Thesis

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Title: Facilitators and barriers for implementation of a UK standardized core curriculum for medical schools, a Dermatology perspective

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Sir William Osler on the importance of altruism

'The practice of medicine is an art; not a trade; a calling, not a business; a calling in which your heart will be exercised equally with your head. Often the best part of your work will have nothing to do with potions and powders, but with the exercise of an influence of the strong upon the weak, of the righteous upon the wicked, of the wise upon the foolish'

DEDICATION & ACKNOWLEDGMENTS

I dedicate this work to my late mother, Dr Madhavi Devi Sharma, whose own experience in PhD health education (Boston University) inspired me to follow her in footsteps. She was a beacon in my life, the kindest, most loving soul.

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ABSTRACT

There is no standard medical curriculum across UK medical schools. The General Medical Council (GMC) provides generic learning outcomes for medical schools. Specialty curriculum implementation in medical schools is varied and inconsistent. This PhD thesis aimed to explore the facilitators and barriers for implementation of a nationally recommended specialty core-curriculum for UK medical schools, using Dermatology as a specialty perspective.

Methodology and methods: A mixed-methods research (MMR) research methodology was used and multiple methods incorporated to address the research question. A scoping review was conducted to identify the available specialty curricula for UK medical schools, and the drivers for their development. A curriculum mapping study at a UK medical school reviewed the local undergraduate (UG) dermatology curriculum against the national British Association of Dermatologists' (BAD) standards. An online cross-sectional questionnaire survey of UK dermatology UG teaching leads helped to understand the possible facilitators and barriers to specialty- specific implementation across UK medical schools. Finally, semi-structured interviews with Deans of medical education of UK schools were undertaken to gather their perspective on specialty curriculum implementation.

Results: The scoping review provided a comprehensive overview of the curricula developed by specialties, in alignment with GMC outcomes. Twenty-six specialties developed a core curriculum to provide specialty specific guidance to medical schools on minimum standards for knowledge and skills required for all

graduates. Drivers for development of these included fear for patient safety, burden of disease, medical schools not including it in their curricula and graduates feeling ill prepared to practice confidently and safely. Curriculum mapping enabled visualisation of dermatology and its relationships between other specialties. The cross-sectional survey revealed knowledge gaps amongst UG leads with respect to mapping and blueprinting of core-curricula and the GMC's proposed implementation of the Medical Licensing Assessment (MLA) in 2024-25 *(*Medical licensing assessment – GMC, 2020). Perceived barriers to curriculum implementation included National Health Service (NHS) clinical workloads, dermatology not deemed a priority in school curricula, and difficulty influencing changes at medical school level. The Deans of Medical Education recognised the importance of including dermatology in the undergraduate curriculum. The skill set, and enthusiasm of the 'specialty champions' was an important factor for engaging medical students. National and local political driven health agendas (e.g. the UK government, the GMC, MLA, and Health education boards) influenced teaching, learning and assessment methods. Cultural attitudes between specialties, NHS Trusts, and Universities, and student feedback determined how well curriculum integration took place. Paucity of adequate clinical staff for teaching, and impact of Covid-19 pandemic were other challenges that influenced curriculum implementation. Perceived facilitators included improved workforce planning with support from inter-professional educators. Transparency in funding to the NHS Trusts towards UG medical teaching and educational governance were considered paramount in ensuring monies followed and reflected the students' experience. Strategies to develop UG lead roles as medical educators included appropriate recognition in job plans

and review of professional development in yearly appraisals. Medical education qualifications and leadership skills were considered valuable for clinicians or academics taking on roles as UG education leads.

This research study identifies facilitators and barriers for UG specialty-specific (dermatology) curriculum implementation in UK, which could be generalizable and relevant to other specialty core-curricula. The study supports creation of practical strategies, and provides a basis for national collaborative ways to improve implementation of specialty core-curricula across medical schools.

ACHIEVEMENTS (AWARDS, PUBLICATIONS, & CONFERENