (Rooke *et al.*, 2021b). Often the range of methods employed is limited compared to human healthcare settings and the reporting of these activities in published veterinary literature is varied. Those described are typically more demonstrative of the activity of advocates and experts than universal adoption, and there is a lack of a comprehensive overview of QI techniques employed by veterinary professionals in published literature (Rooke et al., 2019, 2021; Hocking, Picken and Ling, 2020; Waine and Brennan, 2015).

Clear effective communication and common language has been linked to the successful implementation of QI initiatives in human healthcare (Cooper *et al.*, 2015; Reed *et al.*, 2014; Shamji *et al.*, 2014). The Healthcare Quality Improvement Partnership (HQIP)[12] identifies twelve key QI methods best suited to healthcare and places these into a clear framework of application within a variety of settings in their education materials (HQIP, 2015). This consistent information regarding language and framework for implementation from a reputable source has been instrumental in helping establish consistent QI

[12] The Healthcare Quality Improvement Partnership (HQIP) is an independent organisation led by the Academy of Medical Royal Colleges, The Royal College of Nursing, and National Voices - an organisation which represents doctors, nurses, and patients within the National Health Service in the UK (HQIP, 2020).

methodology practices within healthcare. This in turn has increased uptake and buy-in from staff working in the NHS.

Whilst the HQIP has established QI frameworks and training for use in the NHS, such frameworks do not exist as clearly within veterinary medicine. RCVS Knowledge has produced several resources specifically aimed at veterinary professionals which are available to all through their website, however results from a questionnaire of UK based veterinary professionals showed that few people were aware of or using these resources (RCVS Knowledge, 2020b; R.C.V.S. Knowledge, 2020). This appears to be particularly true for those in non-clinical job roles such as administrators and receptionists, and few resources can be found that are specifically aimed at these staff families. Research shows that QI methods could prove hugely beneficial to the veterinary sector through increasing productivity, reducing complications, and improving and maintaining quality of care delivered to patients (Rose, Toews and Pang, 2016c; Elliston, Heayns and Fish, 2012; Mustafa and Anjum, 2009); however, QI methods are not yet well incorporated. Instead, the examples available of professionals using QI methods are rarely termed as QI and are rarely conducted in a cyclical format which is required of a true QI intervention/project (Rooke *et al.*, 2020, 2021b). The research presented in chapter 3 showed a variety of factors affecting the adoption of QI within UK veterinary practice. Confusion and inconsistency surrounding the terms and language used to describe these methods contributes to the challenges for the application of QI methodology in veterinary practice (Hocking, Picken and Ling, 2020; Rooke *et al.*, 2019). In the field of human healthcare, critical analysis is used to evaluate the effectiveness and transferability of many QI projects conducted. This is to ensure that the work being done is not only reliable but applicable to as wide an audience as possible. This is made possible by the use of a mainstream accepted and validated terminology (Kitto, 2018; Sajdlowska *et al.*, 2015; Mainz *et al.*, 1992).

<u>Aims:</u>

- To define key terms of importance to QI using language understandable to all stakeholders using an evidence-base methodology alongside expert opinion which will encourage uptake across the profession of the terminology and ultimately improve the care delivered.

<u>Objectives:</u>

- Gather a panel of stakeholders relevant to the provision of veterinary care.

- Hold an eDelphi study to review and generate veterinary specific definitions relating to quality care, QI, and QI methods.
- Use the eDelphi method attempt to reach consensus on the most appropriate definitions for specific QI terms.

6.2 Methods

6.2.1 The eDelphi process

The modified eDelphi methodology is a group consensus approach to access a geographically dispersed group of experts. The method systematically uses a combination of literature review, stakeholder opinion and the judgment of field experts to reach agreement (Miller *et al.*, 2020; Toronto, 2017). Through a series of intensive questionnaires interspersed with controlled feedback from participants, each subsequent round is developed using answers provided in the previous round (Chou, 2002). A modified four round eDelphi process was utilised to generate consensus amongst a panel of stakeholders. Three iterative rounds of online questionnaires were followed by a fourth used to gather feedback (Fig.13).

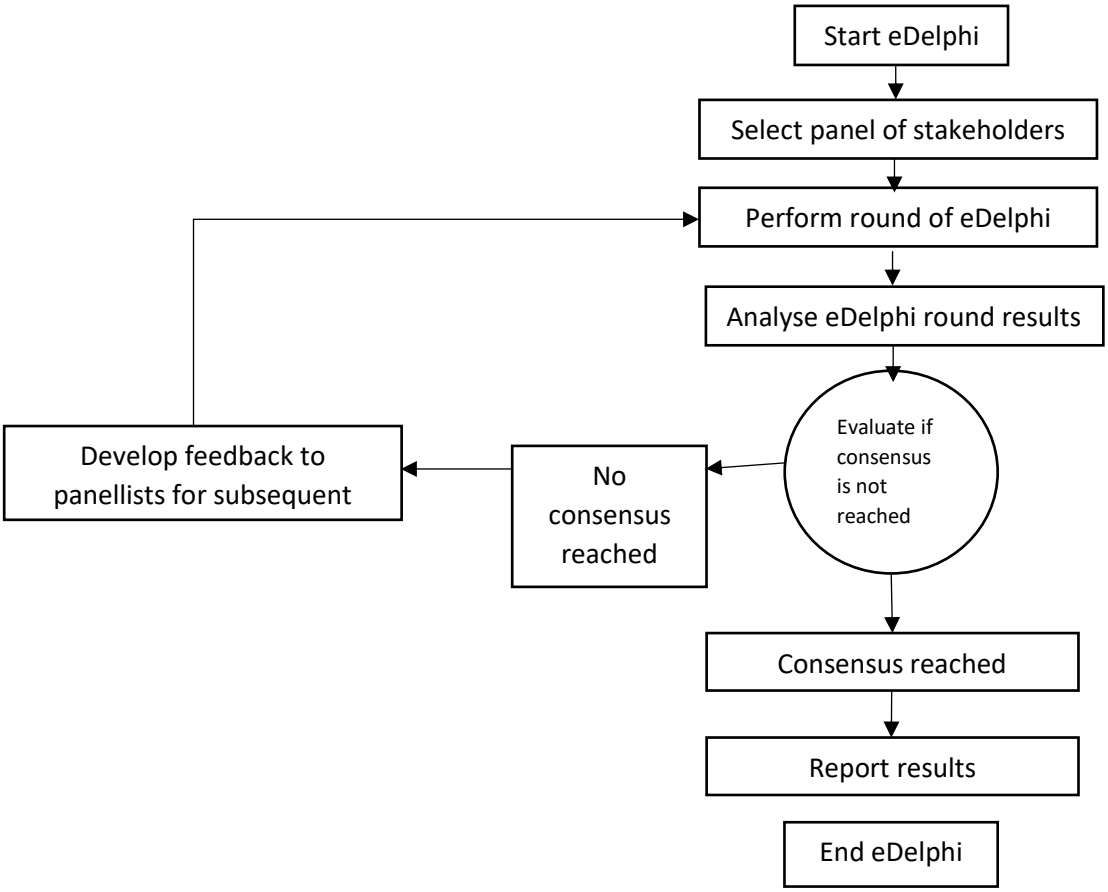

Figure 13 - Flow chart demonstrating the basic eDelphi process followed for this study. This cycle will either continue until consensus is reached as shown, or the process automatically terminates after a pre-defined number of rounds.

6.2.2 Recruitment of panel

The target population for the eDelphi was first opinion practice stakeholders, including vets, nurses, and animal owners. These stakeholders were targeted to meet the overall aim which was to identify terms that best represented QI approaches for the benefit of animal care. All participants were invited to volunteer their interest through a short questionnaire distributed via a social media campaign and advertised with a press release by RCVS Knowledge, The University of Nottingham, and the Centre for Evidence-based Veterinary Medicine (CEVM) of the School of Veterinary Medicine and Science. The questionnaire included questions such as: current job role, type of work performed, whether they worked at a corporate or independent practice, current knowledge, and use of QI in their work (Table 18). An adjusted questionnaire was used for pet owners (PET), who were recruited specifically through social media. The questions included the type and number of animals owned, their current profession and if they had ever had contact with QI in any capacity (Table 19). Snowball sampling was used to widen the recruitment with participants encouraged to pass the questionnaire link on to anyone they knew who might be eligible to take part.

Table 18 – Table showing the total demographic criteria used by researchers to select veterinary professionals to sit on the eDelphi panel discussing consensus for veterinary specific QI terms. Criteria included current job role, type of work performed, whether they worked at a corporate or independent practice, current knowledge, and use of QI in their work.

Job role / current profession	Qualified veterinary surgeon (QVS) Clinical director / Practice Owner (CD/Po) Registered veterinary nurse (RVN) Administrator (Admin) Practice manager (PM) Receptionist/client care (RRCC) Auxiliary staff (Aux)
Type of work performed at current practice	First opinion Referral University Ambulatory Charity
Practice ownership/management	Corporate Independent University Charity
Type of animal treated by practice / owned (pet owners).	Small animal (e.g., cats, dogs, rabbits, guinea pigs etc.)

	Exotics (e.g., reptiles, pet fish etc.) Equid (e.g.: horses and donkeys) Farm (e.g.: cattle, pigs, goats, sheep, alpacas etc.).
Prior knowledge of quality improvement methods either in veterinary or another industry	Previous experience in veterinary medicine Previous experience in another industry No previous experience of QI

Table 19 Table showing the total demographic criteria used by researchers to select pet owners to join the eDelphi panel discussing consensus for veterinary specific QI terms. Criteria included the type and number of animals owned, their current profession and if they had ever had contact with QI in any capacity.

Type of animal owned	Small animal (e.g., cats, dogs, rabbits, guinea pigs etc.) Exotics (e.g., reptiles, pet fish etc.) Equid (e.g.: horses and donkeys) Farm (e.g.: cattle, pigs, goats, sheep, alpacas etc.).
Prior knowledge of quality improvement methods either in veterinary or another industry	Yes No Don't know
Involvement in client response activities, by providing feedback (positive or negative) to a veterinary surgery. This may have been a phone call, complaint or compliment letter, social media review or client satisfaction questionnaire.	YES No
Length of time owning animals	1-10 years 11-20 years 21-30 years 31+ years

6.2.3 Panel selection

A target of 50 participants was chosen to ensure maximum representation and to allow for the inevitable drop out of participants throughout the process (Habibi, Sarafrazi and Izadyar, 2014; von der Gracht, 2012; Okoli and Pawlowski, 2004). A random selection of individuals from the recruitment questionnaires were invited to participate. The overall makeup of the panel was balanced on job role, type of work, and for owners, animals treated/owned and previous experience of QI. (Table 18, 19 and 20). By recruiting a larger than the minimum typically recommended allowed the possibility of accepting a lower

threshold of agreement to achieve consensus (>70%) as members not in agreement would be less likely to represent a single demographic (Jorm, 2015).

Table 20 - Break down of the selected panel for the eDelphi to develop consensus on veterinary specific QI terms. Participants categorised by their job role demographics, the percentage each role took of the entire panel and actual number of participants represented each job role category.

Role in the veterinary profession	Percentage of panel	Number of people
Qualified veterinary surgeon	20%	10
Registered veterinary nurse	22%	11
Pet owners	12%	6
Clinical director / practice owner	10%	5
Practice manager	10%	5
Receptionist / client care team	10%	5
Administration staff	10%	5
Auxiliary staff	6%	3

6.2.4 Selection of initial terms and definitions:

A list of fifty- six terms (Appendix I) related to QI were identified by RCVS Knowledge from the glossary of terms produced by NHS Scotland Quality Improvement HUB along with suggestions and comments from the RCVS Knowledge Quality Improvement Advisory Board (QIAB). This list of terms were shared with the research group consisting of three representatives from The University of Nottingham (FR, MB, and JB) and two representatives from RCVS Knowledge (AD and CG). To select the terms to be included in the eDelphi, each member of the group independently selected from the list of terms based upon whether they felt that there was no single unified term applicable to the veterinary profession or if the term prominently featured in RCVS Practice Standards Scheme or the RCVS Code of Conduct. After this process was completed, an open discussion was held amongst the panel to present opinion and evidence for a final list of terms. Terms were selected if chosen by the majority of the group (≥3 members), as well as discussion and comparison of existing resources (Appendix J). This process ensured the terms put to the panel were both relevant to veterinary practice and policy and required further research to produce a veterinary relevant definition. After this process, fourteen terms were nominated to be put to the eDelphi panel.

To identify possible definitions, two databases (PubMed - https://pubmed.ncbi.nlm.nih.gov/ and CAB abstracts - https://www.cabdirect.org/) were searched. If numerous definitions were available for one term, priority was given to those

most frequently used in published medical literature. Where there were insufficient definitions found in the published literature search, definitions used in policy documentation or education were also utilised. Selected definitions were then put to the research group without alteration. After discussion among the research group, each term had a minimum of two and a maximum of three of the most frequently used definitions in literature. Some terms needed minor adjustment to be relevant to the veterinary field for example in certain situations replacing the term patient with client.

6.2.5 Consensus parameters

Prior to commencing the eDelphi process, it was agreed within the research group to set a consensus level of >70% agreement among the eDelphi panel before a term could be considered 'accepted'. This cut off was selected based on previously published Delphi studies and the most common levels applied. Definitions were also required to meet a minimum threshold of ≥15% agreement to be put forward to the successive round. This threshold was selected as a balance between eliminating unpopular choices to focus the panel towards consensus and ensuring that if all members of the three main demographic groups (clinical veterinary professionals, client care team/administrators and pet owners) all selected a single choice that this would remain.

6.2.5.1 Terms without consensus or definition options

Due to the likelihood of dropout in each round, there was the possibility that a single definition could remain which did not achieve consensus but was the only option remaining after other choices were eliminated (for example, option A, 29/42 (69%) participants; option B, 5/42 (11%) participants; option C, 4/42 (10%) and option D 4/42 (10%) participants). In this case, the subsequent round included the remaining definition plus an option to not select this definition. The panel were therefore given the option of still maintaining autonomy of their opinion whilst not forcing them into choosing an option they did not feel was appropriate whilst remaining true to the methodology followed for the other terms.

6.2.6 Questionnaire distribution

Questionnaires were distributed via automated email using the platform Online questionnaires (https://www.onlinesurveys.ac.uk, Jisc, Bristol, UK). Each panellist on the eDelphi specifically consented to participate at the start of each questionnaire. All panellists were also advised that their responses would be confidential and anonymous,

and that participation was voluntary. Panellists were assigned a code related to their job role (e.g., “Admin 4” for administrator 4 and “PetO1” for pet owner 1). This enabled any comments to be left anonymously. Only the author had access to the list of names, emails and codes, and these codes were automatically captured by the questionnaire platform when the participant logged in to complete the questionnaire.

The panel were asked to complete each round of the questionnaire within four weeks. Non-responders were sent reminders after three weeks and, where necessary, after a further 10 days. Each participant was sent personalised email links to the questionnaire so that completion could be tracked, and targeted reminder emails could be sent. Panellists were not explicitly asked to provide feedback regarding the process of data collection until the final round. They were permitted and encouraged in the first round to provide rationale and reasoning for their suggested definitions and if appropriate this was fed back to the group in the second round.

6.2.7 Round one methods

In the first round of the eDelphi, the panel were presented with forty literature-based definitions of the fourteen terms to vote on (Table 21). Within the questionnaire the terms were grouped into thematic areas. Panellists were also given the option to propose their own definition for each term. Results from Round One were reported anonymously back to the research group; all comments and new definitions were anonymised. Participants that suggested new definitions were asked to provide reasoning behind their suggestion. This ‘feedback’ was anonymised once received by the researchers so participants could not ascertain which new definitions and accompanying comments had been made by which participant. Cumulative percentage scores were used to determine agreement levels, the definitions that had not reached the minimum threshold of 15% agreement were not put forward to the second round. Any non-responders were eliminated from the study at this point.

Table 21 - Table detailing the forty literature definitions relating to QI terms presented to eDelphi panellists in round 1 to develop consensus on veterinary specific definitions for QI terms. Definitions given in the order as they appeared to panellists and were gathered from a comprehensive search of literature. If no or few definitions were found in peer reviewed publications the search was extended out to policy documents and other reputable publications.

Term to be defined:	Literature-based definitions offered
Section 1 – Definitions relating to quality care	
Quality veterinary care	• Providing a service that is accessible to animal and owner, enabling them to receive the care needed and ensuring that care is effective (Loomans *et al.*, 2008; Lin and Brian, 1996). • Providing health services for animals and their carers that increases the likelihood of desired health outcomes and are consistent with current professional knowledge. Quality care should be: safe (avoiding harm to patients during the course of care), effective (providing service based on evidenced-based medicine to all who could benefit and avoiding providing services to those who will not benefit), patient-centred (providing care that is respectful of and responsive to the needs, values and wishes of the owner but prioritises the health and welfare of the patient), timely (reducing wait and harmful delays), efficient (avoiding waste), equitable (providing care that does not vary in quality because of gender, ethnicity, geographic location or socioeconomic status) and support the care-giver experience (providing care which supports a sense of fulfilment and pride for the care-giver) (IOM, 2018). • Providing a delicate balance between health and wellbeing of the population (vaccination, castration, and health programmes), sustainable finance (affordable care), sustainable use of environment and resources (avoiding waste of equipment, ideas, and energy), providing the best possible evidence-based care for the individual animal whilst also meeting client needs and wishes (Dean, 2018; Reed and Card, 2016). (This basic description is used by the Royal College of Physicians to describe quality care in human healthcare, with adjustment to include client wishes and need where here the client is the animal owner/keeper/bill payer to make this applicable to veterinary care)
Quality improvement	• Quality Improvement initiatives must bring clarity to what quality care is (there must exist clear and accepted definitions of what quality care is in order to measure care delivered), measure and publish examples of quality care (the system can only improve what is measured, there must be transparency on outcomes and information must be robust, relevant and timely), reward quality care (by incentivising and recognising quality care when it is measured as such participation in activities will be encouraged), encourage leadership for quality care (leadership not only nationally but locally – in house is essential for QI to be embedded, encouraged and rewarded appropriately), innovate quality care practices (continuous QI requires innovative approaches to delivering and measuring care as they present themselves - it is a continuous process) and finally safeguard quality care that already exists (any system striving for improvement must also recognise and protect the standards of care when they are met and maintained) (HQIP, 2015).

	• A formal, systematic, and cyclical evaluation of a programme or system of care, administration or experience that is carried out with the intention of monitoring or improving the quality of the care or service provided to the client and patient (Rooke *et al.*, 2019, 2020, 2021b) • The combined and unceasing efforts of everyone – healthcare teams, patients and their owners/carers, researchers, payers, planners, and educators – to make the changes that will lead to better patient outcomes (health), better system performance (care) and better professional development(Batalden and Davidoff, 2007).
Clinical effectiveness	• Doing the right thing, in the right way, for the right patient at the right time(Powell, Rushmer and Davies, 2009; Varkey, Reller and Resar, 2007). • Clinical effectiveness includes monitoring and improving the outcomes of patients and service users, by ensuring health professionals are up to date in their practices, properly supervised where necessary and implementing the best practice and quality(National institute for health and care excellence, 2017). • The application of the best available knowledge derived from research, clinical experience, and client preferences, to achieve optimum processes and outcomes of care for patients(Viner, 2009, 2010).
Patient safety	• The absence of preventable harm to a patient during the process of health care and reduction of risk of unnecessary harm associated with health care to an acceptable minimum. An acceptable minimum refers to the collective ideas of given current knowledge, resources available and the context in which care was delivered weighed against the risk of non-treatment or other treatment (Emanuel *et al.*, 2009). • A discipline in the health care professions that applies safe scientific methods toward the goal of achieving a trustworthy system of health care delivery. Patient safety is defined as an attribute of health care systems that minimizes the incidence and impact of adverse events and maximises recovery from such events (World Health organisation (WHO), 2017). • The reduction of risk or unnecessary harm associated with health care to an acceptable minimum (Tivers, 2015; Runciman *et al.*, 2009) .
Clinical governance	• A framework through which an organisation is accountable for continually improving the quality of their services and safeguarding high standards of care by creating an environment in which excellence in clinical care will flourish (Godsall, 2008; Scally and Donaldson, 1998). • Clinical governance provides mechanisms to identify problems and then to find, implement and sustain meaningful solutions. The component parts of clinical governance could easily be compared to a jigsaw puzzle; each • piece is interlinked with the others, rather than sitting by itself in isolation. Each piece requires all the others to be in place before the picture is complete e.g., clinical guidelines, clinical effectiveness and audit, lifelong learning, client choice, collaboration and teamwork, research and development, evidence / information, implementation, and risk management all form veterinary clinical governance (Godsall, 2008)

	• Clinical governance is a continuing process of reflection, analysis, and improvement in professional practice for the benefit of the animal/patient and the client/owner (Royal College of Veterinary Surgeons, 2020).
Section 2 – Definitions relating to methods of quality improvement	
Clinical audit	• The collection of data prospectively or retrospectively in health care settings to answer a specific question relating to the delivery of clinical care. The ultimate aim of clinical audit should be to improve the care delivered to patients and the service delivered (Waine *et al.*, 2018b) • A systematic 'cycle' that involves measuring care against specific criteria, taking action to improve it if necessary, and monitoring the process to sustain improvement. As the process continues, further improvements can be made (Benjamin, 2008) • A Quality Improvement cycle that involves measurement of the effectiveness of healthcare against agreed standards for high quality and taking action to bring practice in line with these standards to improve the quality of care and health outcomes (HQIP, 2015; Burgess, 2011)
Significant event audit	• A retrospective audit that looks at one case in detail, from beginning to end, to either increase the likelihood of repeating outcomes that went well or decrease the likelihood of repeating outcomes that went badly (RCVS Knowledge, 2020d). • Individual cases in which there has been a significant occurrence (not necessarily involving an undesirable outcome for the patient) analysed in a systematic and detailed way to ascertain what can be learnt about the overall quality of care and to indicate changes that might lead to future improvements (Gillam and Siriwardena, 2013) • A process in which individual episodes (when there has been a significant occurrence either beneficial or deleterious) is analysed in a systematic and detailed way to ascertain what can be learnt about the overall quality of care, and to indicate any changes that might lead to future improvements (Mosedale, 1998b, 2016b, 2018)This definition was created as an amalgamation of various definitions all used by this author in different publications.
Morbidity and mortality rounds (also known as: M&M's, morbidity conferences, mortality conferences)	• A regular periodic conference usually held to review cases seen that resulted in poor or avoidable outcomes, used as a learning exercise for all members of staff involved (Giddins *et al.*, 2015). • A forum where adverse outcomes can be discussed. They have the potential to improve patient outcomes, quality of care, attitudes toward patient safety and they contribute to the education of clinical staff. M&M meetings are deemed an important component of clinical governance that provide both the necessary administrative assurances that poor outcomes are being monitored and addressed, and the environment in which learning from them may take place (Ferreira *et al.*, 2019; Sinitsky *et al.*, 2019; George, 2017; Higginson, Walters and Fulop, 2012). • An open forum for the collaborative review of adverse events without fear of retribution or blame. The primary goals should be improving patient care and maximising the educational benefits of a shared experience (Kravet, Howell and Wright, 2006).

Section 3 – Definitions relating to administration, direction, and guidance.	
Management	• The coordination and administration of tasks to achieve a goal. Such administration activities include setting the organisation's strategy and coordinating the efforts of staff to accomplish these objectives through the application of available resources (INDEED editorial team, 2020). • The process of ensuring efficiency and accuracy with which outcomes are achieved by the people and systems that deliver them (Henry and Lord Balledmond OBE, 2016).
Leadership	• Taking responsibility for case management, client communication and the coordination of the team of veterinary nurses and receptionists who facilitate their roles (Pearson, Butler and Murray, 2018). • Leadership is principally concerned with key tasks and perspectives, but it also has its personal side, which should not be neglected. Personal leadership refers to our inwardly focused efforts to succeed, conceptualising an individual's values, interests, and aspirations. Management leadership involves coping with complexity, coping with change by using communication and conflict-resolution skills, and diplomacy and motivational skills (Oxtoby, 2018; Robins, 2011).
Guidelines	• Systematically developed statements to assist the clinician and carer in making decisions about appropriate healthcare for specific circumstances (Broughton and Rathbone, 1999). • A written statement describing the best clinical practices for specific scenarios in patient care. These are based on the professional judgement of a given group of veterinary professionals (developers) in a given practice area and designed to improve the decision-making process (Pugliese *et al.*, 2019). • Systematically derived statements that help practitioners to make decisions about care in specific clinical circumstances. These should be research or evidence based. Guidelines should provide extensive, critical, and well-balanced information on the benefits and limitations of various diagnostic and therapeutic interventions so that the clinician can carefully judge individual cases (Lohr and Schroeder, 1990).
Protocol	• Rules of how to proceed in certain situations. They provide health care practitioners with parameters in which to operate. The term 'code of practice' may be used synonymously with clinical protocols. A code comprises a set of laws or rules. Codes of practice may be formulated by statutory organisations, professional bodies, employers, or voluntary organisations. They may cover a diverse range of issues or focus on a specific process or issue (Turner, Merriman and Dale, 2005) • A written plan that specifies procedures to be followed in defined situations. A protocol represents a standard of care that describes an intervention or set of interventions. Protocols are more explicit and specific in their detail than guidelines, in that they specify who does 'what', 'when' and 'how' (Boyce, 2017). • Rigid statements allowing little or no flexibility or variation. A protocol sets out a precise sequence of activities to be adhered to in the management of a specific clinical condition. There is a logical sequence and precision of listed activities (Rosenfeld and Shiffman, 2009).

Checklists	• Lists of vital actions which need to be completed before, during, or after a procedure. By compensating for the limits of our memory, they can act as a trigger to remind us of crucial steps that are easily overlooked (Mosedale, 2016a, 2020). • An organised tool that outlines criteria of consideration for a particular process. It functions as a support resource by delineating and categorising items as a list—a format that simplifies conceptualisation and recall of information (Hales *et al.*, 2008). • An algorithmic listing of actions to be performed in a clinical setting, the goal being to ensure that no step will be forgotten (PSN, 2019; Verdaasdonk *et al.*, 2008).
Standard operating procedure (SOP)	• A set of steps that a person or group of people must perform to complete a job by removing variation. It is a process document that details the way an operator should perform a given function (Amare, 2012). • A set of written and detailed instructions that document a routine or repetitive activity followed by an organisation to achieve uniformity of the performance of a specific function. SOP avoids variations regardless of the operator and time of operation; provides individuals with the information to perform a job properly, facilitates consistency in quality of an end-result, addresses safety concerns; and minimises chances for miscommunication even if there are temporary or permanent personnel changes (United States Environmental Protection Agency (EPA), 2007). • Written documents describing routine procedures carried out in veterinary practices. A properly constructed SOP can improve practice efficiency, possibly save money, act as a training manual for staff and, as a last resort, be used by the practice to defend itself should any charges of wrongdoing be levied (Gunn, 2000).

6.2.8 Round Two methods

In Round Two panellists were instructed to re-read all the definition options presented and were informed of the presence of new definitions that were not present in the first round. These 'new' definitions were presented as they were written by the panel member that suggested it with alterations only made to correct spelling or grammatical errors. Alongside these new definitions, none of the definitions presented from round one that were still included were altered. The eDelphi panellists were given the chance to provide feedback and comments at the end of each section of the eDelphi which were then fed back to the research panel. The same processes for distribution, reminders, and analysis were used as in round one; however, participants only had three weeks to complete the second round.

6.2.9 Round Three methods

After concluding Round Two and analysing the results, the panel were given the final list of definitions to vote on. The definitions that had failed to reach the minimum agreement threshold of 15% were eliminated but no other definitions were altered or added at this stage. For this round the panel were given the percentage agreements for each term remaining from the previous round, so they had some idea as to how other panellists had voted, as well as the percentage agreement for those terms that had been 'accepted'.

6.2.10 Round Four methods

Panellists were invited to participate in a concluding questionnaire after round three. At this stage, panellists were informed of which definitions had reached consensus through the eDelphi process and were given the opportunity to leave feedback. Questions specifically focused on the reasons why the participants thought some terms had not reached agreement and gave an opportunity to provide suggestions for how to improve existing definitions that had failed to reach consensus and general feedback about the process.

6.3 Results

6.3.1 Participant demographics

One-hundred and sixty-nine responses were received to the initial recruitment questionnaire, and fifty were invited to take part in the panel in accordance with the proportions required for each role. Thirty-two panellists completed all three rounds of voting with each of the demographic groups represented at each stage of the process (Table 22).

Table 22 - Table details the total number of participants for each demographic job group that responded to each round of the eDelphi study to gather consensus on veterinary specific QI definitions.

Job Role	**Round 1**	**Round 2**	**Round 3**	**Round 4**
Registered veterinary nurses	7	6	4	0
Veterinary clinicians	9	9	7	1
Practice manager	4	3	3	0
Clinical directors / practice owners	5	5	5	3
Administrators	5	4	3	3
Receptionists / client care team	4	4	3	0
Auxiliary staff	2	2	2	0
Pet owners	6	6	5	1
Totals:	42	39	32	8

6.3.2 Round One result

Forty-two out of 50 participants responded fully to the round one questionnaire. Ten of the literature-based definitions failed to reach the 15% consensus required to be put forward in Round Two and so were eliminated. Thirty-six additional definitions were proposed as alternatives by the panel. These were a combination of adjusted definitions from the ones provided (e.g., wording or sentences altered), as well as entirely new definitions. Those participants suggesting 'new' definitions were encouraged to provide rationale and reasoning for their suggestions as well as evidence if collated from an existing definition they knew. The collection and analysis of round one results combined with research group discussions occurred over a two-week period. The panellist "feedback" showed strong engagement from participants and good insight into the thought processes used to arrive at new definitions relevant to them and their job role:

QVS 7: *"With most of the questions I was often torn between the more detailed definitions which I felt were helpful in providing a fulsome explanation; and shorter terms that were less verbose and maybe less pretentious / pompous."*

PetO4: *"Emphasis has to be on continuous improvement and preferably with patient/client involvement, reference to shared values should be made to give a whole picture view of veterinary practice."*

6.3.3 Round Two results

Thirty-nine panellists completed the second eDelphi round. At the conclusion, four of the proposed terms had reached consensus (70%) and were accepted (quality veterinary care, Significant Event Audit, M&M rounds, and guidelines). Thirty-two definitions failed to reach the required minimum 15% consensus and were eliminated. This left forty-four definitions to progress into round three. For two terms, imposing the minimum threshold of agreement meant the removal of all but one definition. Feedback again signposted to a difficulty participants had in selecting just one definition as specific aspects of veterinary practice experienced by participants were not represented.

RVN4: *"Workplace cultures are still not devoid of bullying and intimidation' nor of discrimination. There is the real danger that fear, and intimidation can manifest in subtle ways when audits and reviews are conducted. Because of this any definitions need to include the wording about safe and retribution free environments."*

PM1: *"In one definition you have put "pets". It should be "animals" as we also treat commercial animals at our practice."*

6.3.4 Round Three results

Thirty-two panellists completed Round Three, at the end of which, ten definitions had reached an acceptable level of consensus (Table 23), with four failing to reach consensus (clinical effectiveness, quality improvement, management, and leadership). Of those reaching consensus, nine out of the ten agreed definitions were original or adjusted definitions suggested by panellists in round one. Only the definition for guideline reached consensus with a definition offered by the research panel. A full overview of process and results is shown in Figure 14.

Table 23 - Table displaying each term and the accepted consensus (>70% agreement) definition using an eDelphi process. The table shows the term, accepted definition (as it appeared to participants), percentage level of consensus reached and also the round in which consensus was reached.

Term	Accepted definition	Percentage level of consensus	Round consensus was reached
Section 1 - Definitions relating to quality care			
Quality veterinary care	Providing health services for animals and their carers that increases the likelihood of desired health outcomes and are consistent with current professional knowledge. Quality care should be: safe (avoiding harm to patients, owners and care-givers while providing care), effective (providing care based on scientific knowledge and professional standards to those animals that would benefit, avoiding underuse or misuse of treatments), patient-centred (providing care that is respectful of and responsive to the needs, values and wishes of the owner but prioritises the health and welfare of the patient), timely (reducing wait and harmful delays), efficient (avoiding waste), equitable (providing recommendations and care that do not vary in quality based on animal and owner characteristics) and support the care-giver experience (providing care which supports a sense of fulfilment and pride for the care-giver).	76.3%	2
Clinical governance	A framework through which an organisation is accountable for continually improving the quality of their services and safeguarding high standards of care by creating an environment in which excellence in clinical care will flourish. Clinical governance is a continuing process of reflection, analysis, and improvement in professional practice for the benefit of the animal/patient and the client/owner.	96.9%	3
Patient safety	The absence of preventable harm to a patient and reduction of risk of unnecessary harm associated with health care to an acceptable minimum. It relies upon an understanding that all staff while committed to helping patients at all times are nevertheless human, and capable of making unintentional mistakes. Patient safety is therefore focused upon identifying safety incidents and learning, such that the same error is not made again by a different operative.	96.9%	3
Section 2 - Definitions relating to methods of quality improvement			
Clinical audit	The collection of data prospectively or retrospectively in health care settings to answer a specific question relating to the delivery of clinical care. The ultimate aim of clinical audit should be to improve the care delivered to patients and the service delivered, through a cycle of measuring, improving, and monitoring.	93.8%	3

Significant event audit	A process whereby significant occurrences (not necessarily involving an undesirable outcome for the patient) in individual cases are analysed in a systematic and detailed way to ascertain what can be learnt about the overall quality of care given and to indicate changes that might lead to future improvements.	76.3%	2
M&M round / conference	An open forum for the collaborative review of adverse events or unexpected outcomes in patient care, without fear of retribution or blame. The primary goals should be improving patient care and maximising the educational benefits of a shared experience.	81.6%	2
Section 3 - Definitions relating to administration, direction, and guidance			
Guideline	Systematically derived statements that help practitioners to make decisions about care in specific clinical circumstances. These should be research or evidence based. Guidelines should provide extensive, critical, and well-balanced information on the benefits and limitations of various diagnostic and therapeutic interventions so that the clinician can carefully judge individual cases.	86.8%	2
Protocol	Rigid statements allowing little or no flexibility or variation in the process being described. A protocol sets out a logical sequence and a precise series of activities to be adhered to. Generally applied to processes rather than treatment of conditions for example infection control, controlled drugs register, x-ray exposure records as a rigid protocol cannot be applied to a living patient who is not rigid.	81.3%	3
Checklists	Short, organised, lists of specific vital actions to be completed at a certain stage in a procedure. Contains only those actions which are both safety critical and often missed. It functions as a support resource by outlining criteria for consideration in relation to a particular process by categorising items into a list, simplifying conceptualisation and recall of information.	75%	3
Standard Operating Procedure (SOP)	Written documents describing routine procedures, both clinical and non-clinical, carried out in a veterinary practice. A properly constructed SOP can improve practice efficiency, possibly save money, act as a training manual for staff and, as a last resort, be used by the practice to defend itself should any charges of wrongdoing be levied.	75%	3

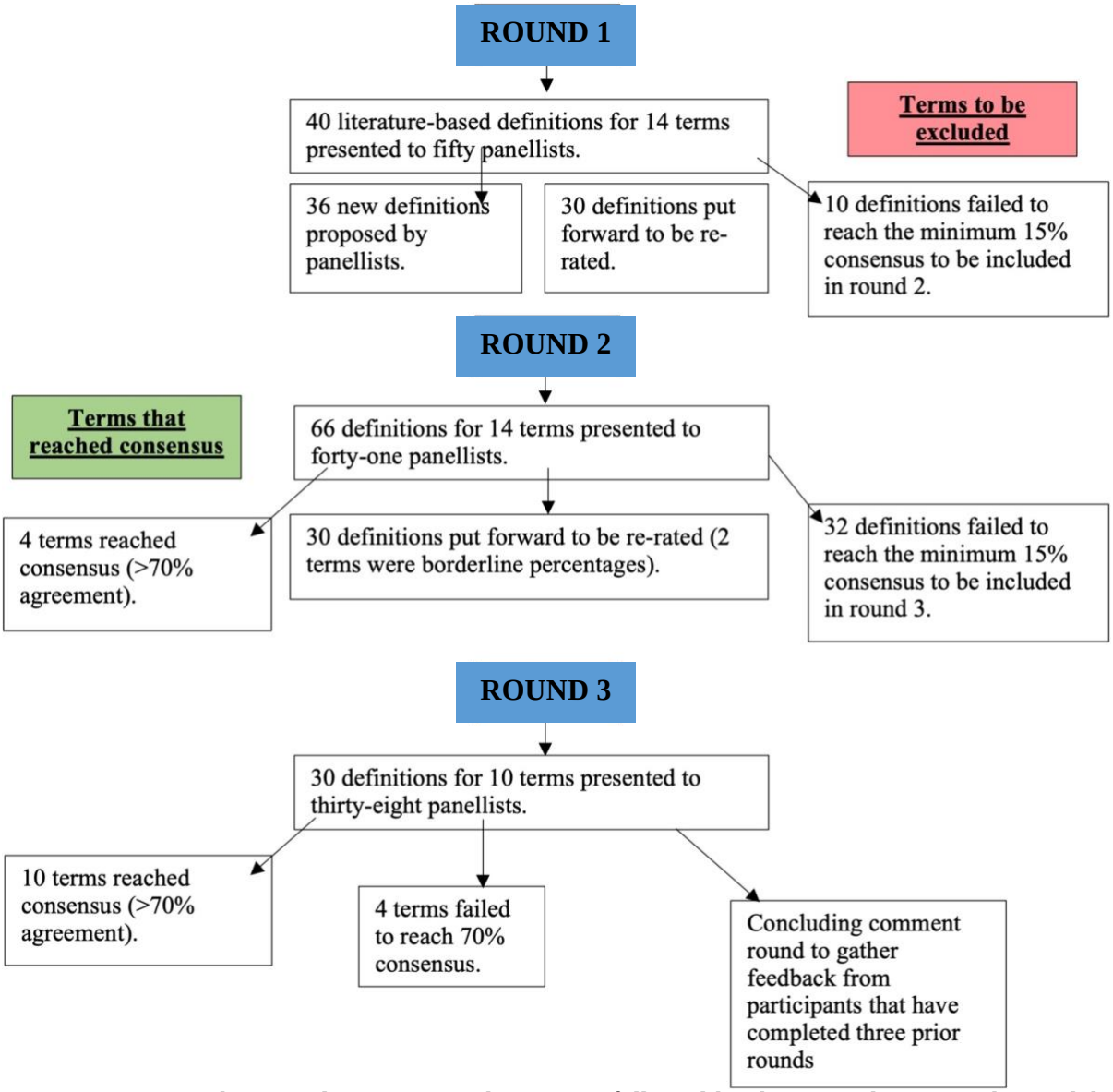

Figure 14 - A schematic demonstrating the process followed by the research team in the eDelphi study to gather consensus-based definitions for veterinary specific QI terms. This includes the results for each definition at each stage of the eDelphi and shows the progression through the study and at which point terms gained consensus (>70% agreement).

6.3.5 Round four results:

Eight panellists took part in a fourth round where they were asked for comments regarding the terms that failed to reach consensus (perceived reasons for non-consensus and suggestions for improving definitions) and general feedback on the entire process. Comments ranged from issues with a single term within a definition provided to the fundamental understanding of what the term represented (Table 24).

Table 24 - Details of the terms that failed to reach consensus during the eDelphi process to create a list definitions of veterinary specific QI terms. The term that failed to reach consensus is accompanied by corresponding comments from participants regarding their perceptions as to why they felt the term failed to reach agreement. These comments were made on the final section of the eDelphi where panellists were invited to give their opinion on terms.

Term that did not reach consensus	**Feedback comment participants**
Quality Improvement	ClinD/PracO1: *"QI doesn't need to be applied only to care that is failing, it can be applied to well managed areas of care with a view to improving them further. I suspect therefore the initial statement didn't achieve 70%"* ClinD/PracO5: "*The first definition is best but should lose the words 'iterative' and also the phrase 'failing in some way'. Iterative is not a 'plain English' word - I had to look it up, and don't feel this phrase would help in general practice. The phrase 'failing in some way' is wrong - QI can be used to refine and improve any clinical process/procedure and not just ones that are assessed as 'failing' the whole point is QI can help the team improve outcome and reduce problems - regardless of how perfect or imperfect the procedure is to begin with"*
Clinical effectiveness	QVS1: *"Client perspective is also vitally important in assessing welfare outcome for their animal (they know them best in many aspects) but the term 'client preference' doesn't for me equate to ensuring animal welfare. Client preference does have a role in terms of clients being able to deliver treatments and maintain nursing care like rest or the integrity of wound dressings but isn't equal to an evidence-based perception of the positive or negative impact of the outcome for the patient."* PetO4: *"Financial aspects of care should be included in clinical effectiveness and not be secondary as they are rarely secondary to owners or clinicians."* ClinD/PracO1: *"Reference to efficacy, efficiency and effectiveness might be helpful"*
Leadership	QVS1: *"Leadership encompasses both personal conduct and attitude as well as strategic thinking, directing but also motivating others to achieve aims. But then also including the "others" in developing the aims, reviews etc. Leadership is a complex concept, I think. So, for me the failure to reach consensus is down to the participants having their own personal biases or understandings of leadership, either through personal experience or the professional environment they operate in and / or learn from."*

	ClinD/PracO5: *"I think we need a plain language simple understood and accessible guidelines. I don't think I've ever used the word comportment and I'm in a key leadership role"* ClinD/PracO4: *"There needs to be more about support and encouragement, motivation, and vision"*
Management	QVS1: *"Definition 1 is excellent but as I have stated elsewhere, is perhaps not accessible enough to participants who perhaps have not had formal education in the terms used throughout the QI project and in particular around leadership and management*" Admin1: *"Possible confusion of "veterinary management" and just "management"*

Specific feedback relating to the eDelphi process was generally complementary.

QVS1: *"In general, I felt that this was a very thought- provoking opportunity and that many of the concepts felt like they referred to qualities and behaviours I look for in others, try to ensure happen in any work I am responsible for setting up, leading or carrying out; and that I try aspire to in my own professional life."*

Admin1: *"I do feel strongly that this needs to be in plain English and accessible/usable for all of the clinical team. My opinion is that the Delphi seeks to produce clear and accessible consensus/guidelines that help within general/clinical practice."*

6.4 Discussion:

This is the first research undertaken to formulate a specific and comprehensive list of quality improvement terms and corresponding definitions to be utilised in veterinary medicine. It represents the views of a wide range of veterinary stakeholders, from diverse backgrounds, education levels and practices across the UK. This research is especially pertinent as it represents the opinions of clinical (veterinary surgeons, registered veterinary nurses and clinical directors/ practice owners) and non-clinical representatives (receptionists/client care team, administrators, practice managers and auxiliary staff), as well as animal owners. An agreed and consistent language should support the development of QI within the professions. This common language will hopefully lead to an increased understanding across the industry, regardless of professionals' individual settings as has happened in human healthcare (Sajdlowska *et al.*, 2015).

6.4.1 Study limitations and methodology:

All the predetermined demographic conditions were met with the initial panel of fifty individuals selected. Although the eDelphi methodology is recognised as supporting agreement among a group of professionals it is only ever truly representative of the views of those who have participated in the eDelphi. It is possible that the findings and outcomes of this eDelphi could have been different had the panel had a different configuration; however, a long time was spent considering the study design that was to be employed (e.g., size and structure of the panel) and how it would be executed to ensure the eDelphi would adequately represent the breadth of the veterinary professions.

A great strength of any Delphi style study is the flexibility it gives participants to adapt and adjust their views and answer over the course of several rounds of questioning. The ability to amend or alter participant views at each round is also paired with the risk that participants will alter their view or answers solely to comply with what they think or know the majority view in the group is (known as the band-wagon effect) (Goodyear-Smith, 2021; Barrett and Heale, 2020). To protect against this, all feedback and comments left were communicated back to the participants with total anonymity. By doing this there was reduced opportunity of the participants with strong personalities or those holding a more senior job role to shape the view of others intentionally or otherwise. It is possible that despite this there was a band-wagon effect particularly in the final round where participants were presented with the agreement percentages for each definition available, although the participants had no way of knowing who had voted for what, so the impact of these percentages was minimised.

If similar studies were to be repeated, it may be beneficial to provide panellists with the opportunity to communicate directly with each other through an anonymised online discussion forum. This could have aided the contextualisation of the terms, promoting group learning experience and discussion, potentially resulting in reaching agreed definitions sooner. Delphi's are commonly employed when more objective forms of evidence either do not exist, or when there are controversies around a topic (Embrett *et al.*, 2020; Sie *et al.*, 2014; Gill *et al.*, 2013). The eDelphi allowed the participants to adjust their opinions and views as more information was provided throughout the process, as well as encouraging full participation and representation of a variety of views on the subject. Using this justification an eDelphi was an appropriate methodology to use for this study given the aim of this work.

6.4.2 Key findings of the study

The results of this study will assist within the context of clinical governance through the PSS if QI was to become a mandated part of practice in the future. Should this happen a centralised glossary of terms and definitions will be needed to streamline education and implementation of these methods across the sector. The outcomes of this work will form the basis of a glossary of QI terms specifically relevant to veterinary practice, leading to a clear and relevant educational resource for veterinary practices and educators alike. Ultimately, this work should facilitate improved outcomes for patients and higher quality care delivery.

This study has provided consensus on the majority of the terms selected. Many of the definitions reaching consensus were those modified by panel members in round one. This shows that the existing definitions gathered from literature, primarily from QI in human medicine do not necessarily translate smoothly into veterinary practice and that the panellists taking part in this eDelphi had a reasonably good understanding of QI prior to undertaking this study. Due to this knowledge, panellists were able to collectively suggest appropriate new terms that most agreed were fit for purpose. This correlates with previous findings of studies that show that although understanding of QI methods is variable across the veterinary industry (Rooke *et al.*, 2019, 2020, 2021b), some professionals in veterinary practice do have excellent understanding and knowledge of QI.

This study has shown that terms that are anecdotally known to be in regular use in practice and familiar to a majority of participants reached a consensus with less difficulty. Significant event audit, M&M rounds and guidelines all reached consensus promptly with little disagreement. Understandably certain job roles seemed to have a clearer understanding of the real-life use of some QI methods in practice, whilst in others this was lacking. Even with this considered across the different job roles represented and variety of veterinary work performed by panellists, ten of the 14 terms successfully reached an agreed consensus-based definition. This shows that although there are differences between stakeholders working in this diverse sector, agreement can still be reached meaning there are certain similarities and common ground within the different ways of interaction and engagement with veterinary medicine.

This panel was unable to reach an agreement on a veterinary specific definition for the term quality improvement (QI). The inability of this panel of stakeholders to reach an agreement on a veterinary specific definition for QI as a term does have implications for

the wider concept of QI in veterinary practice. Whilst this lack of agreement is indicative of several barriers to effective QI use in the veterinary sector, as detailed in Chapters Three and Four, it is extremely positive that many other QI and QVC related terms did successfully reach agreed definitions. QI is used in other industries with long standing, successful use of QI methods as an umbrella term for various methods of iterative tests used to continuously monitor and improve the quality of a service or product (Rooke *et al.*, 2021b). Historically, however, the veterinary sector has not always considered QI in this way, with previous focus on the methods that could be used, and less on the overarching concept of QI. Consequently, individuals are likely to be more familiar with specific QI methods such as checklists, M&M rounds, significant event audit and clinical audit (Pang, Rousseau-Blass and Pang, 2018; Waine *et al.*, 2018b; Okpe and Kovach, 2017c; Rose, Toews and Pang, 2016d; Frandsen, 2015; McMillan, 2014). This may indicate that the veterinary profession's understanding of QI is still evolving. Another consideration is that in veterinary practice there are owners as well as animals to consider which inherently means not all aspects of QI may translate easily from human medicine. Additionally, there is evidence from the few published studies on this subject that demonstrates a disparity in knowledge, education, and understanding of QI between different groups of workers in veterinary practice (Rooke *et al.*, 2019, 2020). It is therefore likely that if there is a lack of understanding regarding QI between different stakeholder groups then it will be more difficult to reach an agreed definition. What is important for the continued development of QI use in veterinary practice is an agreed definition and terminology for professionals to use when utilising these individual QI methods. This agreed terminology would help to ensure that multiple veterinary professionals can utilise these methods with a consistent approach and goal in mind..

Many of the definitions put forward by the panel for both management and leadership detailed the qualities a person performing these tasks needed, rather than the actual definitions of the terms in relation to QI in veterinary practice. Both terms can be challenging to clearly define. Often opinion, ethos and philosophy will all influence a person's view on what constitutes good management and leadership (Stringfellow *et al.*, 2015; Buell, 2012; Abbas *et al.*, 2011). Obviously defining management and leadership is a contentious topic, with all options provided to the panellists failing to even reach 50% agreement in the final round of voting which again signposts to the fact that further research is required to fully explore these concepts and what they represent for the

veterinary profession. Involving a broader range of individuals, including those from organisations such as the Veterinary Management Group will be critical moving forwards.

The term "clinical effectiveness' did not achieve consensus, perhaps because it does not have a universal definition applicable to all stakeholders in the veterinary profession. A definition often used is that clinical effectiveness is about doing the right thing at the right time for the right patient (Powell, Rushmer and Davies, 2009), which inherently means that this is likely to differ between job roles within a veterinary practice and may explain the lack of consensus.

The mix of professionals and pet owners involved in this eDelphi study increased the heterogeneity and diversity of the group. Studies in the field of human medicine have found that the inclusion of patients (lay persons) in such research studies provide a unique perspective not otherwise presented by the professionals (Hussler, Muller and Rond, 2011; Rowe and Wright, 2011; Powell, 2003). Hussler *et. al* (2011) noted that the feedback provided by lay people can be hugely beneficial, enabling full representation to be achieved (Hussler, Muller and Rond, 2011). In veterinary medicine, the inclusion of animal owners is a proxy for the animal viewpoint as the actual receivers of care (the animals) cannot voice their experiences. Additionally, a key aspect of providing a quality veterinary service is in understanding the experiences of paying clients, therefore it was essential they were included in the panel to ensure their views were represented. In this study the pet owners that participated provided invaluable views and feedback across the process that could not have come from other panel members.

This research goes one step further than previous studies to potentially signpost towards specific areas of QI where a better understanding exists and conversely, areas where further insight is needed.

6.5 Conclusion

This study describes a novel piece of research aiming to lay the foundations for key quality definitions that are specifically for use in veterinary practice. By involving a broad range of stakeholders, the definitions that reached agreement are applicable to and understood by a variety of people across job roles and contexts. This would make these definitions easier to embed as a concept into mainstream veterinary practice, as well as being ideal for use in education and policy. Future work should focus on those terms where uncertainty is still present.

Chapter 7

Developing a veterinary specific planning framework and educational document to assist planning and executing a QI project in practice.

Abstract

Intro: Extensive work has been done within human healthcare to develop frameworks to aid the process for planning and executing QI projects. The aim of this study is to take the first steps towards establishing a framework and provide practical tools for the selection, implementation, and evaluation of QI interventions in veterinary practice.

Aim: To design and pilot an educational document including a planning framework and assess its ability to assist with the planning and execution of QI activities in veterinary practice.

Methods: An information document using a KDD framework was developed to help veterinary professionals analyse and select a QI method to be applied within their service/practice. Two practices were selected via convenience sampling to give feedback on the framework and guidance contained within the new resource, and trial it by planning and conducting a QI project.

Results: The educational document was created via discussion from an informed group of veterinary professionals. Introduced into selected practices and through facilitated discussion utilised to design a QI intervention specific to each participating practice. Each practice had three months following the initial planning meeting to design and implement a QI initiative in their practice. After this time all participants completed a review process with researchers to feed back on the efficacy and usability of the education document in planning and implementing their QI initiative.

Conclusion: Decisions concerning veterinary QI education are critical and must be informed by those currently working in practice because changes implemented could affect people and work processes for many years. Sustained change to achieve better patient outcomes and safe, patient-centred care is reliant on a simple flexible approach applicable to multiple settings, practices, and scenarios. KDD diagrams thus far seem to fulfil this need within veterinary practice. Whilst more robust testing that goes beyond a pilot study is required the results so far are promising, with KDD diagrams allowing even disempowered members of staff who aren't as confident to have their voice heard and to take ownership of the process they are designing.

7.1 Introduction:

Competence from healthcare practitioners in the utilisation of QI methods is recognised as a key skill in the human healthcare system (Herman, Weiss and Thomson, 2020; IOM, 2018; Holmboe E.S. and Cassel C.K., 2007). As QI becomes ever more embedded into the healthcare system, attention is being paid to the way in which information, education and training on QI methods are delivered at various stages throughout a person's career (Headrick *et al.*, 2015). The identification and articulation of which QI method is best suited and appropriate for the system of care being acted on will inevitably support effective design, execution and repetition of any QI intervention used (Reed *et al.*, 2014). Published research on QI in veterinary practice is now appearing which is in turn further encouraging uptake and awareness of these methods and their benefits (Rooke *et al.*, 2019, 2020, 2021b, 2021a; Hocking, Picken and Ling, 2020; Mosedale, 2020; Bauch, 2004; Fernandes, 2003). Information dissemination and training in QI methods is still a prominent subject when examining adoption of QI by the veterinary sector. Limited educational resources and guidance are available that are specific to veterinary practice and those that are primarily come from a single source (RCVS Knowledge (R.C.V.S. Knowledge, 2020)). Resources available are often restricted and with the narrow focus of several select QI methods (clinical audit, M&M rounds, and checklists) (R.C.V.S. Knowledge, 2020; RCVS Knowledge, 2020b, 2020a, 2020d; Anonymous, 2015; RCVS Knowledge, n.d.). Rather than encouraging a flexible holistic approach to monitoring and improving the quality care delivered. There is little to no specific guidance available either through published literature or online educational resources on planning and selecting a QI intervention appropriate for veterinary practice. Successful use of the existing resources available rely on the prerequisite knowledge of users to be able to evaluate the system they are monitoring and select an appropriate QI method to use. Guidance on how to begin the process of quality monitoring and improvement is absent currently which could be the reason that mainstream uptake of these methods is currently poor in many areas of veterinary medicine.

The research conducted in human healthcare can in part be transferred across to veterinary practice due to the similarities that exist between the two industries (Rooke *et al.*, 2021b). Results from human healthcare studies repeatedly show that correct and precise planning, involving all members of the team conducting the QI intervention, is vital to successful implementation and sustained improvements (Brown *et al.*, 2019; Starr *et al.*, 2016; Headrick *et al.*, 2015; Armstrong *et al.*, 2012; Boonyasai *et al.*, 2007; Varkey, Reller and

Resar, 2007). Several frameworks to aid planning and executing QI projects have been developed and used. Although it is rarely stated in the literature where this framework development stemmed from, it is certainly similar to the planning tools used for QI in other industries, for example engineering (Shao-Hui *et al.*, 2009), education (Kennedy, 2011), and business (Kok *et al.*, 2001). The adaptability of these frameworks has enabled them to be successfully transferred from one industry to another with key adaptation in place to cater for the individual nature of each sector. There is good reason to think that for this reason veterinary medicine can capitalise on the work that has been done in other sectors to devise their own frameworks applicable to the industry.

Any framework to aid in prior planning of a QI activity must include four key factors:

- an agreed aim,
- potential interventions to achieve this aim,
- anticipated cause/effect relationships between the interventions,
- the aim and measures to monitor improvement.

(Cox and Sandberg, 2018; Needham and Korupolu, 2010).

A key tool containing these four key factors are driver diagrams or Key Driver Diagrams (KDD), which can be found both in the manufacturing industry where QI originated (Saghari, Rahmani and Budinská, 2022; Donauer, Peças and Azevedo, 2015; Elezi *et al.*, 2012; Rennolls, 2006), and human healthcare (Rose *et al.*, 2021; Siracusa *et al.*, 2020; Valleru, Krishna and Fristad, 2019; Newton *et al.*, 2017; Raval and Kenney, 2015). These can be used to meet the required factors for planning QI and are also particularly useful when either relevant literature and prior examples are scarce or unreliable, or up to date local data is unavailable or not suitable for use due to incorrect or absent data collection (Hatch *et al.*, 2019). These diagrams provide a simple but reproducible method for individuals or teams to create a framework for their QI activities. These diagrams also allow for 'local' context to be considered, to generate consensus among the QI team involved, and improve buy-in from the wider team that will be conducting the interventions. The KDD process has not been documented as used in veterinary medicine before but could represent a steppingstone for those interested in performing QI activities within practice but who are unsure where to begin.

The aim of this study is to take the first steps towards establishing a framework and provide practical tools for the prior evaluation, selection, and implementation, of quality improvement (QI) interventions in veterinary practice.

Aims:

- To design, pilot and assess the KDD process' ability to assist with the execution of QI activities in veterinary practice.
- Develop a methodology based upon user feedback for effectively implementing KDDs in equine practice.

Objectives:

- Use the knowledge and information gathered throughout this thesis to design a QI planning document suitable for use by veterinary professionals with prior knowledge and or experience of QI methods.
- Design a key driver diagram implementation tool targeted towards veterinary professionals.
- Gather feedback on the KDD tool from industry professionals experienced in using QI at their practice.
- Conduct a pilot study using the developed KDD tool to assist veterinary professionals to identify a QI topic of relevance and to facilitate the planning and execution of the corresponding QI project.
- Gather feedback from participants on the usability and efficacy of the KDD tool and assess usability in veterinary practice.

7.2 Materials and Methods:

7.2.1 Research working group formation

The first phase of this project was to form a working group to plan and write an education document specifically tailored to assist veterinary professionals with planning and actioning a QI intervention within a veterinary practice. This group consisted of three academic staff members from the School of Veterinary Medicine and Science, and two equine surgeons from clinical practice. The members of this group were chosen due to their varied and extensive experiences within the field of veterinary medicine, evidenced based veterinary medicine and QI including management, education and policy making as well as their prior knowledge, experience, and contribution to the wider PhD project

7.2.2 Designing a veterinary specific QI training document and planning framework

The progression of the training document in creation was a collaborative effort between several members of a working group and followed a strict process through development (Figure 15).

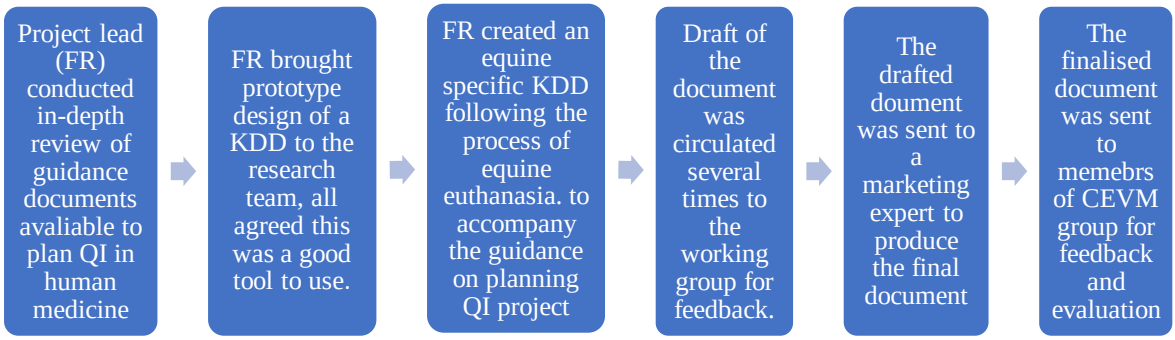

Figure 15 - Flow chart describing the process of designing a veterinary specific QI training document. It describes the iterations that the document went through to be completed and details the members involved at each stage of development.

An example veterinary specific KDD framework was developed to be used in the training document as an example of the process to user (Figure 16). Two key meetings were held with all members of the working group in attendance to discuss what should be included into the training document before an initial draft of the document was made. Once the document was drafted all communication between group members occurred over email and over the course of several weeks. Eight drafts of the document were made before all members were happy with the final product. Particular care was taken over terminology and continuity of language used in the document (Rooke *et al.*, 2021a), and the glossary of QI and QVC related terms produced in Chapter 6.

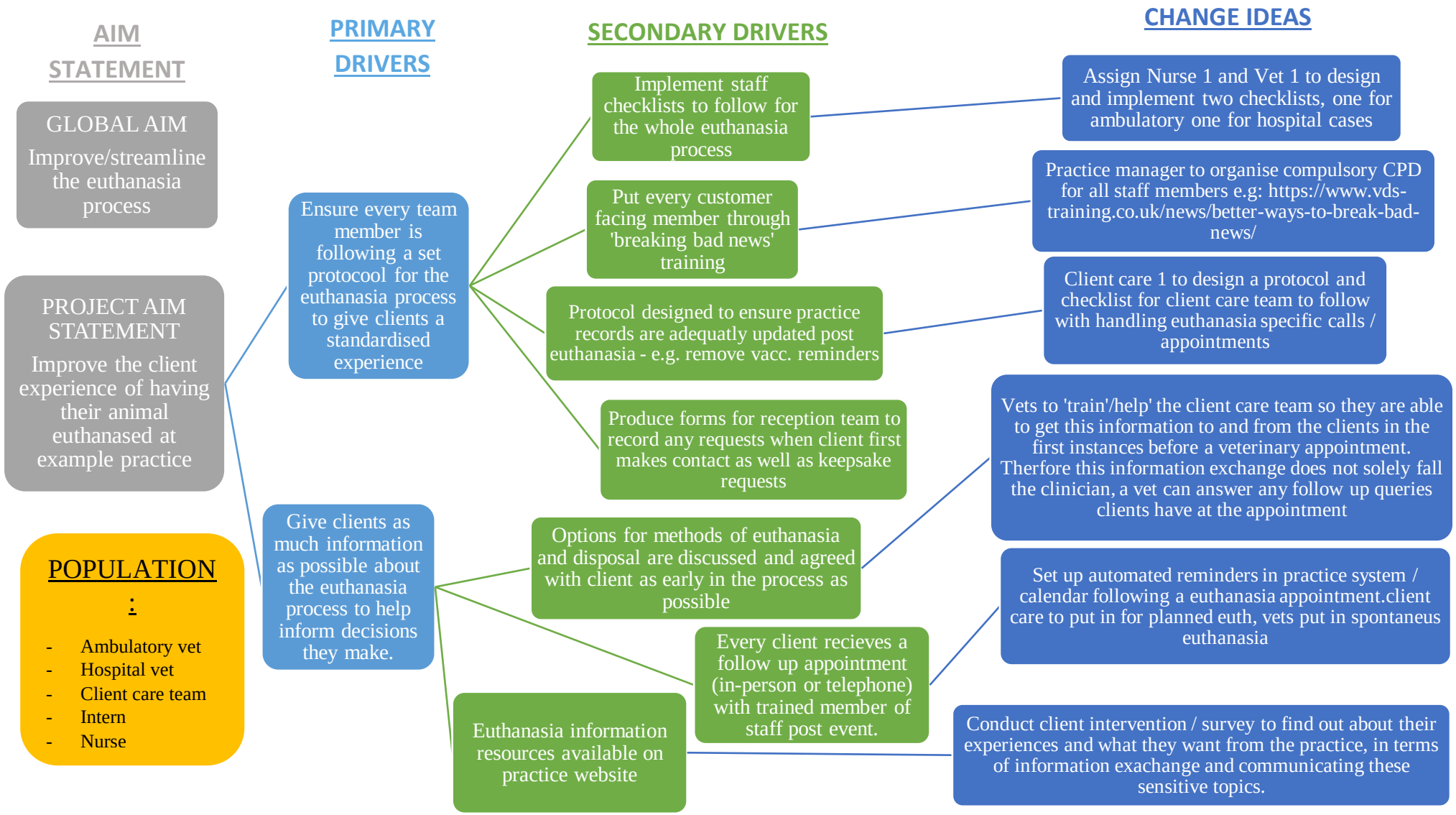

Figure 16 – Veterinary example of a working KDD framework on the subject of equine euthanasia designed by the working group creating a veterinary specific, QI training document. The veterinary practice detailed is hypothetical, and researchers drew on their own personal experiences of this process at a variety of practices.

The basis of designing any KDD is to start with four columns to fill. The process is designed to be most effective with an outcome driven project where the desired monitoring or improvement is clearly defined at the start.

1) An Aim Statement outlining the project goal or vision. The aim statement is derived from the problem you are trying to address, for example, "What are you trying to accomplish?" Ideally these should be SMART[13] aims that the group agrees on.
2) Primary Drivers are high-level factors that you need to influence in order to achieve the aim. They are improvement areas that must be addressed to achieve the desired outcome. Primary Drivers should be written as straightforward statements rather than as numeric targets.
3) Secondary Drivers are specific factors or interventions that are necessary to achieve the primary drivers. They are targeted areas where you plan specific changes or interventions. Each secondary driver will contribute to at least one primary driver (drawn using 'relationship arrows'). They should be processes to deliver changes that you have reason to think will impact the outcome and ideally should be evidence based. They should be necessary and collectively sufficient to achieve the aim. The secondary drivers are found by brainstorming the causes of the problem among the team.
4) Change Ideas are well defined change concepts or interventions to address the secondary drivers, for example, "What change(s) can we make that will result in improvement?" Each change idea will contribute to at least one secondary driver (drawn using 'relationship arrows').
    a) Prioritisation of Change Ideas: all change ideas need to be assessed to determine which ones you will test as a priority based upon determining if it will have a high or low impact on the aim, and whether it will be easy or difficult to implement.

Population describes those people involved in the project. It can include people directly involved in the planning and organisation or the QI project and those people that are actors within the project. It is vital that each person responsible is clearly identified particularly in the change ideas as these are commonly specific actions for people to carry out.

[13] SMART aim refers to: Specific, Measurable, Actionable, Relevant and Time bound.

Following the re-drafting process the document was sent to a professional marketing manager of CVS Equine who gave direction on visual design of the document, presentation of information and reprographics. The final product of this process was a six-page A4 booklet (Appendix K), containing basic information on QI in veterinary practice, guidance on how to begin a QI intervention at a veterinary practice and a worked example of the development process used in planning a QI project at a veterinary practice in the form of a key driver diagram (KDD). This document was designed to be applicable to as many veterinary professionals and individual practices as possible and created to be used by those who already had some prior knowledge or experience of QI methods.

7.2.3 Education document and planning framework

Following development within the working group the structure of the QI education and planning document contained an introduction section and then a four-step process for users to follow. This was done to ensure clarity in the order and organisation of the process of planning a QI project.

- Introduction – a brief overview of what the following document would contain and the reason behind careful planning and execution of QI.
- Step 1 - "What is QI and how can it help me?": a very brief overview of what QI is, how it could/has been used in veterinary practice and listing the 12 key QI methods identified by the HQIP.
- Step 2 - "Planning a QI intervention in your veterinary practice" the three basic stages to implementing a QI project in veterinary practice and also an outline of what QI can realistically achieve.
- Step 3 – "Personalising your QI project to YOUR practice". This section it is emphasized the importance of personalisation when planning a QI project. Readers were urged to use both their own and others key knowledge of their own practice process' and protocols to enable their project to be both successful and produce relevant helpful information.
- Step 4 – "How can a key driver diagrams (KDDs) assist in planning a QI project?": step by step information on how to utilise KDD diagrams to ensure effective and efficiently planned QI projects. The four stages of KDD are explained and then a veterinary example of a KDD diagram is shown to demonstrate how they can be used to plan.
- Reference list and acknowledgments. Pilot participant selection

An exploratory pilot study approach was employed to test out the efficacy and usability of the training document designed and by extension the KDD process. Convenience sampling was used to select participant veterinary practices and participants from the vet practices. Individuals that had previously taken part in research projects through the University of Nottingham and had specific staff members experienced in QI methods were contacted and asked to participate. Two practices were selected.

7.2.4 Pilot participant selection

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7.2.5 Initial feedback on the document from selected veterinary professionals

Once created, the document was piloted with industry professionals (referred to as key participants or KP's) to gather initial feedback. Initially the practices were asked to nominate one person who was either a designated QI lead within the practice or someone with prior knowledge and experience of QI methods, to partake in an online interview with the lead researcher (FR). This meeting was conducted on Microsoft Teams (www.microsoft.com/en-gb/microsoft-teams/teams-for-work, Redmond, United States) and lasted for approximately 45 minutes. This was a semi-structured interview to give a framework to the feedback required during this interview, and a key list of questions were given to participants in advance (Table 25). The purpose of this meeting was to assess the suitability of the practice to par-take in this research, get a better idea of current processes for QI analysis and monitoring in the practice and also gather comprehensive feedback on the document produced.

Table 25 Table showing the basic structure of questioning used by interviewer to gather feedback from QI leads from each practice taking in pilot study examining the use of a QI education document and planning framework released to test practices to trial.

Question number	Question:
1	Does the document present the information in a clear and understandable way?
2	Were there adequate relatable examples used within the document to make it relatable to your practice and experience of work?
3	Is the document appealing to look at?
4	Are there any particular bits of the document that jump out as you'd want changed or presented differently?

Audio recording of initial interviews with KP QI leads from each practice were transcribed and collated with field notes taken by lead researcher FR. Quotes from KP during these interviews were used to gather critical feedback on the training document produced and also informed the final reflective phase of the process after the QI project had been planned and implemented at each practice.

7.2.6 Piloting the use of a veterinary specific QI training document and planning framework to plan and execute a QI project/intervention in veterinary practice.

The QI leads in each practice were asked to go back to their practices and form their own QI working group. How many participants were invited into this group was decided by the leads. They were encouraged to consider the type of project they would like to plan for and the members of staff most likely to play a key role in implementing that project and any changes that would be likely to result from the work (e.g., a surgeon and surgical nurse should be invited for a QI project analysing surgical patients).

A week after the feedback meeting, the practices were contacted, and a date arranged for FR to attend a QI project planning meeting. Practices were instructed to consider a couple of options for QI projects they could conduct, relevant to their practice and data. This prospective project could be using real data they had already gathered or be a completely new project. The meeting was chaired by the QI lead and the education document was used to regulate the planning process.

FR attended the meetings to assist and guide the process if needed, field notes were taken, along with audio recordings. The notes taken during these meetings were used by FR to create a working KDD diagram to be used by the QI lead going forwards in each of the practices. Following on from this, regular email contact was maintained with both practices in the form of progress and implementation updates to monitor the progress of the QI projects. Two months after the initial meeting, both practices implemented their projects and preliminary data gathered.

For the focus groups conducted at the practice premises with the selected QI working groups, audio recordings were transcribed and used along with field notes to create detailed KDD diagrams for both practices. Fields notes and email communications from each practice were kept for the duration of the study, throughout the planning and early implementation of each QI project. These were primarily used to inform planning decision made by the QI working group of each practice but also informed the line of questioning for the final phase of the study where participants reflected on their whole experience.

7.2.7 Feedback and reflection from practices on the document and framework used to plan and execute a QI project in veterinary practice

Feedback and reflection focus group meetings were held at both practices with all practice members who had taken part in the planning and execution of the QI project. Participants gave detailed updates of the progress of their QI project. Following this they were asked to reflect in detail on the process of planning and implementing QI interventions using the guidance booklet designed. The structure for these focus groups was as follows:

1. General feedback on progress of project from planning (May 2022) to implementation (July 2022)
2. Did you feel the personalised KDD diagram assisted you in the planning and execution of your QI project?
3. Reflecting through your experience is there anything you would like to change:
    a. during the planning phase of your QI project?
    b. during the implementation phase of your QI project?
4. Now you have used the training document to plan a project at your practice, is there anything you would like to change about the information/examples contained within the document?

a. Do you feel more / different examples would benefit someone else using this document to plan a QI project at their practice?

All participants were given the opportunity to provide any other feedback they felt could benefit the development of the training document and assist other veterinary professionals in planning a QI project.

The final phase of the study required participants to present their project to the working group of their practice and the key researcher (FR), as well as answer a series of structured questions designed to encourage them to reflect on their experience using the training document to plan a QI project and provide critical feedback on decisions made. The results of this were transcribed by FR and used for the write up of this study

7.3 Results

7.3.1 Participating practices and participants

Both practices recruited to participate in the pilot comprised of a hospital site out of which work a core team of veterinary practitioners, nurses, yard staff, technicians, receptionists, and administrators. In addition to this both practices also had active ambulatory units with their own team of veterinary surgeons serving the local surrounding area. More complex cases that cannot be treated 'on the road' are routinely sent in for further diagnostic work/treatment in both practices (Table 26). The analysis and use of the education document was carried out by those staff members working solely out of the hospital sites.

Table 26 - Table containing the details of the two practices included in the participatory action research study examining the usability and efficacy of a veterinary specific QI planning and training document.

Practice 1	A medium size independent ambulatory/hospital practice, dealing primarily with first opinion, elective surgeries, and aftercare. Few staff members based wholly at the hospital, instead a rota of ambulatory vets covering hospitalisation cases each week with a small core team of nurses, yard staff, receptionists and a surgeon based solely at the hospital premises.
Practice 2	A large corporate hospital practice, comprising of central 'hub' practice site (the hospital) and four 'island practice sites' based at different geographical locations in the area covered. All ambulatory

	staff still work around the central location of the hospital site but may only actually attend the site with a specific case they have referred or for a meeting instead working out of their 'island practice site'. A large clinical team is based solely at the hospital comprising of, specialist veterinary surgeons (orthopaedic, soft tissue and medicine), a large nursing team, several interns and residents, client care team, administrators, yard staff and specialist technicians (imaging and soft tissue). As well as seeing the first opinion cases referred in by their own ambulatory team, referral work for other practices both local and national is regularly carried out due to the specialist nature of the veterinary surgeons working out of the hospital site and specialist practitioners visiting on a regular basis.

7.3.1.1 Key Participants (KPs)

Initial contact was made with the KP's from each of the contributing practices. The KP's were specifically recruited/nominated by their practice for their own experience and knowledge surrounding the use of QI methods in veterinary practice (Table 27).

Table 27 - Details of the key participants (KP's) from the two veterinary practices taking part in the participatory action research study examining the usability and efficacy of a veterinary specific QI planning and training document.

KP 1 – practice 1	Qualified veterinarian for 16 years, senior clinical associate at a medium sized independent practice. Held an RCVS certificate, a European College of Veterinary Surgeons diploma**,** and an RCVS diploma. Prior experience of partaking in QI initiatives such as clinical audit and checklists.
KP2 – practice 2	Qualified vet for 26 years, primarily seeing both 1st opinion and referral orthopaedic and diagnostic imaging cases at a large, busy equine hospital. Held an RCVS certificate and an RCVS Diploma, Member of the British College of Veterinary Specialists. Prior experience organising and partaking both small clinical audits and larger practice wide multi contributor QI projects.
KP3 practice 2	Qualified veterinary for 10 years, currently specialising in medicine and ambulatory work. Has prior experience of QI methods from a specific CPD

	event attended, no current experience designing and conducting a QI project in practice.

7.3.2 Feedback on completed QI education document and planning framework

Overall, the feedback was positive, and all participants felt this document would be useful in planning a QI project in veterinary practice.

KP3, practice 2 - "*I've been on QI CPD, but I've never really, other than M&M rounds and our clinical audit. I've never really done anything more than that in real life if that makes sense. And I think one of the big things that I struggled getting my head around has been where do you even start sometimes? And actually, if I've got this guide I quite like that it breaks it down and being like, OK, well, you just start there and then we'll work it out from there if that makes sense."*

It was felt by all three KPs that the document was appealing to look at and had a good text to image/diagram ratio so as to make it too overwhelming for the reader

KP1, practice 1 - *"I think there's enough sort of written paragraphs to explain it all, but it's broken up nicely with diagrams, it mean that you're not just stuck with lots of text the whole time."*

KP3, practice 2 - *"The way you lay it out is very logical and straightforward. I think the diagrams particularly make it very easy to follow and they are really good guideline because if you start to get a little bit lost in what you're doing, you can refer back to them"*

Feedback on changes that could potentially be made to improve the document varied. Practice 2 felt it needed to be made totally clear that this document was designed for those already with prior knowledge and experience of QI. Not doing so as not to overwhelm a person inexperienced in QI. Practice 1 felt that including further example of QI in veterinary practice could assist with readers visualise what was possible with QI. Practice 2 feedback concurred with this idea that perhaps it would be beneficial to include more than one example of QI projects that could be planned and carried out using KDD diagrams. Their reasoning revolved around to helping readers get a feel for the 'right size' of project to be aiming for and ensure people do not try to take on too much.

KP2, practice 2 - *"That's a good suggestion actually because you can really reiterate that it is small changes in key areas that would be a really good."*

These meetings also provide insight into the differing attitudes that can surround some of the language involved when discussing QI methods.

KP2, practice 2 - *"You could point out to people that if they are doing the right thing at the right time not only does it make their practice more effective but also slightly more*

profitable, I don't know or maybe more successful, vets can be very squeamish about talking about profits and money."

KP1, practice 1 - *"Also, I think with older generation vets they sometimes are quite defensive, if you say to them you need to improve your quality, you'll get a lot of "oh my quality is brilliant" sort of thing. .... whereas in more recent years we have definitely become more open about talking about performance and quality etc"*

7.3.3 Using the document and framework to plan and execute a QI project in practice – a pilot.

The two practices participating had the opportunity to select their own QI working group and QI project (Table 28). The practices were advised to select their team aiming to utilise the intimate knowledge of professionals working closely in the area aiming to be analysed.

Table 28 Table displaying the demographic results from each participant practice and also the proposed QI project to be completed for a study into the use of a pilot training document specifically aimed at QI interventions in veterinary practice. Table details each participant selected to be involved in the working group and selected QI project to complete.

Practice:	**Selected QI project (aim statement)**	**Participants in QI working group**
Practice 1	Develop a standardised process for surgical patients from admittance to discharge with the aim to avoid errors within this process.	- Veterinary surgeon (senior clinical associate) - Head veterinary nurse
Practice 2	Reduce catheter complication from 2022-2023 per audit data collected annually.	- Head veterinary nurse, - Registered Veterinary nurse, - Veterinary surgeon (Imaging Specialist) - Veterinary surgeon - Hospital intern.

7.3.3.1 Practice 1

As a smaller independent veterinary practice, practice 1 had less rigid infrastructure in place in regard to the current QI used and data collected. Their selection of QI project to plan and implement was based on anecdotal experiences of those within the working group rather than numerical audit data or the outcome of official reviews. The QI project was chiefly led by one member of the QI working group, who, after planning discussions with

other key members of staff elected to implement a new checklist to better help monitor and track surgical patients as they passed through their service.

7.3.3.2 Practice 2

Practice 2 had previously attempted QI projects with corporate assistance and had mixed levels of successful results. They already had in place a solid process of clinical audit data collection, and audit data available for a variety of cases and scenarios. Their selection of QI project was made to address an identified issue within their audit data for catheter complications throughout 2020-2021. The project was primarily led by the veterinary nurses present in the QI working group and advised by the veterinary practitioners.

7.3.4 Creating a bespoke KDD framework for participating practices

The KDD diagrams were created by researcher FR, using information the participants at each practice provided to fill the framework. The KDD diagrams identifying information has been redacted to maintain anonymity of participants (Figure 17 and 18). These were emailed to each KP one week after the initial QI planning meeting held at practice.

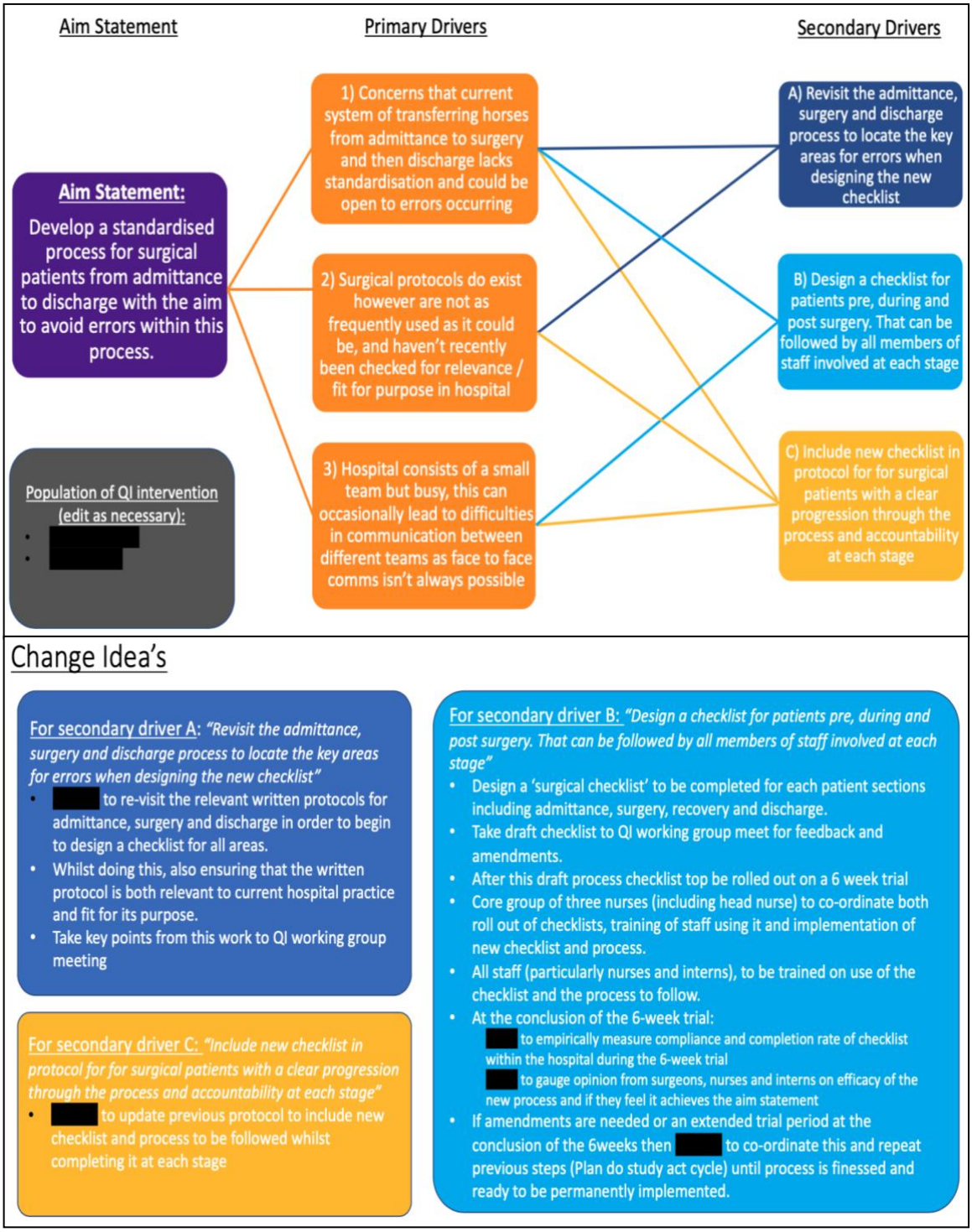
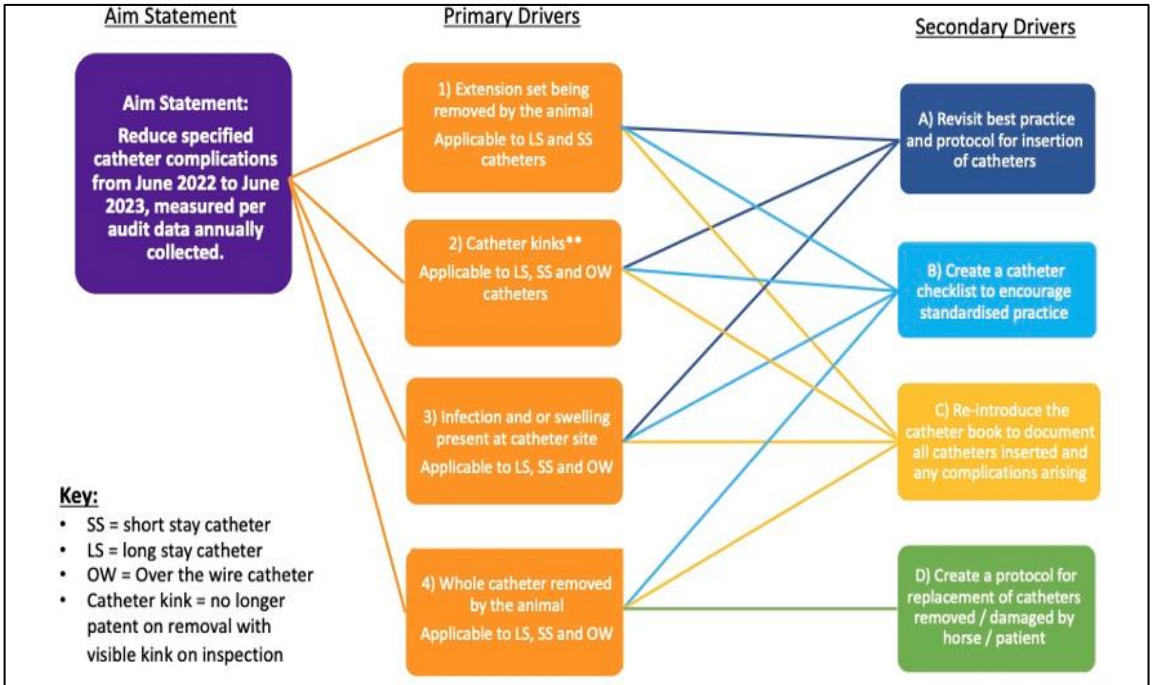


Figure 17 - KDD diagram created for Practice 1 to layout the design for the QI intervention planned. The intervention revolves around creating a more standardised process of admitting, operating on, and discharging patients at the hospital unit. Key information is redacted to maintain anonymity of participants.



Change Idea's

- For secondary driver A: *"Revisit best practice and protocol for insertion of catheters"*
  - [redacted] to check best practice and protocol (BPP), is it still fit for purpose, relevant and applicable to current hospital practice? Take this assessment to core QI group
  - Discuss (and possible adjust) within core QI working group
  - [redacted] Create a checklist of all applicable staff to sign off that they have read and been shown BPP
  - [redacted] to create an 'authorization list' of who can place which types of catheter within the hospital
  - In addition to this [redacted] will create a list of who is responsible for training others who are not currently on the catheter 'authorization list'
- For secondary driver B: *"Create a catheter checklist to encourage standardised practice"*
  - Reviewed BPP to be disseminated into colour coded checklists for every type of catheter placement, each one no more than 1 A4 page by [redacted]
  - Take checklists to working group to be approved
  - [redacted] to Laminate documents
  - [redacted] to be responsible for ensuring that every prepped catheter tray has the appropriate checklist in it and to inform Becky if more are required/need replacing
- For secondary driver C: *"Re-introduce the catheter book to document all catheters inserted and any complications arising"*
  - [redacted] to purchase an appropriate lined book and pen
  - Book to be kept on intern's station in hospital
  - [redacted] to co-ordinate informing of hospital staff of catheter book and how to use it
  - All QI working group to take responsibility for ensuring staff fill out book (especially during the first 3 weeks)
- For secondary driver D: *"Create a protocol for replacement of catheters removed / damaged by horse / patient"*
  - [redacted] to recruit key members of staff to a secondary working group for the creation of a new protocol for the replacement of catheters that have been removed or damaged by patient.
  - This group must include at least one member of: Yard staff, Intern, Medicine clinician and nurse (more can join if needed applicable but all these groups, must be represented as key players in this area).
  - Working group to co-ordinate via email to assist [redacted] to create protocol
  - Once created protocol will be taken to QI working group for evaluation and feedback
  - Then protocol will be trialed for 4 weeks to ensure it is relevant, applicable and fit for purpose.

Figure 18 - KDD diagram created for Practice 2; the intervention planned aims to reduce catheter complication within the hospital. Key information is redacted to maintain anonymity of participants.

7.3.5 Reflective feedback on QI training document and planning framework post pilot study of QI project implementation – Practice 1.

Overall Practice 1 provided positive feedback from their experience; the professionals that had used the QI tool reported back that they liked the checklist and at the time of gathering data it was successfully serving the purpose for which it was designed. The practice had not previously attempted to design or implement any formal QI project and the leader of the QI working group had no prior knowledge or experience of QI methods. When reflecting on the entire process conducted, this inexperience was exposed; participants identified the lack of attention they had paid to how information was disseminated in their practice and noted the particular difficulty they had had navigating an ever changing out of hours rota.

Participant 2, Practice 1 - "*Problem was in the execution, maybe thinking more about the nuts and bolts of how it was going to be put in place. Trusting the information to flow down the chain of all staff didn't really work."*

Participants noted that the training document and assistance of researchers was particularly useful when they reached difficult points in the process of planning and implementing a new QI tool. Having the ability to revisit what was discussed at the initial planning meeting and check that processes were being followed as discussed and planned.

Participant 2, Practice 1 - *"you've been really useful, you've managed to come up with completely different ideas, the outside perspective has been very helpful. You can be separate from politics and not really knowing how the practice runs is actually very helpful as it brings fresh new ideas when we get stuck."*

Participant 2, Practice 1 – *"it was nice to have this to reassure me I was following the right path, especially when there was push back from some staff, I always felt confident in what needed to be done to get done what we needed"*

During this reflective meeting a plan was put in place to continue to modify and fine tune the QI project and data monitoring methods were put in place so that the reflective process could continue in a cyclical manner after data collection was completed, permitting the vet practice to get maximum benefit from this process.

7.3.6 Reflective feedback on QI training document and planning framework post pilot study of QI project implementation – Practice 2.

Although the practice had previously conducted quality monitoring activities, this was the first time a formal QI working group was formed and created a QI project, to specifically target an area for improvement using formal structured methods. Participants felt that the structure provided to them by the training document and personalised KDD diagram had been beneficial in both the planning and execution of the QI project.

Participant 3, Practice 2 – *"The whole document really helped with organisation and structure of what we were going to do made a good template for what we are doing and why, we kept coming back to the KDD diagram, always relating everything we are doing back to our primary aim and making sure we stayed on track together."*

Participant 1, Practice 2 - *"Fit for purpose and worked really well"*

Participant 2, Practice 2 – *"It gives confidence doesn't it? You know that anything to take to the wider practice has already gone through the right stages beforehand makes you feel like you have good backup for what you're asking from people"*

Like in Practice 1, individuals within Practice 2 reflected on the benefit of having an outside perspective to help moderate the initial QI planning meeting and commented that the mix of participants from the practice itself made a huge difference to the outcome and smooth running of the project.

Participant 4, Practice 2 - *"I liked the in-depth first meeting and by introducing things we hadn't done before and different ideas from outside the practice, we could hold the discussions with everyone involved and it enabled us to get all the different viewpoints."*

It was noted that perhaps the document was most beneficial to those that had not been involved in a QI project before, making the proposed project accessible to all, even those who had not come into contact with QI in their normal role in the practice before.

Participant 3, Practice 2 - *"It helps structure it really well, and not having been involved in QI before it made it accessible to everyone. And means everyone can get involved and have an input"*

Practice 2 agreed in their feedback that having a combination of different staff members, personalities and experiences within their QI working groups made for an enriched experience.

Participant 2, Practice 2 - *"Lots of fresh ideas which was nice. A mixture of people who are do'ers and ideas people worked well"*

Despite previously suggesting that the document could hold more veterinary specific examples of QI project, having used the document, participants felt that what was contained was sufficient to do the job.

Participant 1, Practice 2 - *"Think now we have used the document we can identify the vet examples ourselves and what was there was sufficient"*

There was a noted difficulty in finding evidence to base their veterinary decision on, that was both relevant to the project being conducted but also how to evaluate evidence that did exist for validity and reliability.

Participant 5, Practice 2 - *"I think it would be beneficial to include some hot tips on how to use and find EBVM examples, especially as we don't have access to all the journals and articles online that most vets do."*

7.4 Discussion

A critical stage in the planning and design process (PDP) of both healthcare and, by extension veterinary care, initiatives and projects are made in the early phases (Elf *et al.*, 2015; Elf, Svedbo and Wijk, 2012; Jensen, 2011). Human healthcare literature typically characterises this early stage of planning as a conceptual phase in which stakeholders will meet, discuss ideas and objectives as well as beginning to prepare for design decisions to implement the training material (Pemsel, Widén and Hansson, 2010; Vischer, 2008). This study focused on developing a framework to assist veterinary practices in planning and implementing a QI project. Limited literature exists that details the planning and preparation that goes into veterinary QI initiatives and projects. Whilst anecdotally practices may have their own internal framework and structures to assist their employees in introducing these types of project, the author could not find any evidence of these published in peer reviewed literature. The success or failure of a QI measurement or change project often rests on the decisions made by participants in the early stages of

planning and preparation. Currently no formal framework exists that specifically instructs professionals on how to plan and conduct a QI project in their veterinary practice.

7.4.1 Methodology

The first task of this project was to form a working group with the knowledge and expertise of QI and the veterinary sector to plan and write an education document specifically tailored to assist veterinary professionals with planning and actioning a QI intervention within a veterinary practice. This group consisted of two equine veterinary surgeons who alongside clinical work also lecture at The University of Nottingham's School of Veterinary Medicine, a veterinary epidemiologist and director of the Centre for Evidence-based Veterinary Medicine (CEVM), a clinical equine surgeon from a busy corporate hospital practice and the head of hospital from a different large equine practice also serving on the council of British Equine Veterinary Association (BEVA). The members of this group were chosen due to their varied and extensive experiences within the field of veterinary medicine, evidenced based veterinary medicine and QI including management, education and policy making as well as their prior knowledge, experience, and contribution to the wider PhD project.

Practices were also chosen to participate due to their similarities in cases seen but their different approach to operations and ways or working as well as internal structure a hierarchy. The formation of the QI specific working groups in each practice allowed the involvement of many different people with different backgrounds, experience, and opinions. This variety of input into a QI project has been proven to be successful in human healthcare. Collaboration between a variety of stakeholders has been identified as key to the successful development of any education documents in human healthcare literature (Eriksson, Frost and Ryd, 2012; Attaianese and Duca, 2010; Boston-Fleischhauer, 2008b, 2008a). The groups of professionals featured in this project included first opinion practice, referral practice, university practice, private practice, corporate practice, and emergency care as well as a range of species treated a various job role. Whilst it was not possible to cater for every type of practice in veterinary medicine, taking on board each person's individual experience and expertise alongside the range of practices included within each working group, the flexibility of the document created could truly be tested. Veterinary medicine is a variable landscape and differing for each different sector, practice and or corporate group (Henry and Treanor, 2012), it's essential that any resource produced is

both general enough to be applicable to a variety of professionals and specific enough to meet the aims of the project.

During the discussion process of planning a QI project, participants were coached in the act-observe-reflect-plan cycles that would be crucial to the data collection process, as reflexivity is at the heart of this study it is vital that participants are able to effectively reflect on their actions, during the study period (Kaluzeviciute *et al.*, 2021).

7.4.1.1 Limitations of the study

Although this study is a pilot, it will begin the process of identifying aspects of training and information disseminations that require specific attention regarding QI use in veterinary practice/medicine. It was key for the process to test the usability of the training document and KDD diagram in veterinary medicine to allow participants to participate meaningfully and guide the data collection process. Because of this required involvement from participants it wasn't possible to fully standardize the exact process followed. In this study, whilst a consistent framework laid out in the training document was followed for each practice, the initial planning meeting for each practice for example, was led by participants and only guided by the researcher. This disparity was combated by ensuring that the same researcher moderated both meetings, and by doing this the researcher was able to record all aspects of the planning meeting and also ensure that the meeting remained on track and give advice. Both practices noted that they felt that the involvement of the researcher at key points in the process of planning their QI project was beneficial.

Unfortunately, this project had to be concluded prior to participant practices being able to complete more than one cycle of inquiry, action, and reflection (Attwood, 1997). Each of the practices taking part in this study have been briefed on how to complete this cyclical evaluation and if they did not do it previously how to effectively measure outcomes and improvements. However, this means that this report does not consist of a full set of results from each practice, only the first cycle of plan, implement, measure/observe.

Systematic data gathering was a key component of this study in order for the participant practices to be able to fully assess to impact of the project planned (Mackenzie *et al.*, 2012). For Practice 2 this was already part of their usual process and protocol for certain areas. Practice 1 did not follow as strict a data gathering procedure as Practice 2, but both practices did have assistance on data gathering for the duration of this study from

University of Nottingham researchers. However, the processes followed by both practices were not identical or standardised.

7.4.2 The use of KDD framework diagrams to assist in planning a veterinary QI project

Kaplan et al. (2012) identified the need for clear frameworks in the planning and execution of QI projects in human healthcare (Kaplan *et al.*, 2012). Whilst the findings of this study would agree with this, it also highlighted the requisite for contextual factors to be considered when creating any framework to be used (Grooms *et al.*, 2017). For the purposes of this project a small, centralised team of both academics from university of Nottingham school of veterinary medicine and centre for evidence based veterinary medicine worked in partnership with external veterinary surgeons working for a corporate practice group. Together they formed a working group to plan and create information on planning a QI intervention project in veterinary practice.

The process of producing a KDD diagram is methodical and detailed. It is best completed in a group setting where each person can offer an opinion or idea for the outcomes of the project in question. The very basic protocol for each initial planning meeting at each practice was the same. Firstly, the outcome was defined clearly and agreed upon by all participants in the practice QI working group with a clear aim statement written. Participants worked collaboratively with researchers in an effort to improve the test tool. This collaboration meant that after the initial design phase, researchers are pro-actively including those directly affected by the research, integrating their perspectives and their input into all stages of the research process (Olshansky *et al.*, 2005).

KDD diagrams have been successfully utilised to meet a variety of needs in human healthcare for many years. Most relevant to this project is their use in QI projects. KDD diagrams can be used to ensure that several required key factors for planning QI projects are met in the planning and preparation phase of a project. They also provide a framework to be followed and encourage the cyclical monitoring of areas for improvement (Sullivan *et al.*, 2021; Peterson *et al.*, 2019; Graber *et al.*, 2018; Picarillo, 2018; Perla, Bradbury and Gunther-Murphy, 2003).

Initiating a QI project in veterinary medicine is challenging. There is extremely limited literature existing that specifically relates to using quality improvement in veterinary

practice, and anecdotally issues around language and terminology used can prevent veterinary professionals being able to concisely provide local data relevant to a project being planned (Rooke *et al.*, 2020, 2021b, 2021a). KDD diagrams provide QI individuals or teams with a simple but reproducible method to create a framework to conduct their QI activities from. They allow for 'local' context to be considered, generate consensus among the QI team involved, and improve buy-in from the wider team that will be conducting the improvement interventions.

The document was designed to be descriptive not prescriptive and instead of having a clear "you must do this" list, it provided guidance on ideas and actions practitioners would need to consider and plan for in order to increase the chances of being successful.

7.4.3 Feedback from participating practices on the process used within the pilot study to plan their QI projects

Within the local context of the practices there has certainly been empowerment of staff that previously had little to no involvement in this sort of project. Groups such as veterinary nurses and auxiliary staff stated that after taking part in these projects, they felt invested in the process of continued improvement and quality monitoring that had not be open to them prior to this study. It was also interesting that those members of staff that had anecdotally been thought of as leaders in processes such as these found themselves taking a more back seat role in favour of the previously disempowered staff. That is not to say that all groups did not have something key to offer. By incorporating a variety of perspectives into the planning phase of the project troubleshooting could occur at the planning phase of QI rather than in implementation phase. Leadership in QI projects can come from a variety of sources including management, clinical leads and also 'experts' in the area to be monitored. The participants from practice 2 found themselves utilising the expertise of the auxiliary staff to achieve the change ideas for primary driver four (removal of catheter by animal) this was due to the close and constant proximity of the grooms to the animals when the catheter sets were being damaged. It was recognised that these staff would be best place to take the lead on change ideas to prevent and manage this driver to reduce catheter complications. This is to this authors knowledge the first-time auxiliary staff such as grooms have been documented as taking such a key leadership role in a complex QI project in veterinary practice. This re-enforces the idea that all staff can play an integral role in the implementation of these methods, and that extensive clinical

knowledge is not required to contribute successfully to a relevant project. The auxiliary staff at practice 2 commented how much enjoyment they had got from participation and having their expertise recognised and utilised by colleagues.

Practice 1, although a smaller practice found that resting the sole responsibility of even a small QI project on a singular member of staff made for logistical difficulties. Particularly when it came to instigation of the improvement model, one member of staff can only be in one place at once. It was also found that this chaotic implementation of the project meant that the QI tool had to be launched and then adjusted several times in order to find the correct process for implementation.

Both practices will continue to use the tools implemented through the course of this study and monitor the outcomes to keep measuring the success or failure of their own models.

The key finding from this study is that frameworks can and should be devised for specific use in veterinary practice to assist with the planning and implementation of QI projects and tools. We cannot lose sight of the individual nature of each distinct veterinary practice; a generalised framework has assisted both veterinary practices taking part in this study in the planning and implementation of their QI project. However, every practice will need to find what works for their own local context.

7.5 Conclusion

Sustained change to achieve better patient outcomes and safe, patient-centred care is reliant on a simple flexible approach applicable to multiple settings, practices, and scenarios. Successful implementation of QI methods is dependent on the structure and the culture of the practice in question. KDD diagrams thus far seem to fulfil this need within veterinary practice. Whilst more robust testing that goes beyond a pilot study is required the results so far are promising. Decisions concerning veterinary QI education are critical and must be informed by those currently working in practice, changes implemented could impact people and work processes for many years KDD diagrams allow members of staff to have their voice heard and to take ownership of the process they are designing for their workplace.

Chapter 8

Final discussion and summary of thesis

8.1 Final summary of thesis findings

The aim of the work within this thesis was to investigate the potential benefits and application of quality improvement (QI) methods in UK veterinary practice, specifically, how these methods could successfully be used to uphold and improve quality of care delivered to patients and clients. The thesis investigated both common practice of QI use in human healthcare alongside the use of QI and adaptations that could be made to adopt these methods into veterinary medicine. Seven objectives were identified as required to meet the aim of the thesis; this chapter will triangulate and evaluate the combined results, make recommendations for future work, and evaluate the impact of these findings on the stakeholders in veterinary medicine.

The review of current veterinary medicine and human healthcare literature (Chapter Two), and research into current knowledge and use of QI methods by veterinary professionals (Chapters Three and Four) provided a key appraisal of the current standing of QI methods in the veterinary sector. The identification of gaps in knowledge and training, and summary of existing evidence were the essential first steps to plan the work needed to integrate QI methods into mainstream veterinary practice. Professionals need evidence-based guidance to base their actions on (Cockcroft, 2020; Curtis, 2020a). Currently this evidence base does not exist in veterinary medicine, and the majority of information is derived from studies in human medicine; there is also a limited variety of QI methods described in veterinary specific literature, which in turn limits the research available for veterinary professionals to utilise. Literature surrounding the use of QI in veterinary practice is sporadic and often restricted to several well-known methods (primarily clinical audit (Viner and Jenner, 2005), checklists (Boston, 2015) and M&M rounds (Higginson, Walters and Fulop, 2012)). Few studies analyse the specific efficacy of using one method in favour of another in veterinary medicine, and as such it is difficult to justify how the methods used are selected. In this current study, a methodical analysis of current practice, paired with the opinions of veterinary practitioners working in a variety of veterinary practices (Chapter Four), began to produce an evidence base for practitioners to utilise these methods effectively in their day-to-day work.

The ever-changing landscape of veterinary medicine and practice was put under extreme stress and strain through the COVID-19 pandemic (Chapter Five) and influenced the direction of this research work. The virus and subsequent restrictions required an almost total overhaul of how vet practices delivered care to their patients. Analysis of how the veterinary sector adapted to continue to provide QVC to their clients during the pandemic provided insight into the adaptability of methods appraising quality care and which changes persisted post Covid. Chapter Four gave an insight into how practitioners felt these methods could be incorporated into their regular work, QI methods by design are supposed to be flexible in their approach and adaptable to many differing situations. The COVID-19 study findings analysed how practices operated under extremes of stress, the necessary adaptations to care delivered, and how QI methods would fit into this. Many participants in this study reported a lack of framework to deal with the additional strain COVID-19 put onto their roles. In addition, some participants felt that management lacked leadership and ability to direct operations during this time. Regular use of appropriate QI would provide practitioners with this framework and provide robust systems for times of stress. Confidence in the use of QI and the self-assessment of care provided could give professionals the autonomy to do this for themselves and give confidence in the decisions they made. Post the initial COVID-19 outbreak, lasting changes to how many practices delivered care occurred, and any subsequent research or resources into the application of QI in veterinary medicine needs to consider and be aware of these changes and the impact they could have.

Each previous chapter (Chapter Two-Five) identified a varied list of barriers and difficulties regarding the widespread implementation of QI methods in veterinary practice, using the current information available. Some barriers were common across all studies, and these included accessibility to information and training, usability, and relatability to job role of current resources available to the profession. After determining a baseline of knowledge and use of QI methods in practice and establishing how QVC was defined and delivered in practice, the next logical step was to address some of the barriers highlighted through these studies. Whilst some participants felt that they had received adequate training and information on the use of QI, to many participants, the term itself was unknown. This creates a barrier through terminology, practitioners recognised the specific method that may be used to analyse quality of care delivered (e.g., clinical audit) but few could identify that this was in fact a QI method. This confusion around terminology linked closely to a lack of specific resources detailing QI methods in veterinary specific terms

and was addressed through the development of a veterinary specific glossary of QI terms (Chapter Six).

A second recurring barrier identified by participants was the education and training available to them. It was highlighted in Chapters Three and Four that few people felt confident in their knowledge of QI, or their ability to conduct a QI project in their practice, even if they had received training or CPD specific to QI methods. This was addressed in the final phases of the study. Chapter Six took steps to establish a standardised language around veterinary QI, facilitating communication within veterinary practices. Chapter Seven then helped develop the tools to implement QI in veterinary practices. This study designed a QI training document and implementation framework for veterinary professionals to use when planning a project in their practice. This was taken from examples of such documents existing in human medicine and aimed to standardise and simplify the daunting process of starting to plan a QI project in veterinary practice. Together, these two studies start to address some of the key current barriers, with a focus on a whole team approach.

8.2 Overall study design and limitations

Discussion around the study design limitations refers to factors affecting the thesis as a whole; individual methodological and practical limitation affecting each chapter are discussed in detail within the separate chapters.

The thesis relied heavily on remote methods of data collection, specifically online questionnaires, focus groups, interviews, and an e-Delphi. This was primarily due to the fact that COVID-19 and subsequent restrictions were taking place for a majority of the study time which prevented face to face data collection (Routh *et al.*, 2021b). The original Gantt chart drawn up for this project had predominantly involved in-depth focus groups at a variety of practices to assess the different opportunities and barriers to implementing QI in a variety of veterinary practices. Following this, the original plan was to hold several intervention studies at selected practices to begin to build a picture of how QI will fit into everyday work in different practice settings. With the enforcement of social distancing measures due to COVID-19, this wasn't possible and there was further uncertainty over the duration of these restrictions. The plan for the thesis research programme had to change substantially, in terms of both the research questions being asked, and the methods

used to collect data. Different methods of data collection and study needed to be devised, gain ethical approval, and be carried out, and this lost a significant amount of time.

Whilst there are advantages to using online methods to collect data, there are inherent limitations to these methods. Online questionnaires in particular can present limiting factors such as restricted access to a wide range of participants, particularly if using email-based methods to contact potential participants (Evans and Mathur, 2018). Commonly, participants were contacted using their practice email address' available online, and there is the potential for such invitations to be categorised as junk email by computer system servers and communications from researchers never being received (Andrade, 2020; Lefever, Dal and Matthíasdóttir, 2006). To combat this, participants for the e-Delphi study (Chapter Six) were recruited via targeted emails, sent to central contacts at veterinary practices and corporations. The emails detailed the participants required and asked the recipient to pass the survey links onto any participants they could both within and externally to their organisation (snowball sampling). It was hoped that this would reach the widest possible demographic and reduce the limiting factor of a poorly representative sample of the profession responding.

Qualitative data formed the bulk of the data gathered in the course of this thesis including focus groups, interviews, and free-text form questionnaires (Habibi, Sarafrazi and Izadyar, 2014; Johnson and Barach, 2008; Morgan, 1996; Ritchie and Spencer, 1994). There has been controversy and discussion as to the suitability of qualitative data in healthcare research (Poses and Isen, 1998). However, they can provide excellent contextual data for complex care environments and the intricate relationships contained within (Johnson and Barach, 2008). They are appropriate methods of data collection when there are unknown barriers that need exploring, before being able to identify solutions. Using in-depth qualitative research has historically resulted in better insight into both the health professionals' opinions and perceptions, as well as identification of barriers to providing quality care and QI in human healthcare literature (Al-Busaidi, 2008). It is not generally possible however, to draw wide reaching, generalised conclusions from qualitative data gathered, the volume and type of data gathered does not allow for these conclusions to be drawn. Conversely a solely quantitative methodology will rarely provide researchers with the 'why' to explain their statistical findings. Either situation could be viewed as a limitation in perspective studies. Veterinary medicine is a variable and complex industry, large research-based projects generally benefit from a mixed methods approach (Hunt *et*

al., 2022; Piano Clark, 2010; Pluye *et al.*, 2009). It is important to consider that there will be many opinions and approaches in a profession as and broad and diverse as veterinary medicine.

It was important for this project that as a wide perspective of data was gathered as possible particularly considering the lack of available pre-existing data, to combat potential limitations to using solely qualitative or quantitative methods, a mix of methods was used to both gather both the broad and the in-depth picture. The abundance of in-depth detailed data gathered from participants in this study provided insights in many aspects of the project, and the broad statistical findings from many members of the targeted cohort allowed a variety of angles to be considered and triangulated across different phases. Descriptive statistics, statistical analysis and quantitative methods used alongside the subjectively analysed qualitative data to draw conclusions from the data gathered for each chapter guarded against the limitation detailed of a singular methodology.

Although not a methodological limitation, a limiting factor of the PhD programme as a whole was the lack of current evidence and research on QI in veterinary practice. It was hoped at the inception of this thesis that several resources would be produced for use in veterinary training and CPD, to inform and guide professionals on the use of these methods. As the thesis progressed however, it became apparent that more groundwork was needed in identifying and addressing barriers and challenges, and generating new evidence, before it was practical to produce these resources. COVID-19 also impacted the focus of the thesis, from practical applications in veterinary practice, to identifying barriers and theorising practical applications of QI, until restrictions lifted and work inside veterinary practices for this project could recommence. The final phase of the project did achieve the development and piloting of a resource to guide veterinary professionals, but this was aimed at teams who already had some knowledge and training in the use of QI. This was an adaptation of the original aims and objectives from the inception of the project but was a more realistic goal.

8.3 QVC and Implementation of QI in veterinary practice

Providing the highest quality veterinary care (QVC) can often be a case of harmonising, not only between the personal views and ethos of veterinary staff and clients, but also maintaining the delicate ecosystem of the veterinary practice, with different groups

collaborating to deliver the best care possible. These aspects feed into, not only the individual veterinary professional's view of what quality care is, but also how they enact this vision in the workplace (Hayes *et al.*, 2020; Bartram, Yadegarfar and Baldwin, 2009; Gilling and Parkinson, 2009; Loomans *et al.*, 2008). 'Quality' in relation to care delivered is not a static concept and will hold different meanings to each individual within a healthcare service; it needs to be recognised and acknowledged as a term in order to look to monitor and improve it. Whilst finding a complete definition of QVC in published literature proved challenging, quality veterinary care (QVC) and quality improvement (QI) are two terms that are inextricably linked. A large portion of several chapters were dedicated to gathering data and opinions from veterinary professionals on their view regarding the definition of QVC. QI methods refer to the systematic framework utilised to monitor and improve quality care. Professionals employing these methods need to be able to quantify and justify their own internal opinion of what constitutes quality care to be able to successfully analyse and improve it. The lack of a clear definition of QVC could explain the difficulty the veterinary sector has had in realising the smooth execution of QI ideology in everyday veterinary medicine. It would also reason that this lack of definition could contribute to the challenges the researcher experienced in implementing these methods at a variety of practices. The research in Chapters Three and Four explored attitudes and opinions of QVC by professionals currently working in the UK veterinary sector and looked for patterns between different demographic groups in order to begin to define this complicated term. It became apparent that not only does QVC hold different meanings to professionals who work in different job roles within a practice, but even those who hold the same job title or share an area of expertise may not agree on a definition. It was not something that participants felt they were commonly asked to articulate. Most could describe aspects of their work that they felt enabled them to provide quality care, but few could detail what a holistic QVC experience would look like, or how each individual member of the practice team may have a hand in providing that.

More work needs to be done to ascertain what QVC means to different professionals in the sector, and how these viewpoints cofunction together to form a 'global industry' opinion of QVC applicable across different professionals working in veterinary practice. Non-clinical staff have their own role to play in providing quality care to the patient. The key findings in Chapter Four was that an encompassing, holistic view of quality veterinary care is needed, including both the clinical and client facing job roles. Whilst the clinical (vets and veterinary nurses) and non-clinical (receptionist/client care and administrators)

staff have differing views on how to provide quality care, these views can come together and complement each other. This study did not explore the opinion of animal owners / clients on what defines quality care. This is a key aspect of QI but was beyond the scope of this current work. There are a small number of studies that have investigated what clients look for from their veterinary practices to provide quality care (Spitznagel *et al.*, 2022; Kogan *et al.*, 2021; Merle and Küper, 2021; Belshaw *et al.*, 2018c, 2018b; Coe, Adams and Bonnett, 2012), however, few of these incorporate veterinary clinicians and other job roles into their evaluation. Research that incorporated all views of QVC and how best to provide it would be a hugely beneficial resource to veterinary professionals not only wanting to use QI methods in their work, but also in their daily practice work. To this researcher's knowledge, the work performed in this area of defining QVC and examining the role each practice member plays in providing this to clients and patients is novel work.

The transfer of research findings into clinical practice (evidence-based veterinary medicine EBVM) has historically been shown to be a slow and disorganised process (Vandeweerd *et al.*, 2012; Schmidt, 2007). A central aim of QI activities in healthcare is to improve and streamline the transfer of these findings into practice through a deliberative, planned process. The crucial principle of any healthcare system, be it for human or animals, is to provide a patient centred, high quality service. The question of how to quantify and develop care delivered is multifaceted and complex. Interest in developing quality improvement (QI) systems specifically tailored to the veterinary industry has increased in the last three years and is backed by the Royal College of Veterinary Surgeons (Anonymous, 2015; RCVS Knowledge, n.d.).

Uptake of the systematic improvement of quality, under the umbrella term 'quality improvement' has been infrequent, disorganised and dependant on individual practice set up and infrastructure in the veterinary sector (Rooke *et al.*, 2019, 2021b). There is anecdotal evidence that many clinics and individual professionals carry out their own version of QI regularly; however, research and recording of these projects is poor, and as this study showed, fundamental aspects, such as understanding, and use of QI terms is highly variable. With limited scientific research into the process of QI in the context of veterinary medicine and no national framework for professionals to follow, the methods currently used are occasionally carried out inconsistently. This also reduces and limits engagement with QI activities if people are unable to clearly see the results of interventions (Zoutman and Ford, 2017c).

8.3.1 Addressing the barriers to implementing QI in vet practice

Numerous barriers and potential difficulties with implementing QI methods in veterinary practice have been identified throughout this body of work. It is important to acknowledge and identify these barriers, but care needs to be taken not to focus solely on this aspect of implementation in veterinary practice.

The UK-wide questionnaire completed during this thesis highlighted the inequality in the level of knowledge and education offered to people working in different job roles within the veterinary sector. The knowledge gap identified could be due to a lack of relevant, reliable available information and education materials specific to the various job roles within a practice. RCVS Knowledge provide educational materials for QI methods, predominantly through their website (R.C.V.S. Knowledge, 2020), via research conducted (Hocking, Picken and Ling, 2020) and through training seminars. The drawback is that this information and training is primarily directed at those holding clinical roles such as veterinary clinicians and nurses. A small proportion may be relevant to those holding non-clinical roles such as administrators, receptionists, and practice managers; however, this study showed there was very limited evidence of professionals within these job roles using these resources for QI. Participants across a variety of job roles stated clearly, they would be receptive to training surrounding QI use in their practices, but very few had received specific training in these methods.

Continuing professional development (CPD) is an important tool for veterinarians and nurses to maintain and enhance their capability to perform competently in their chosen practice area as well as to acquire new knowledge and skill sets over their career. Although there is generally a mandated minimum number of CPD hours to complete, there are issues with verifying that these activities take place, and the quality of CPD activities can vary hugely (Gates *et al.*, 2021). There are no such mandates on CPD for other job roles in veterinary practice, although individual practices and organisations may have their own requirements of their staff (de Groot *et al.*, 2013; Short *et al.*, 2011). If structured and specific CPD resources existed, this could be a key component in disseminating QI information to veterinary practitioners, particularly nurses and clinicians. The quality of these resources needs to be high, and the language used needs to be understandable, specific, and relatable to the unique challenges faced in veterinary practice. This inequality in knowledge and access to training across different job roles presents a significant barrier to QI implementation. Studies in both human healthcare and other sectors show that all team

members including patients (clients) have a key role to play in achieving a holistic view of the quality of care delivered (Desveaux *et al.*, 2019; Pannick, Sevdalis and Athanasiou, 2016; Boyd *et al.*, 2011; Muntlin, Gunningberg and Carlsson, 2006). Several grant initiatives both in the UK and USA have proved effective in cultivating and training QI competencies in human nursing (Margonari, Hannan and Schlenk, 2017; Brown, Feller and Benedict, 2010; Kovner *et al.*, 2010). Fewer studies have been conducted into other non-clinical job roles however, Swinglehurst *et. al.* 2011 found that receptionists and administrators had an important contribution to make to the quality monitoring process. They found that, similar to veterinary medicine, this contribution was often hidden, underrepresented but extremely specialist and required the expert knowledge that could only be obtained by those working in these roles (Swinglehurst, 2011)

The work contained in this thesis looked to address selected barriers, whose resolution would assist professionals in engaging in QI methods. Individuals using QI methods will encounter barriers unique to their practices and need to be able to address these when they are encountered in a robust manner. Engaging in this problem solving, reflexive practice on a regular basis will encourage participants to take ownership of the changes instigated by their projects, and ensure they are personalised and appropriate for each setting. Practitioners could easily fall into the trap of spending too much time and effort on addressing potential barriers that may not impact every practice environment. Instead, it would be more advantageous to design and provide veterinary professionals with a good framework for execution of QI in their vet practices that be tailored to their unique practice culture. This needs to be done before the momentum and enthusiasm the industry currently has for these methods is lost.

8.4 The future of QI in veterinary medicine:

Opportunities for future study have been identified throughout this body of work, with specific recommendations made in individual chapters. If the industry wishes to continue to progress with the implementation of these methods into practice, then the continuation of high-quality published research is essential to provide veterinary professionals with evidence-based resources to base their QI decisions on. All stakeholder needs have to be considered in order for these methods to be applicable and useable.

8.4.1 Role of human healthcare research in the implementation of QI in veterinary practice

A key limiting factor from the beginning of this research was a lack of published research specifically relating to QI in veterinary practice. Although research specifically examining QI methods in the veterinary profession is lacking, there is extensive research in human healthcare and particularly the NHS examining QI methods and their use. This research can in part be transferred across to veterinary practice due to the similarities that exist between the two industries (Alder and Easton, 2005). However, there are also notable differences that prevent all findings and recommendations being fully transferable. Most notably, euthanasia is considered a viable and humane treatment method in veterinary medicine, which is not the case in human medicine (Alder and Easton, 2005). Human clinicians are able to gain informed consent and diagnostic guidance from their patients in real time as they experience their symptoms, veterinarians however, rely on second-hand information from a third party who also provides consent to treatment for their animals based on their own ethics and experiences (Ashall, Millar and Hobson-West, 2018; Modric and Martinez, 2011).To combat this, research into current veterinary practice protocols and experiences was used to make informed decision about the transferability of the studies being analysed. Many of the barriers identified in this work, preventing use of QI methods in practice, have been encountered and addressed by researchers in human medicine. The NHS, like the veterinary care sector is comprised of a series of complex multifaceted systems each with their own structure and arrangement of professionals, patients, and clients (Schiff and Rucker, 2001; Portillo, 1998; Pollitt, 1996). Therefore, it is unsurprising that complications experienced in human healthcare are also present in veterinary medicine. Where possible, veterinary specific research was used throughout this thesis to inform methodologies and review of literature. Often the methods referred to were not termed as QI, but instead described an identified QI process and methodology such as clinical audit or checklists.

Examining execution and uptake of QI in the NHS has shown that these methods are most successfully implemented with low–level changes made by individual or small groups of actors in their specific area of work (Donnelly, 2017). Two review studies published in 1998 had already identified the issues evident with making sustained changes to upper-level management systems through large scale projects (Blumenthal and Kilo, 1998; Shortell, Bennett and Back, 1998). The absence of sustained uptake and significant change was put down to structural issues, human issues and/or environmental context, or a

combination of all three. Effective QI implementation in veterinary care needs to be specific and in the context of the system that is to be changed. Ideally, it should be completed by a person or group of people currently working and familiar with the system in question (Rooke *et al.*, 2021b; Al-Shdaifat, 2015; Choi *et al.*, 2001). Results from Chapter Three (knowledge and understanding questionnaire) and Four (focus group at equine veterinary practice) acknowledges that the professionals working in veterinary practice want to be involved in this process. Whilst participants recognised that their lack of experience may require them to engage guidance from outside, they want to fundamentally be in control of the monitoring and improvement of their care systems. By doing this, they are able to recognise the changing systems they will encounter and adapt methods accordingly to meet the specific goals required. Attention to the technicalities of any application of QI to a healthcare setting is important (the technological requirements and time obligations for those carrying it out); equally important is the engagement, knowledge and education of those professionals working in it (Spurgeon, Clark and Wathes, 2015; Parand *et al.*, 2010). There are always specialised local processes, protocols, and culture to contend with at each practice or department, as well as the dynamics of staff and managers alike. Current research describes application of QI methods in this setting as a careful balancing act between tried, tested, and evidenced methods, and use of local department expertise. The practices involved in Chapter Six showed that when given agency and the freedom to express their ideas, staff can very much take the lead and use their local knowledge and expertise to conduct a successful project. Whilst this was a small study, it concurred with the earlier research in this thesis where veterinary professionals advocated for their own empowerment when utilising these methods - they want to be in charge on conducting these projects, not external or corporate figures.

Correct and precise planning, involving all members of the team conducting the QI intervention, is vital to successful implementation and sustained change/improvements (Valleru, Krishna and Fristad, 2019; Swanson and Pearlman, 2017). Extensive research from human healthcare shows that engagement across all departments and job roles is possible and vital to a successful far-reaching project (Spurgeon, Clark and Wathes, 2015; Parand *et al.*, 2010). In the late 1990's and early 2000's, it was noted that the approach taken, and strategy selected for a QI project in human medicine was often nominated to keep in line with prevailing disciplinary customs and habits of a department rather than due to scientific evidence and the transfer of research findings (Akl *et al.*, 2007; Grol and

Grimshaw, 2003; Grol, 1997). This was despite a growing body of research conducted within the human health profession on the effectiveness of various QI strategies. This trend can also be seen currently in veterinary medicine with practitioners very familiar with the QI methods using methods that have been ingrained in education and industry for a prolonged period of time e.g., clinical audit and checklists (Curtis, 2020b; Mosedale, 1998b, 2020; Frankel, 2017; Boston, 2015). This practice of not being innovative when selecting the most appropriate tool to monitor and improve care practice can be related back to a lack of evidence-based materials and studies for professionals to fall back onto to evidence their decisions. Like the human sector, the veterinary profession anecdotally has a susceptibility to exclusively select and use the methods that are familiar and entrenched into their practice guidelines and the Practice Standards Scheme (PSS) laid out by RCVS. Whilst this selectivity is not necessarily a negative, it can be extremely limiting to application of QI, and means that the most appropriate method available is not being applied to the system being analysed.

8.4.2 Continuing education

Education has been highlighted throughout the thesis as a significant barrier for many wanting to get involved in QI. Whilst there are resources available through websites such as RCVS Knowledge (R.C.V.S. Knowledge, 2020), few participants working in non-clinical roles (receptionists, administrators etc) were using, or aware of the existence of this. The resources are aimed at those in a clinical role, such as veterinary clinicians or veterinary nurses, and there are limited to no resources focused on those in a non-clinical role using QI. This needs to be addressed, studies within the human healthcare sector emphasise entire team involvement is crucial for effective use of these methods (Swanson and Pearlman, 2017; Morganti *et al.*, 2012; Øvretveit, 2011; Choi *et al.*, 2001).

The Healthcare Quality Improvement Partnership (HQIP) is an independent organisation solely dedicated to the education and development of quality improvement within the NHS. The HQIP has produced learning resources and documentation that identifies twelve key QI methods best suited to healthcare settings. This has been instrumental in helping establish common QI language to within the NHS (HQIP, 2015, 2020). Establishing frameworks for QI methods has created continuity across the NHS in approach to carrying out QI activities, and although these methods will alter slightly depending on the department and people carrying out the study, the fundamentals remain the same. This means that sharing of information and knowledge across departments becomes a

possibility as well as allowing for transfer of skills, through the movement of people / workers. The development of these frameworks highlighted the need for co-development and planning of QI projects. The use of a detailed framework in practice has also been shown to increase engagement from participants, as well as the variety of change ideas produced and implemented (38). Although it is rarely stated in the literature where this framework development stemmed from, it is similar to the planning tools used for QI in other industries, for example engineering (Elezi *et al.*, 2012), education (Thomas Garavan and Tsinidou, 2012), and business (Kok *et al.*, 2001). Once again, this shows the steps that healthcare is taking to streamline processes and protocols in line within their system and ensure high quality care is provided using systems and processes similar to the manufacturing industry (Nicolay *et al.*, 2011) In time, the veterinary sector can aim to achieve this level of development of QI education and planning structure and benefit from the work already completed in the human healthcare, education, and engineering sectors. If these frameworks for language, information and training do exist within veterinary medicine, they are contained within a singular practice or corporation structure, inaccessible to those outside of the organisation. Making this information available to all who wish to access it by using, for example, a central database for QI education, containing a variety of material, relevant to those working in all job roles within veterinary medicine, would go a long way to resolving the inadequacies present in current QI education and information.

8.4.3 Technology and progressing the use of QI

There is scope for technological advancements in the use of QI methods in both human and veterinary healthcare services. There are increasing trends in the veterinary sector towards utilising computerised technologies to make practitioners' lives easier and reduce paper and clutter around the practice (Pelzer *et al.*, 1991). These innovations can be basic such as computerising client records, lab results and treatment plans (Thrusfield, 1983; Thrusfield and Hinxman, 1981; Priester, 1972) or innovative such as using virtual reality technologies to train veterinary students in surgery (Hunt *et al.*, 2020). The COVID-19 pandemic necessitated the need for many practices to look towards computerised and virtual means of providing care to their patients. Results from the longitudinal survey (Chapter Five) showed that some of these techniques have remained in place post COVID-19. The same is true for veterinary education, where technological innovation occurred at a rapid rate and the concept of flexible learning outside of a classroom has remained post COVID for many veterinary institutions (Das *et al.*, 2022; Bowen, 2020).

In terms of quality improvement, veterinary medicine can be an extremely time pressured environment. Delivering quality care to a variety of animals and clients requires the collaboration and efforts of many different people fulfilling varied professional roles. Lack of time was a frequently cited barrier to executing QI in veterinary practice. The use of novel computerised applications available to be used by many professionals at the touch of button, could not only simplify the process of gathering data on process and protocols but also make these methods accessible to all members of the team. Understanding the distinctive system of veterinary medicine is key to being able to address some of the barriers to implementation but overcoming these barriers has been achieved in other industries (Phillips *et al.*, 2010; Senker, 1985) and have been shown to improve the primary care delivered (de Lusignan, 2010; Delaney *et al.*, 1999). The veterinary sector could benefit from these innovations.

8.5 Overarching conclusions from thesis

This thesis offers a translation of QI theory into practice and provides a roadmap for successful implementation of these methods into veterinary practice. Several steps towards this implementation goal have been achieved through this body of work. Barriers have been clearly identified, a framework devised and delivered through a stakeholder driven approach. This will improve the likelihood of successful long-term application and use of QI in veterinary medicine, despite noted barriers and complications. A co-production method has been used to develop tools to meet the needs identified by participant veterinary professionals.

The key take home messages from this thesis include:

- Development and practice of a standardised language would encourage active discussion from a variety of veterinary professionals regarding the quality of the care delivered to patients.
- Ensuring cohesive and uniform implementation of QI project across practices and corporations through use of veterinary specific tool kits which are accessible and adaptable to all types of practice and professionals working within.
- Recognising the role and importance of all staff in the process is key, staff need to become familiar with assessing and adapting their process and protocols on a regular basis. This reflexivity needs to be conducted in a safe blame-free environment to allow for both proactive and reactive changes to happen regarding quality of care delivered.

Staff that are well versed and familiar with the process of evaluating and updating their care systems to adapt, are better prepared to cope under pressurised conditions such as those seen during COVID-19.

- Identify and utilise pioneering professionals who are proactively using these methods currently in practice, these 'QI champions' are what will continue to push the development of these methods forwards.

Evidenced in this work is the fact that QI methods can not only be used to monitor and improve the quality of care delivered to animals but also to improve the veterinary team's effectiveness and therefore increase staff morale. Veterinary staff stated that participation in pilot QI studies in their veterinary practice as part of this thesis enabled them to feel empowered and confident in their work and the decisions they make. Particularly for those groups often side-lined in previous attempts to introduce these methods (nurses, receptionists etc), it can only be a positive for the patients themselves and the industry as a whole.

This study represents a significant development into the use of QI methods in veterinary medicine. In a situation such as COVID-19 with rapidly changing restrictions impacting on care provided and staff well-being, staff that are well versed and familiar with the process of evaluating and updating their care systems to adapt, are better prepared to cope under pressurised conditions. Lack of staff empowerment has been cited as a cause for low job satisfaction and linked to high rates of turnover within veterinary practices.

Through identification and evaluation of the challenges and barriers experienced in veterinary medicine alongside careful consideration of existing research in human healthcare, proactive steps were taken to address some of these difficulties. The development of a strong framework of standardised terminology was an important first step in the integration of these methods to practice. Alongside this, a training and implementation framework specific to veterinary practice represents an innovative, first of its kind resource accessible to veterinary practitioners, including those who have had no prior training or experience of QI methods in their job role. These developments are required to successfully implement veterinary QI and will form a solid foundation for further research in this area and successful implementation in practice.

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Appendices:

Appendix A, Chapter 3, p.28 - Original draft of questionnaire: 'knowledge of QI in veterinary practice' sent out to a participating practice for piloting.

Section 1:

In this section you will be asked some questions about your current job role, place of work and background within the veterinary sector

Q1) Which of these best describes your current job role within a practice:

- Clinical Veterinary surgeon
- Clinical Director / Practice Owner
- Administrator
- Veterinary nurse
- Practice manager
- Receptionist
- Other (type box)

Q2) What is your highest level of professional qualification?

Text box here

Q3) What year did you gain this qualification?

Text box here that only accepts numbers

Q4) Is your practice part of the RCVS Practice Standards Scheme?

- Yes
- No – (go to Q5)

Q4.2) If yes, is your practice accredited as Core, General Practice or Veterinary Hospital?

- Core
- General Practice
- Veterinary Hospital

Q4.3) If your practice is accredited under the Practice Standards Scheme, has it obtained any Awards? If so which Awards?

- Yes – (Additional text box to write which award)
- No

Q5) What type of work does your practice perform?

- First opinion
- First opinion
- Referral
- University
- Other

Q6) What types of animal are primarily treated by your practice? Please tick all that apply

- Small animal
- Exotics
- Farm
- Equine

- Other - Text box here

Q6.2) What types or species of animal do you personally primarily treat if you are a veterinary clinician?

Text box here

Section 2:

In this section you will be asked some questions about clinical governance and quality improvement methods, your current knowledge and if and how you feel they might be utilized in your current workplace and the wider veterinary sector.

Clinical governance is an umbrella term defined as: "activities that are carried out to help sustain and improve high levels of patient care and standards. (Scally and Donaldson, 1998). In veterinary practice Clinical Governance forms part of the R.C.V.S. core standards often clinical governance works involves retrospective analysis and reflection on performance or events that have occurred. Staff experiences are used to implement change and improve care.

Q7) In your current job role are you actively involved in planning or carrying out clinical governance work?

- Yes
- No – to section 2
- I don't know

Q7.1) What type of clinical governance work have you personally planned or carried out at your current workplace? Please tick all that apply.

- Risk management
- Clinical audit
- Education / training / continued professional development (CPD)
- Evidence based care
- Patient / client experience and involvement
- Staffing and staff management
- Performance reflection
- Critical event reflection

- None

Q8) Whose responsibility is it in your workplace to organise / oversee clinical governance work?

Free text box

"Quality improvement (QI) methods can be defined as "a formal and systematic evaluation of a program or system of care, with the intention to improve the quality of the care and/or service delivered." Examples of QI methods includes:

- Checklists
- Clinical Audit
- Benchmarking
- Plan, Do, Study, Act cycles (PDSA cycles)
- Decision trees

Q9) Have you ever heard of Quality Improvement methods before undertaking this questionnaire?

- Yes
- No – skip to Q11

Q10)How would you rate your knowledge and understanding of Quality Improvement (QI) methods?

- Heard of QI and have a good knowledge and understanding
- Heard of QI and have had some experience using it
- Heard of QI but never used it

Q11) Using the definition and examples provided above, do you currently utilize Quality Improvement methods within your work/practice – even if it is known under a different name?

- Yes
- No
- Don't know

Q12) Have you received any education on QI methods, either as part of your degree course or for continued professional development (CPD) or within your workplace?

- Yes
- No

12.2) If yes, where did you receive this training / information from?

- As part of my degree
- degree name and institution
- As part of CPD training
- details of course(s)
- Informally from a work colleague
- Formally within your workplace

Q13) Have you ever received any formal training in your workplace on how to utilize QI in your work?

- Yes
- No – to question 14
- Don't know
- Q13.1) What form did this training take?
- Online webinar
- Online course to be completed in own time
- Face to face workshop from external professional
- Face to face workshop with internal staff member

Q14) Using the definition of QI provided above, how useful do you feel QI approaches could be if implemented correctly in veterinary practice?

Not very useful à useful

Q15) What barriers do you feel could affect the successful implementation of QI in your veterinary practice?

- Lack of time to undertake QI activities
- Lack of understanding of how to do QI. / What QI is?
- Lack of resources to undertake QI activities

- Lack of good direction/support from superiors
- Lack of support from colleagues in the practice
- Fear of reprimand for mistake/error in carrying out QI activities?
- Other (open box)

Section 3:

In this section, you will be asked questions relating to clinical audit and its use in your current place of work.

Clinical Audit is currently the only mandated form of QI required by the Royal College of Veterinary Surgeons and can be defined as: "A quality improvement process that seeks to improve patient care and outcomes through systematic review of care against established care standards. Where indicated, changes are implemented, and improvements made and further monitoring is used to confirm improvements gained from the changes made in a cyclical manor." Principles for Best Practice in Clinical Audit (2002, NICE/CHI)

Q16) Have you heard of clinical audit in the context of veterinary care?

- Yes
- No – move to section 4
- Don't know

Q17) Have you ever personally taken part in a clinical audit cycle as part of your current job role?

- Yes
- No - next section
- Don't know

Q18) There are several different types of clinical audit that can be undertaken. Which type/types of clinical audit have you completed in your current role? (Please tick all that apply)

- Outcome audit
- Process audit
- Significant event audit
- Other type of clinical audit
- I am unsure the type of audit carried out

Q19) How would you rate your understanding of the clinical audit process?

Poor à excellent

Section 4:

The healthcare quality improvement partnership (HQIP) is an established body within the NHS, specifically tasked with promoting high quality care through QI in UK health services. Through their systematic evaluation of clinical practice against standards they have identified 12 Quality Improvement methods that they believe to be effective within the NHS to encourage improvement in the quality of care.

Q20) Are you familiar with any of the below QI methods? and have you ever used them within your current job role? - tick box for most appropriate answer (1-6)

Clinical Audit

Checklists

Plan, Do, Act, Study, Cycles (PDSA)

Models for Improvement

Lean thinking/Six Sigma

Performance Benchmarking

Healthcare Failure Models & effect analysis

Process Mapping

Root-Cause analysis

Communication tools

Technological innovations

Decision Trees

1. QI Method
2. No, I have never heard of this QI method
3. I have heard about it but have little understanding of how it works
4. I understand what this is but would not know how to use it in practice.
5. I understand this method, would know how to use it but do not currently use it.

6. I clearly understand this method and have used this in my work.

Q21) If you were to receive training on the benefits and use of QI relevant to your job role within your practice, how would you like this information delivered?

- Online course
- Webinar
- Podcasts
- Information leaflets
- Dedicated CPD day from external professional
- Short CPD workshop sessions split over a number of days
- CPD workshop delivered by trained colleague
- Practical sessions

Thank you for participating in this survey. If you have any questions about this questionnaire, please get in touch with Freya Rooke on Freya.rooke@nottingham.ac.uk

If you are interested in receiving a summary of the results of the questionnaire, please tick this box: Yes and No tick box

Appendix B, Chapter 3, p. 28 - Revised and final 'knowledge of QI in veterinary practice questionnaire' completed by veterinary professionals working within the UK.

Section1:
In this section you will be asked some questions about your current job, place of work and background within the veterinary sector.

Q1)

Which of these best describes your current job role within a practice:

- Clinical Veterinary surgeon
- Clinical Director / Practice Owner
- Administrator
- Veterinary nurse
- Practice manager
- Receptionist
- Other (type box)

Q2)

What is your highest level of qualification (professional or educational)?

Text box here

Q3)

What year did you gain this qualification?

Text box here that only accepts numbers

Q4)

Is your practice part of the RCVS Practice Standards Scheme?

- Yes
- No – go to Q5)
- Unknown – go to Q5)

Q4.2) If yes, is your practice accredited as Core, General Practice or Veterinary Hospital?

- Core
- General Practice
- Veterinary Hospital

Q4.3) If your practice is accredited under the Practice Standards Scheme, has it obtained any awards? If so, which awards?

- Yes
  Additional text box to write which award
- No

Q5)

What field best describes your practice? (Please tick all that apply)

- First opinion
- Referral
- University
- Ambulatory

- Other

Q6)

What types of animal are treated by your practice? (Please tick all that apply)

- Small animal
- Exotics
- Farm
- Equine
- Other
  Text box here

  Q6.2) If you are a veterinary clinician or nurse, what types or species of animal do you mainly treat/care for?
  Text box here

Section 2:

In this section you will be asked some questions about Clinical Governance and Quality Improvement methods, and how you feel they might be used in veterinary practice.

In veterinary practice Clinical Governance forms part of the RCVS core standards. Quality improvement forms part of clinical governance and often involves retrospective analysis and reflection on performance or events that have occurred. Staff experiences are used to implement change and improve care. Quality Improvement methods can be defined as "a formal and systematic evaluation of a program or system of care, with the intention to improve the quality of the care and/or service delivered." Examples of QI methods include:

- Checklists
- Clinical Audit
- Benchmarking
- Plan, Do, Study, Act cycles (PDSA cycles)
- Decision trees

Q7) Have you heard of Quality Improvement methods before undertaking this questionnaire?

- Yes
- No

Q8) How would you rate your knowledge and understanding of Quality Improvement (QI) methods?

- Heard of QI and have a good knowledge and understanding
- Heard of QI and have had some experience using it
- Heard of QI but never used it

Q9) Clinical Audit is currently the only mandated form of QI required by RCVS and is defined as:
"A quality improvement process that seeks to improve patient care and outcomes through systematic review of care against explicit criteria...Where indicated, changes are implemented...and further monitoring is used to confirm improvement in healthcare delivery." Principles for Best Practice in Clinical Audit (2002, NICE/CHI)
Are you familiar with this process in the context of veterinary practice?

- Yes
- No

Q9.1) How would you rate your understanding of the clinical audit process?

Poor à excellent

Q9.2 If you have undertaken clinical audit in your practice what areas have you chosen to investigate? Please provide an assessment of how successful you believe each has been (0= complete failure, 10= perfect example).

Q10) Have you received any education or training on any of the QI methods, for example, as part of your degree course or for continued professional development (CPD) or within your previous or current workplace?

- Yes
- No

Q10.1) If yes, where did you receive this training / information from? (Please tick all that apply)

- As part of my degree
  - Degree name and institution?
- As part of CPD training
  - details of course(s) / on-line material
- Informally from a work colleague
- Formally within your workplace
- Other
  Text box

Q11) What do you think are the barriers that could affect the successful implementation of QI in your veterinary practice? (Please tick all that apply)

- Lack of time to undertake QI activities
- Lack of understanding of how to do QI / What QI is
- Lack of resources to undertake QI activities
- Lack of good direction/support from superiors
- Lack of support from colleagues in the practice
- Fear of reprimand for mistake/error in carrying out QI activities
- Other (open box)

Q12) If you were to receive training on QI relevant to your job role within your practice, how would you like this information delivered (please tick all that apply)?

- Online course
- Webinar
- Podcasts
- Information leaflets
- Dedicated CPD day from external professional
- Short CPD workshop sessions split over several days
- CPD workshop delivered by trained colleague
- Practical sessions

Thank you for participating in this survey. If you have any questions about this questionnaire, please contact any of the research team.

If you are interested in receiving a summary of the results of the questionnaire, please tick this box and provide your email address

Text Box for participants to leave email

Appendix C, Chapter 4, p.52 – Topic guide used in all focus groups conducted by facilitator FR, to guide the conversation and ensure all key points of interest were covered during the session. Notes on participants expressions, demeanour, group synergy and non-audible cues for later analysis.

Focus Group Topic guide:

Intro: thank you very much for all taking the time to take part in this interview. My name is Freya Rooke; I am PhD student from the University of Nottingham's school of veterinary medicine and science. My research project is surrounding the knowledge and use of quality improvement methods within the veterinary industry in the UK; specifically, I am focussing on professionals working within the equine veterinary sector to get a clear view of current practice in a variety of equine veterinary job roles.

- Check received info sheet: any Q's?
- Get back signed consent forms from and explain recording

START RECORDING

- Complete demographic info / check it has been completed on consent form
- Group Length: 1 hour
- Primary goal: To see things the way you see them... more like a conversation with a focus on your experience, your opinions and what you think or feel about the topics
- 2. Verbal consent
    - Having received all this information are you all happy to participate in this focus group?
    - Verbal Consent was obtained from the study participants / Verbal Consent was NOT obtained from the study participants

There aren't any right or wrong answers in this session and any questions you come up with please ask away. We are just starting to explore this subject and I'm really keen to hear your opinions and personal experiences.

I) Warm –up

Purpose: establish and begin to analyse group dynamics, scout out the vocal / quiet participants, who may need more prompting and who may need reminding of equal participation.

- So, if we go round the table could everyone state their name for the recording and how long you have worked at B&W equine hospital?

II) Broad associations

Purpose: to get participants to speak broadly about the topic area (QI), with minimal involvement from moderator (me) and provide avenues of further discussion later

- As you know we're going to be sharing opinions, experiences, and ideas around the use of QI in equine veterinary practice if you're unsure what I mean by a certain question or terminology used and would like more clarification please ask.

    - As a starter: When I say quality veterinary care what are some of the first words that comes to mind? – What does providing quality care mean to you as a professional in your current role?

- And with that in mind if we talk about quality improvement what does that mean to you?

III) In Depth

Purpose: to define the range of opinions present and develop further the themes gathered from section II.

- Who should be responsible for Quality care
- Who should be responsible for Quality Improvement

Will QI implementation come from the top down? Clear structured guidance / guidelines, processes, mandates, and codes of conduct from 'above' OR will it come from the bottom up? From staff being free to use their own initiatives, taking responsibility for their specific job roles with free open discussion on way and methods to improve?

- Do you feel that Quality care and how to improve the quality of care is discussed enough both professionally and in education?
- What have you been taught about QI?

Where? When?, Formal / Informal? QI in education? Is it there already? needs to do more?, compulsory?

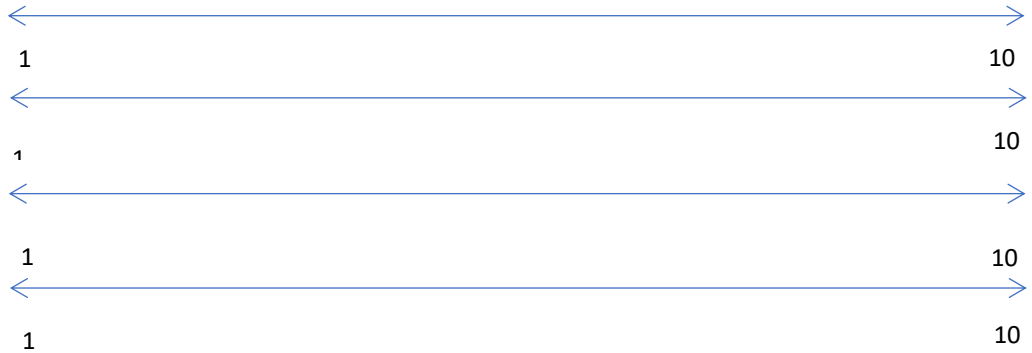
- Do you feel that everyone (no matter what their job) has access to the same training and information?

Currently there is a big difference in the information and training in QI and quality care offered to people in different job roles within the veterinary sector (admin, virtually nothing, vets a lot more, nurses some) what do you think might be the reason for this?

- Are you aware of Quality Improvement resources you could access of your own accord?

If you were to undertake your own research and/or training in Quality or QI, do you know where you could find those resources? And do you feel those resources are sufficient?

- Can you think of any examples of quality improvement methods you use or have used in your job?
- On a scale of 1 to 10 how involved do you feel in planning and carrying out of quality improvement methods at this practice



IIII) Closing Q's:

After the discussions we have had today:

- Do you think if used correctly QI could be useful in veterinary practice? How?
- Who do you think is best placed either in the practice or externally to take the lead in implementing and analysing any future QI projects

- There has been difficulty effectively implementing QI methods in veterinary practice can you think of any reason for this difficulty?

Thank you for your time and the really interesting points raised in this group there has been great input from everyone.

Does anyone have anything to add to this subject that they haven't had the chance to say yet?

Appendix D, Chapter 4, p52 – Copy of information sheet and consent form sent to all participants prior to conducting the focus group. Including basic information regarding the subject of study (QI and QVC) as well as GDPR, data protection and the purpose of the larger project.

Quality Improvement project in Equine Veterinary practice: Information Sheet

Thank you very much for agreeing to take part in this project 'investigating the use of QI in equine veterinary practice. Your contribution and time are extremely valued; could you please take the opportunity to fully read this short information sheet and fill in the short demographic questionnaire below. This is a very important aspect of the project and bringing this information pre-prepared with you on the day will ensure smooth running of the groups on the day.

My name is Freya Rooke; I am PhD student from the University of Nottingham's school of veterinary medicine and science. My research project is surrounding the knowledge and use of quality improvement methods within the veterinary industry in the UK; specifically, I am focussing on professionals working within the equine veterinary sector to get a clear view of current practice. The outcome of this project is to produce guidance to professionals working within equine veterinary practice on how to effectively implement some of these QI methods into their work. And to equip all staff with the tools needed to effectively measure and benchmark their performance within their specific job role in equine veterinary medicine.

Background:

The term Quality Improvement (QI) methods is an umbrella term that encompasses many individual methods. These methods can be used to assess study and benchmark a process or system of care. They are commonly used within the National Health Service as well as in the manufacturing industry to address a wide variety of issues from resource management of facilities and equipment, financial management, right through to adaptations to the delivery of care and clinical innovations (20). Utilisation of these methods within a healthcare service have been shown to encourage a culture of self-reflection and constant improvement through encouraging professionals to take ownership of the work they perform; this in turn leads to higher quality care delivered to the patients.

What does this mean to me?

Quality Improvement methods are not restricted to just being used in a clinical setting, they have been used to measure and improve many different areas of the healthcare service. The adaptability of these methods means that they can be used to measure many things, from infection rates post-surgery, measuring risk factors during anaesthetics to increasing GP capacity to see patients by re-organisation of prescribing administration duties. These are just a few examples of many but they do demonstrate the far reaching

possibilities of QI methods and the need for involvement of the entire team to make effective changes.

The purpose of this focus group:

What I'd like to discuss today are your personal experiences of QI in the workplace and how we could improve understanding and increase the use of these methods. A key aspect of implementing these methods into a sector such as healthcare or veterinary care is involvement of the entire team and empowerment and ownership of care delivered from all staff members, clinical and non-clinical. I want to know how different groups feel about these changes and specifically how to avoid marginalising certain groups whose opinions and experiences are sometimes over-looked.

How will my data be used?

Your responses to the questions during this focus group will be kept anonymous, all personal data will be removed, and no individuals will be identifiable. The responses will be combined with those of other participants and used to inform the next phase of this study.

The University needs to process your personal data in order for you to participate in this study. Details such as how to contact the University's Data Protection Officer and your rights as a data subject can be found at www.nottingham.ac.uk/utilities/privacy/privacy.aspx

Further detail on how your information is processed and how to find out when it will be disposed of can be found at https://www.nottingham.ac.uk/utilities/privacy/privacy-information-for-visitors-correspondents-and-prospective-applicants.aspx

This study has been designed by Freya Rooke (PhD student), Dr John Burford, Professor Sarah Freeman, and Dr Marnie Brennan at the Centre for Evidence-based Veterinary Medicine (CEVM) at the University of Nottingham.

If you have any questions about this study at any point during the process, please contact: Freya Rooke on: svxfr@exmail.nottingham.ac.uk

Or John Burford (lead supervisor) on: svzjhb@exmail.nottingham.ac.uk

Using the subject line: QI Project.

Participant Consent Form

Study Title: Quality Improvement project in Equine Veterinary practice

Participant Name/s:

Address:

Contact number/s:

Email address:

I / We in the capacity as the individual listed above hereby give my permission for Freya and associates to undertake data capture of me in the form of recording and transcribing my contribution to a focus group. I / We understand the purpose of this focus group is to gather knowledge and opinions on current use of QI in UK equine veterinary practice.

In addition to granting consent for participation in this research, I also grant consent for the data obtained from this to be used and analysed over the course of the research study.

I /We understand that data collected will be coded to ensure anonymity and that examinations will be performed accompanied by a member of allocated staff to enable any individuals to be removed from the study at my / our request. I / We are aged over 18 years and have read and understood this consent form and also understand that verbal consent will also be required at the time of data capture.

Signature: _____

Please print name/s: _____

Date: _____

Thank you for your participation in my research

Appendix E, Chapter 4, p.53 – 'Master' list of child and parent codes produced through analysis of the focus group transcripts. Codes listed in bold show 'parent codes' related and linked 'child codes' are displayed below their parent code in regular text.

1. Always things to improve upon	**33. External influences**	**129. Relevant and applicable training**
2. Ambulatory vs hospital cases	**34. Face to face interaction**	**130. Responsibility for QI activities**
3. Asking for help	**35. Facilitating QI**	130.1. change from the top down
4. Balancing act	**36. Feedback**	130.2. management taking responsibility
5. Barrage and overload of Information	**37. Feeling inadequate**	130.3. managements job to implement change
6. Barriers to QI	**38. Financial expectations from management**	130.4. QI led by management
6.1. case load preventing QI	**39. Financial impact on patient care**	130.5. responsibility for QI
6.2. culture changes take time	**40. Follow up communication**	130.6. role of R.C.V.S.
6.3. diary conflicts	**41. Formal QI methods**	130.7. role of the individual in the process
6.4. lack of awareness of QI	**42. Unofficial monitoring**	130.8. taking a specific and personalised approach to QI
6.5. lack of clarity on what's important	**43. Implementation of QI**	130.9. taking ownership of QI
6.6. lack of engagement from all team members	**44. Informal QI methods**	130.10. taking responsibility
6.7. lack of engagement in QI	**45. Freedom in communication**	130.11. the right person to carry out QI
6.8. lack of facilitation to carry out QI	**46. frustration**	**131. Restrictions of career development**
6.9. lack of information	**47. Geographic influences on service**	**132. Reviewing and reflecting service offered to clients**
6.10. lack of resources	**48. Gold standard**	**133. Role of communication in QI**
6.11. lack of standardisation	**49. Gold standard of care**	**134. Service to the client**
6.12. lack of time	**50. Good service**	134.1. client experience
6.13. lack or relevant information	**51. Group analysis of performance**	134.2. client journey
6.14. negative associations with QI	**52. Group reflection on current practice**	134.3. client vet communication
6.15. no time given for QI activities	**53. Guidance**	134.4. client wish.es
6.16. people don't view QI as important	**54. Heroic**	134.5. forming a relationship with clients
6.17. planning but no doing	**55. High standards of clinical care**	134.6. giving patients best standards of care
6.18. poor communication	**56. Holistic approach to QI**	134.7. proactive client care
6.19. poor communication between departments	**57. Honesty in QI activities**	134.8. satisfied customer
6.20. poor information	**58. 'If it aint broke don't fix it'**	134.9. service provided start to finish
6.21. poor inter-departmental communication	**59. Impact of social media**	
6.22. poor knowledge of QI terminology	**60. Importance of experience**	
6.23. poor manager communication	**61. Financial constraints**	
6.24. poor record keeping	**62. Individual reflection on performance**	
6.25. poor relationships with your colleagues	**63. Ineffective QI**	
6.26. practice system and structure influences QI	**64. Ineffective resources**	
	65. Ineffectual QI	
	66. Inequality within the practice	
	67. Influence of practice set up	
	68. Information on QI is available if you want it	
	69. Internal evaluation of practice for QI	
	70. Keeping things running	

6.27. problem with implementation
6.28. problems around QI language and terminology
6.29. protecting time to do QI
6.30. red tape
6.31. reasons for QI not to 'work'
6.32. structure of the practice regarding QI
6.33. team 'buy in' to QI
6.34. team not working well together
6.35. time constraints
6.36. understaffed
6.37. unrealistic expectations of management
6.38. vets don't have time
6.39. wanting change but unable to implement it
7. Benefits of QI
7.1. ability to innovate change
7.2. accountability within the process of care
7.3. client input to QI
7.4. constructive criticism
7.5. create an environment where everyone can participate
7.6. empowerment of all staff
7.7. encouraging participation
7.8. finding solutions to time constraints
7.9. future for QI in veterinary practice
7.10. giving people the opportunity to influence change
7.11. information sharing
7.12. proactive change
7.13. providing the best possible service to client
7.14. using QI to inform positive change
8. Carrot and stick
9. Case continuity
9.1. case follow up
10. Client feedback
10.1. client complaints
10.2. client satisfaction
10.3. complaints
71. Knowledge of QI
72. Lack of appreciation for other job roles
73. Leadership
74. Lead by example
75. Leading by example
76. Learning from experience
77. Learning from mistakes
78. Learning lessons from human healthcare
79. Logistical issue with providing quality care
80. Making time for QI
81. Management limitations
82. Marketing
83. Minimising risks through QI
84. Mismatched staff
85. Mortality and morbidity rounds
86. Motivation for self-improvement
87. No quick fix
88. No time to communicate well
89. No-blame culture
90. Not being listened to
91. Not being listened too
92. Not everyone has the power to create change
93. Not everyone pulling their weight
94. 'Not in my job role' attitude
95. Not involved in QI
96. Not utilising QI methods correctly
97. Not viewing the entire client experience
98. Offering all available options
99. Open and non-judgemental comms
100. Opinions on other practices
101. Opportunity for discussion
102. Over worked
103. Owner financial constraints
104. Package of care
105. Payments
106. Peer review
107. Personalising your service to the client
108. Personal development
134.10. treating every patient equally
135. Set in our ways
136. Short staffed
137. Solo working
138. Splitting responsibility
139. Staff limitations
140. System not working
141. Teamwork
141.1. all the cogs in the machine
141.2. supporting each other
141.3. team dynamics
141.4. team effort
141.5. trust in your colleagues
142. Technology innovations to assist QI
143. The client
143.1. bonding with clients
143.2. client compliance
143.3. client constraints
143.4. different types of client
143.5. honest with the client
143.6. managing client expectations
143.7. managing the client
144. Tick box exercise
145. Timely communication with clients
146. Too much compartmentalisation
147. Training
147.1. access to training
147.2. delivery of training and information is vital
147.3. educating people
147.4. inequality of training provided for different roles
147.5. lack of training for certain job roles
147.6. making training applicable to all
147.7. onswitch
147.8. personalised

10.4. complaints procedure
10.5. positive client feedback
10.6. 'problem' clients
10.7. types of complaint
11. Certain jobs for certain people
12. Clients overstepping the line
13. Clients don't understand
14. Clinical care
14.1. best care to the animal
14.2. conservative approach
14.3. 'Fixing the horse'
14.4. Levels of clinical care
15. Being motivated by colleagues
16. Communication
17. Corporate vs private practice
17.1. corporate pressures
17.2. monetary pressures
18. CPD
19. Critical appraisal
20. Departmental communication
21. Desire to do a good job
22. Different types of practice
23. Dual role within a practice
24. Dysfunctional practice
25. EBVM
25.1. anecdotal evidence vs EBVM
25.2. role of EBVM
25.3. utilisation of collected data to inform change (EBVM)
25.4. journal club
26. Education
27. Embed into practice
28. Everyone is doing their best
29. Examples of poor clinical audit
30. Expanding knowledge
31. Experienced
32. External evaluation

109. Personal interaction
110. Practice culture
111. Practice protocols
112. Practice standards
113. Pressures from management to meet targets
114. Pressures to make money
115. Preventative medicine
116. PSS
117. QI currently used in practice
117.1. auditing
117.2. checklists
117.3. clinical audit
117.4. M&M rounds
117.5. protocol
117.6. protocols
117.7. use of audit
118. QI in PSS
119. QI in veterinary syllabus
120. QI is a recent thing
121. QI language
121.1. carefully choosing language
121.2. differences in terminology
121.3. simplifying language
122. Quality veterinary care (QVC)
122.1. everyone is responsible for QVC
122.2. improving and maintaining quality
122.3. improving veterinary care across the board
122.4. quality care is not equal for all clients
122.5. sharing responsibility of quality care
123. RCVS Knowledge
124. Reactive over proactive change
125. Realising limitations
126. Recognising professional value in a job role
127. Referral
128. Reflective practice

training for the job role you're doing
147.9. QI education
147.10. qualifications
147.11. self-training
147.12. sharing knowledge
147.13. time to train
147.14. job relevant training
147.15. training each other in quality monitoring
147.16. using others experience to learn
147.17. veterinary certificate
148. Unqualified working
149. Unable to work effectively
150. Positive practice culture
151. Staff morale
152. Using communication to Generate money
153. Using NHS resources
154. Want to be involved in QI
155. Wellbeing of veterinary professionals
155.1. confidence in own skills
155.2. Confidence in your work
155.3. doing 'the best you can'
155.4. happy staff
155.5. mental well-being
155.6. not feeling valued
155.7. self-care
155.8. undervaluing participation in a case
156. What is QI
157. Whole team involvement in QI

Appendix F, Chapter 5, p.82 – Example of COVID-19 (part one) questionnaire released to veterinary professionals working in UK practice at the time of the survey.

Information to participants:

The on-going COVID-19 pandemic has impacted every aspect of life in the UK in the last two weeks. With government guidance and restrictions being regularly updated and implemented, veterinary practices have had to remain flexible in their approach to continuing to provide quality care to the animals they treat daily.

The purpose of this research is to gauge the various methods that have been employed in different practices in order to maintain the highest standards of care to patients whilst also ensuring staff safety.

Confidentiality and Consent: Participation in this questionnaire is entirely voluntary, all information provided will be totally anonymous and nothing will be shared with anyone outside the researchers involved in this study.

By answering the questions in this survey, you are stating that you are happy to participate in this project and we have your consent to use your responses both in our research and in any subsequent publications.

Who is organising this study? This study is part of a larger PhD project being completed at the University of Nottingham investigating the development and application of quality improvement methods in equine veterinary practice.

This survey has been designed by Freya Rooke (PhD Student) along with Dr John Burford (Assistant Professor in Equine Surgery, University of Nottingham), Professor Sarah Freeman (Professor of Veterinary Surgery, University of Nottingham), Dr Marnie Brennan (Director of the Centre for Evidence-based Veterinary Medicine and Assistant Professor in Epidemiology, University of Nottingham), Tim Mair (Specialist in Equine Internal Medicine and Surgery at Bell Equine veterinary clinic) and Jo Suthers (Soft tissue surgeon at B&W equine veterinary clinic).

This study has received approval by the ethics committee at the School of Veterinary Medicine and Science, University of Nottingham.

Please do not hesitate to contact us if you require any further information or have any concerns.

Freya Rooke svxfr@exmail.nottingham.ac.uk
Dr John Burford john.burford@nottingham.ac.uk
Dr Marnie Brennan marnie.brennan@nottingham.ac.uk

Q1) Which of these best describes your current job role within a practice?

- Clinical Veterinary surgeon
- Clinical Director / Practice Owner
- Administration
- Veterinary nurse
- Practice manager
- Receptionist
- Other *(type box)*

Q2) What type of work does your practice perform? (Please tick all that apply)

- First opinion
- Referral
- University
- Ambulatory
- Other *(type box)*

Q3)What types of animal are treated by your practice? (Please tick all that apply)

- Small animal
- Exotics
- Farm
- Equine
- Other *(type box)*

Quality care: Providing the highest quality veterinary care can often be a delicate balancing act 'Quality' in relation to care delivered is not a static concept and will hold different meanings to different individuals. The Royal College of Physicians (RCP) describes quality care as: ***"creating a delicate balance between health and wellbeing of the population, sustainable finance, environment and resources alongside providing the best possible care for the individual"*** **Although** this definition of quality care was created with human healthcare in mind it is also applicable to the values and aims seen when providing quality veterinary care.

In these difficult conditions it is now more important than ever to be providing high quality clinical care to animals whilst also keeping members of staff and clients safe and compliant with government policy.

Q4) In your current role at your veterinary practice what changes have been implemented in the last week in direct response to the on-going Covid-19 pandemic regarding:

a) Internal communication – *(type box)*
b) Changes to staffing levels (perhaps encouraging people who can work from home and reducing the number of staff coming into the practice / hospital) *(type box)*
c) Client communication (including telemedicine / triaging)– *(type box)*
d) Routine outpatient appointments at the practice premises / hospital *(type box)*
e) Emergency outpatient appointments seen at the practice premises/hospital *(type box)*
f) Ambulatory visits (routine / elective procedures)– *(type box)*
g) Ambulatory visits (emergencies) *(type box)*
h) Visitors to the practice – *(type box)*
i) Use of social media to inform clients of current situation / protocol *(type box)*

Q5) has the covid pandemic effected your levels of stress and anxiety?.....

a) how would you rate your current level of work-related stress (1=low 10=high)
b) how would you rate your overall level of anxiety over the last two weeks relating to COVID-19 (1=low 10=high)
c) how anxious are you regarding your current job security? (1=low 10=high)

Q6) what has been the largest barrier to delivering quality care to emergency cases in the past two weeks (or since the pandemic started?) *(Type box)*

Q7) what has been the largest barrier to delivering quality care to routine cases in the past two weeks (or since the pandemic started?) *(Type box)*

We would like to continue to monitor the veterinary industry's response to this pandemic as it develops over the coming weeks, if you are happy to take part in this follow-up research, please fill in your email address below. Your contact details will be removed from the data prior to analysis to ensure anonymity.
(Type box)

Appendix G, Chapter 5, p.83 – Example of COVID-19 (part two) questionnaire released to veterinary professionals working in UK practice that had completed survey one and indicated they would be happy to complete subsequent surveys.

Introduction/information for participants:

Dear Sir or Madam, Firstly, thank you so much for taking the time to fill in the survey regarding the effect of the on-going COVID-19 pandemic on the UK veterinary industry. The data gathered thus far has been extremely informative and it is hoped that from this we can formulate some guidance for veterinary practice's surrounding the novel methods they can use to maintain quality care to their patients during this crisis.

As this pandemic is on-going, we are interested to track the changes implemented and lifted as the situation continues. The reason you are receiving this email is you stated and left an email address saying you would consider completing some follow up research. In response to the new guideline released by R.C.V.S released week attached below there is a link for a short follow up survey to complete. As before all data shared with us will be completely anonymous and has been approved by the university of Nottingham's ethics committee.

Please input your unique participant number assigned to you through the first questionnaire to progress to the questions:

Q1) In response the new guidance released by R.C.V.S. and British Veterinary Association on 9th April 2020 has your practice updated its approach to any of the below situations? (If no then state no change or leave box blank):

a) Internal communication – *(type box)*
b) Changes to staffing levels (perhaps encouraging people who can work from home and reducing the number of staff coming into the practice / hospital) *(type box)*
c) Client communication (including telemedicine / triaging)– *(type box)*
d) Routine outpatient appointments at the practice premises / hospital *(type box)*
e) Emergency outpatient appointments seen at the practice premises/hospital *(type box)*
f) Ambulatory visits (routine / elective procedures)– *(type box)*
g) Ambulatory visits (emergencies) *(type box)*
h) Visitors to the practice – *(type box)*

Q2) have the barriers to delivering quality care changes since the updated guidance has been released.

Yes No

a) If answer yes, please detail how:
(Type box)

Q3) what has been your practices main means of communication with clients during the pandemic?
(Type box)

Q4) self-rated levels of stress and anxiety:

a) how would you rate your current level of work-related stress (1=low 10=high)
1 2 3 4 5 6 7 8 9 10
   i. what would you describe as the primary cause of your work-related stress? *(Type box)*

b) how would you rate your overall level of anxiety (1=low 10=high)
1 2 3 4 5 6 7 8 9 10
   i. Is the reason for you overall level of anxiety related to COVID-19?
   Yes No

Appendix H, Chapter 5, p.84 – Example of COVID-19 (part three) questionnaire released to veterinary professionals one year after the initial survey. Participants had completed survey one and two and indicated they would be happy to complete subsequent surveys.

Information and consent for participants:

In March 2020 the UK officially entered 'Lockdown' as a result of the rapidly progressing Covid-19 virus. The restrictions implemented impacted almost every aspect of life in the UK, including provision of veterinary care. With government guidance and restrictions being regularly updated and implemented, veterinary practices had to remain flexible in their approach to continuing to provide quality care to the animals they treated daily, whilst simultaneously keeping their human clients and employees safe.

The reason you are receiving viewing this survey is that you participated in a questionnaire-based study conducted by researchers from the University of Nottingham as part of a larger PhD project and provided us with an email address giving us permission to contact you again in relation to completing some follow up research. As the pandemic progressed, several studies were conducted to track the changes implemented by veterinary practices as restrictions were implemented and lifted by both the government and veterinary governing bodies. This study is to gauge the various methods of care, communication and organisation implemented by different practices during the COVID-19 pandemic in order to maintain the highest standards of care to patients whilst also ensuring staff safety. The data gathered in the previous rounds of this study was extremely informative and gave a good picture of the progressive measures taken by various veterinary practices to address the challenges created by a global pandemic.
One year on we would like to offer you the opportunity to complete a very short follow up questionnaire. The purpose of this is to gauge any long-standing changes to operation and management within your practice and it is hoped that from this we can formulate some guidance for veterinary practices surrounding the novel methods they can use to maintain quality care for their patients during a crisis. As before all data shared with us will be completely anonymous and this study has been approved by the University of Nottingham's Ethics Committee.

Confidentiality and Consent: Participation in this questionnaire is entirely voluntary, all information provided will be totally anonymous and nothing will be shared with anyone outside the researchers involved in this study.
By answering the questions in this survey, you are stating that you are happy to participate in this project and we have your consent to use your responses both in our research and in any subsequent publications.

Who is organising this study? This study is part of a larger PhD project being completed at the University of Nottingham investigating the development and application of quality improvement methods in equine veterinary practice.
This survey has been designed by Freya Rooke (PhD Student) along with Dr John Burford (Assistant Professor in Equine Surgery, University of Nottingham), Professor Sarah Freeman (Professor of Veterinary Surgery, University of Nottingham), Dr Marnie Brennan (Director of the Centre for Evidence-based Veterinary Medicine and Assistant Professor in Epidemiology, University of Nottingham).
This study has received approval by the ethics committee at the School of Veterinary Medicine and Science, University of Nottingham.

Please do not hesitate to contact us if you require any further information or have any concerns.

Freya Rooke freya.rooke@nottingham.ac.uk
Dr John Burford john.burford@nottingham.ac.uk
Dr Marnie Brennan marnie.brennan@nottingham.ac.uk

Section 1:

Q1) In the first and second round of this study conducted a year ago you were asked to reflect on changes your practice had made to:

- Staffing levels (perhaps encouraging people to work from home if possible and reducing the number of staff coming into the practice / hospital at any one time)
- Client communication (including telemedicine and triaging)\
- Internal communication
- Routine outpatient appointment at the practice premises/hospital
- Emergency outpatient appointments at the practice premises / hospital
- Ambulatory visits (routine / elective procedures)
- Ambulatory visits (emergencies)
- Visitors to the practice
- Use of social media to inform clients of current situation

Since the second survey in May 2020 has anything changed in your practices approach to the following scenarios. (If approach to these activities have returned to how they were before the pandemic please select option 3). If there has been numerous changes over this time or you would like to add additional information or comments, then please use the free text box below.

	1. Changes made and updated periodically in accordance with government / RCVS guidance	3. Changes made since April 2020 but operating now as before COVID-19	4. No change at all in response to COVID-19	5. unsure of changes that have or have not been made
Staffing levels (perhaps encouraging people to work from home if possible and reducing the number of staff coming into the practice / hospital at any one time)				
Client communication (including telemedicine and triaging)				
Internal communication				
Routine outpatient appointment at the practice premises/hospital				
Emergency outpatient appointments at the practice premises / hospital				
Ambulatory visits (routine / elective procedures)				
Ambulatory visits (emergencies)				
Visitors to the practice				
Use of social media to inform clients of current situation				

a) if you have any further information or comments to add in relation to your answers provided above, please leave them here. *(Type box)*

Section 2: These questions will ask you about barriers you have encountered in the provision of quality care to you patients / clients. The definitions of quality care is:

"Providing health services for animals and their carers that increases the likelihood of desired health outcomes and are consistent with current professional knowledge. Quality care should be: safe (avoiding harm to patients, owners and care-givers while providing care), effective (providing care based on scientific knowledge and professional standards to those animals that would benefit, avoiding underuse or misuse of treatments), patient-centred (providing care that is respectful of and responsive to the needs, values and wishes of the owner but prioritises the health and welfare of the patient), timely (reducing wait and harmful delays), efficient (avoiding waste), equitable (providing recommendations and care that do not vary in quality based on animal and owner characteristics) and support the care-giver experience (providing care which supports a sense of fulfilment and pride for the care-giver)."

Q2) In your practice, what was the most significant barrier to you providing quality care to your emergency clients/patients during COVID-19? *(Type box)*

Q3) In your practice what was the most significant barrier to you providing quality care to your routine cases / outpatients during COVID-19? *(Type box)*

Q4) If applicable what was the most significant barrier to you providing quality care to your in-patient cases during COVID-19? *(Type box)*

Section 3:

In this section you will be asked to rate your current stress and anxiety levels, these will be compared to previous answers in relation to working during the COVID pandemic. Due to the sensitive nature of some of these questions they have been made optional, if you do not feel happy answering please press skip which will take you to the next question. Once again, any information provided is fully anonymised and the raw data will not be shared outside of the researchers listed in the introduction.

Q5)

a) How would you rate your overall level of anxiety (1 - low to 10 – high)
1 2 3 4 5 6 7 8 9 10

b) How would you rate your overall level of stress (1-low to 10-high)
1 2 3 4 5 6 7 8 9 10

c) How would you rate your overall level of work-related stress
1 2 3 4 5 6 7 8 9 10

d) Is your reason for overall level of anxiety and stress different from your work-related stress (if yes please elaborate)
Yes No
   i. If the answer is yes, please elaborate

Section 3: reflections on the past year and looking to the future

Q6) do you feel that your veterinary practice / employers have provided you with adequate mental health support during the COVID-19 pandemic.

Yes No

(Free text box for further details)

Q7) Reflecting on your experiences over the past 12 months, is there anything you think that you or your practice should have done to further optimise the quality of animal care delivered over this pandemic period?

Q8) which three things do you feel your practice did very well in response to the pandemic that enabled you and your colleagues to continue to offer high quality care?

	Examples of something your practice did very well in response to the pandemic that enabled you and your colleagues to continue to offer high quality care	Is this something your practice did before the pandemic?			If you answered no, do you think your practice will continue this post pandemic?		
		Yes	No	N/A	Yes	No	N/A
Example 1	*(type box)*						
Example 2	*(type box)*						
Example 3	*(type box)*						

Q9) If you were being asked to contribute to a guidance document for veterinary professionals in the future dealing with similar situations (e.g., global pandemics, significant emergencies of other kinds), what would your top three recommendations be? *(Type box)*

Q10) Retrospectively is there anything you feel that you, your practice or even the industry as a whole, could have been done differently to optimise the quality of care delivered over the course of the pandemic? Please be as specific as possible here *(type box)*

Thank you for completing the final round of this survey series. If you have any questions or queries relating to this survey or any of the previous ones, please do not hesitate to contact me:
svxfr@exmail.nottingham.ac.uk

Appendix I, Chapter 6, p.116 – List of fifty definitions put forward by RCVS knowledge to be considered for inclusion in the e-Delphi to determine veterinary specific definition for QI terminology.

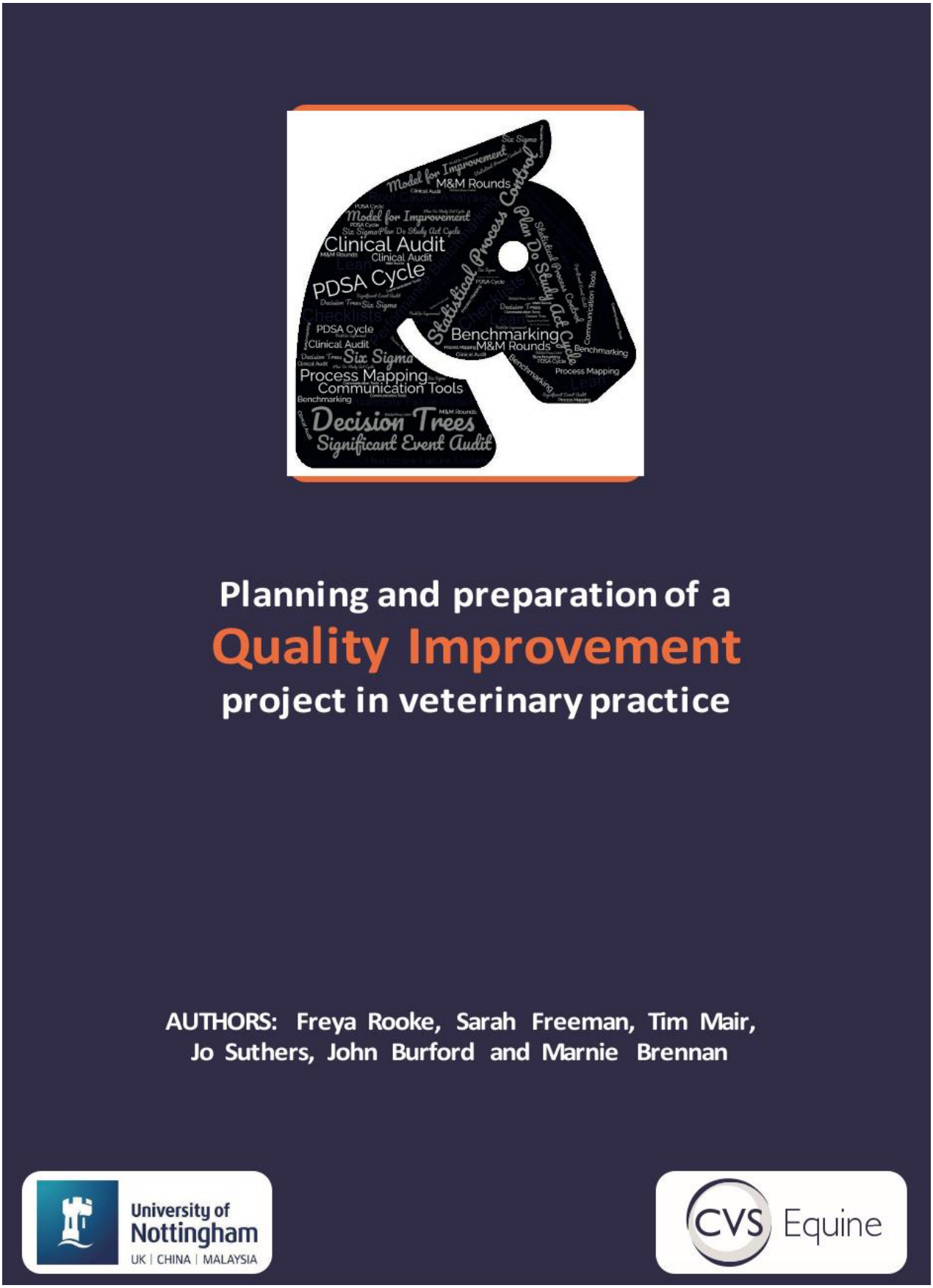
1. Structure audit
2. System factors
3. System thinking
4. Trend analysis
5. Significant event audit
6. Simulation
7. Situational awareness
8. Skills matrix
9. Spread
10. Reflection
11. Registry
12. Research
13. Root cause analysis
14. Run chart
15. Safety I
16. Safety II
17. Safety Systems
18. SBAR
19. Schwartz round
20. Process audit
21. Process map
22. Practice guideline
23. No blame
24. Hierarchy
25. Human factors
26. Critical incident reporting
27. Debrief
28. Fishbone diagram
29. Five why's
30. Funnel plot
31. Consensus guideline
32. Consensus protocol
33. CPD
34. Algorithm
35. At scale
36. Confidence interval
37. Significant event
38. Critical incident
39. Efficient
40. Safety
41. Timely
42. Effective
43. Plan Do Study Act
44. Never event
45. Burnout
46. Patient/client-cantered care
47. Equity
48. Experience of the care giver
49. Just culture
50. Near miss
51. Practice meetings (vs Clin. Governance Meetings)
52. Policy
53. Protocol
54. Clinical governance meetings
55. Benchmarking
56. Checklist

Appendix J, Chapter 6, p.117 - list of original terms for definition and example of process table used to narrow down selection of terms to put forward for eDelphi. Members of the research group were each presented with their own copy of this table and were required to tick or cross each box for each term, results for each members was then collated to decide on final terms to be defined in the eDelphi study.

	Definition exists in literature	Consensus needed	Features in PSS (either and SA, FA, and E PSS)	Features in code of conduct
Structure audit				
System factors				
System thinking				
Trend analysis				
Significant event audit				
Simulation				
Situational awareness				
Skills matrix				
Spread				
Reflection				
Registry				
Research				
Root cause analysis				
Run chart				
Safety I				
Safety II				
Safety Systems				
SBAR				
Schwartz round				
Process audit				
Process map				
Practice guideline				
No blame				
Hierarchy				
Human factors				
Critical incident reporting				
Debrief				
Fishbone diagram				
Five why's				
Funnel plot				
Consensus guideline				
Consensus protocol				
CPD				
Algorithm				
At scale				
Confidence interval				
Significant event				
Critical incident				

Efficient				
Safety				
Timely				
Effective				
Plan Do Study Act				
Never event				
Burnout				
Patient/client-cantered care				
Equity				
Experience of the care giver				
Just culture				
Near miss				
Practice meetings (vs Clinical Governance Meetings)				
Policy				
Protocol				
Clinical governance meetings				
Benchmarking				
Checklist				
Quality improvement				
Guideline				
Clinical audit				
Clinical effectiveness				
Quality				
Leadership				
Management				
SOP				
Patient safety				
Clinical governance				
Morbidity and mortality meeting				

Appendix K, Chapter 6, p.144 – complete education booklet and planning framework created to aid vet practices in planning and executing a QI project.



PLANNING AND PREPARATION OF A QUALITY

Improvement Project in Veterinary Practice

INTRODUCTION: The purpose of this document is to help inform and guide veterinary teams about how to plan and action a quality improvement (QI) project in a veterinary practice setting. It will be especially useful to QI leads within a practice looking to encourage and organise veterinary team members to measure and analyse performance and quality of care within their practice.

There has been an increasing focus recently within the veterinary sector on using QI methods adapted from human healthcare. RCVS Knowledge has encouraged awareness and uptake of some aspects of QI through practice guidelines and their information hub (1), and QI methods have been incorporated into the RCVS Practice Standards Scheme. Often in veterinary medicine familiar approaches such as clinical audit and checklists take centre stage when evaluating care given within a practice. However, there are many other data-driven techniques that are more fitting and complimentary to veterinary practice.

The most vital aspect of completing a QI project is adequate planning to be able to select the appropriate method to apply to your individual practice environment. There are further online resources available to inform readers of the specifics of individual QI methods, but this document will guide you through the early process of planning a QI project for your practice, forming your team, and identifying the methods best suited to your individual project. Of course, quality improvement methods cannot drive progress alone and it is important that you should consider ensuring the following framework is in existence at your practice to ensure your QI project will be successful.

- Robust clinical governance arrangements for engagement
- Governing body regulation, accreditation, and inspection
- Client feedback
- Review of the relevant published literature
- Adequate open communication routes within your practice e.g., practice meetings

Step 1

What is QI and how can it help me?

Quality improvement (QI) describes the processes used to review, monitor, and improve safety, effectiveness, and care experiences of patients and clients in veterinary practice. Essentially QI asks, 'are we doing the right thing, for the right person at the right time' (2,3). Situations that can be analysed and evaluated using QI include monitoring and improving judicious antibiotic use, assessing and reducing the risk of 'near miss' events, testing effectiveness of procedures, or evaluating and streamlining practice processes. There are a range of QI methods adapted from manufacturing and regularly used for both human healthcare and veterinary medicine, some will be familiar, and some will be new to you.

Clinical audit	PDSA cycle	M&M rounds
Benchmarking	Process mapping	Communication tools
Decision trees	Significant event audit	Model for improvement
Six sigma	Statistical process control	Checklists

Completing a QI project does require some time and effort, but may have many benefits including:

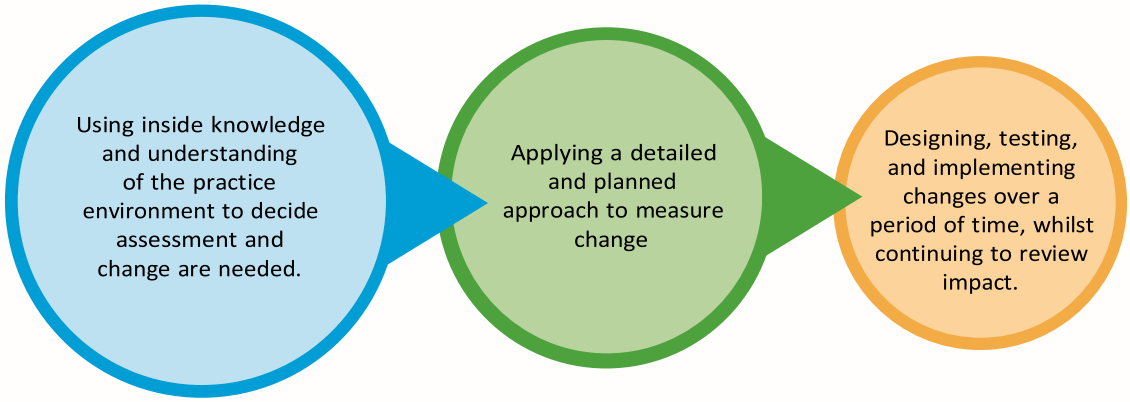
- Identifying and celebrating excellent practice when it occurs as well as striving to improve.
- Providing all staff with the opportunity to participate in assessing and improving (if needed) the care delivered in their practice.
- Helping teams within a practice work together more efficiently by encouraging sharing of knowledge and experiences and providing leadership opportunities (1,2).
- Most importantly, it encourages proactive as well as reactive changes - it is about thinking about what might go wrong or could be improved, rather than waiting for problems to occur before reacting.

QI provides an assessment of care processes and systems in a safe, blame-free, learning environment that allows all members of staff to have their say (6–8).

Step 2

Planning QI intervention in your veterinary practice

There are three key factors to be considered in any QI project.



There is often not a single change or 'fix' – a successful intervention will require gradual refinement and adjustment through the QI cycle, with all the team contributing. Veterinary teams need to work together to plan interventions for their unique settings, that are tailored specifically to their needs and will evolve with the practice. QI is not just about 'proving' that a change has worked.

All the nineteen QI methods listed above have been effectively used in healthcare, the key is to select the correct method with careful thought about the context or situation for your practice. Any QI intervention must be applied consistently and have time built in for the team to reflect and plan moving forwards, not just focus on the 'doing' part of QI.

Step 3

Personalising your QI project to YOUR practice

QI methods are most effective when they are specific to the practice or department they are being carried out in and are made by individuals or a small group of professionals in their specific area of work (9,10). Before commencing any project, it is important to closely analyse the details of the veterinary practice you are working in (fig.2). This can be done either by the QI lead or the entire group. By doing this, you and your team will automatically start to identify the areas for analysis and possible improvement and begin to form a QI 'question' to base the project around.

Figure 2 mind map showing some of the aspects to consider when analysing your veterinary practice before commencing project planning. There may be more or less to include pertaining to your individual practice, this information can be shown either as a mind map, list or post-it notes.

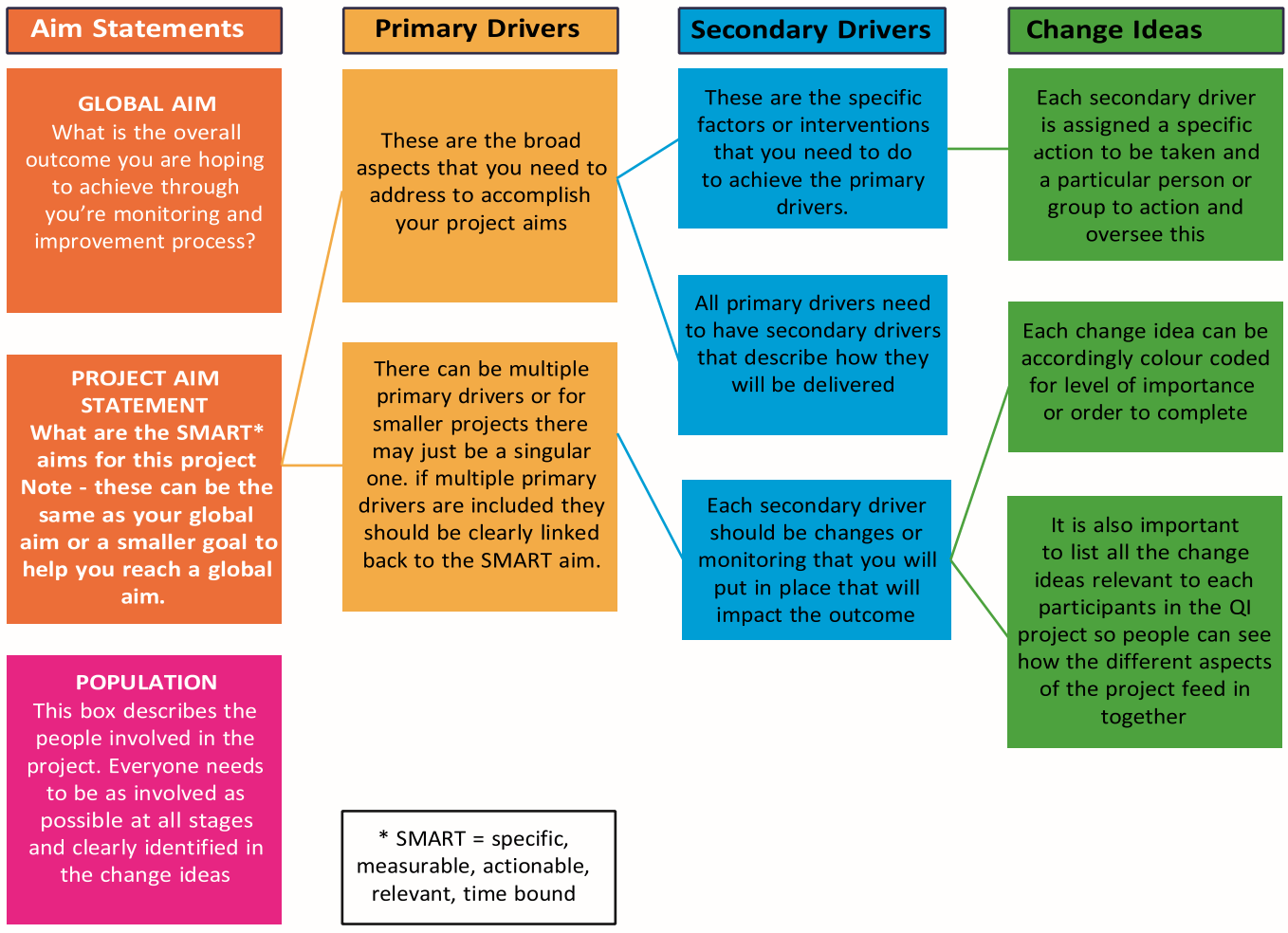
Step 4

Use of Key Driver Diagrams (KDD) for planning a QI project

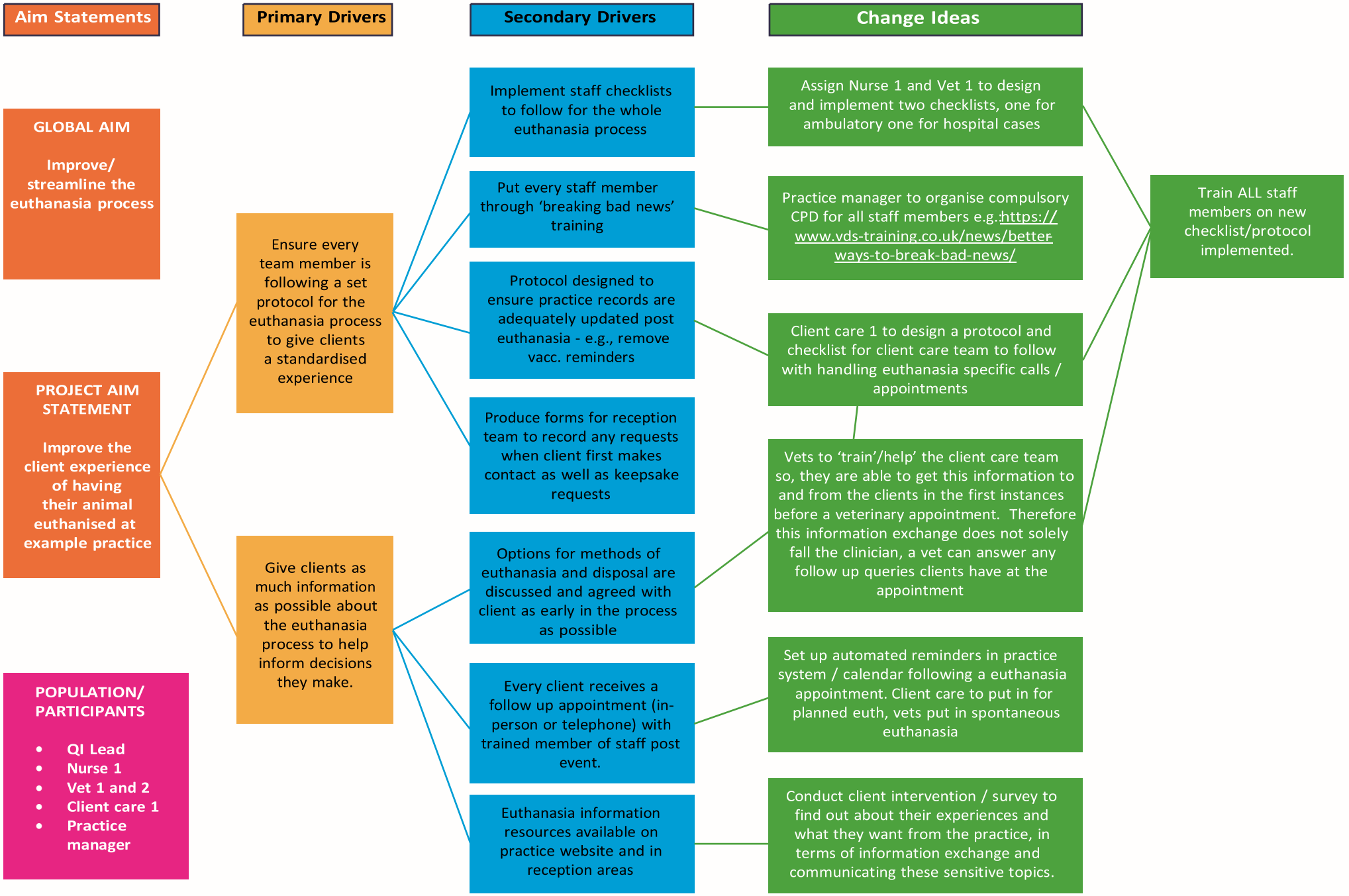
Any planning that occurs before a QI intervention should follow a 4-step process:

1. Agree an aim
2. Identify any potential interventions needed to achieve your aim
3. Consider what may happen because of the planned interventions (remember to think about potential effects of a combination of different interventions and impacts across different teams/services)
4. Decide what you want to have changed, and how you will measure this

A key driver diagram (KDD) is an easy-to-follow way to map out a proposal, execute it, and analyse your QI intervention (11). A KDD takes these established steps, and groups the information for each step of your planned QI project into easy to read, column boxes.



Example KDD diagram for implementing a QI project aimed to analyse and improve euthanasia services at an equine hospital offering inpatient and ambulatory services.



Finally, as part of step four, you need to conduct what is called a prioritisation of change ideas. This is the process of deciding which change ideas will be tackled as a priority. You can do this by considering whether each change idea will have a high or low impact on the aim statement, and whether it will be easy or difficult to implement. High impact and easy to implement ideas should be prioritised first e.g., printing or ordering resources about euthanasia to display in reception areas vs. giving consistent information to all clients about cost of euthanasia and disposal.

Steps 1 and 2 can be completed by a project leader alone and step 3 onwards needs team involvement / input from all people or group representatives involved in the QI project. This approach This approach allows project leaders to assess the scale of an intervention and make sure it is realistic and achievable. It also ensures that everyone affected and involved in the QI project takes part in the planning and decision making about the changes.

Interventions are unlikely to be perfect first time; participants expect a series of changes, in response to false starts and obstacles. Measuring impact is essential as it ensures that you refine and improve and changes. This makes it more likely that any changes made will be long lasting and can adapt and evolve with the practice staff and client needs.

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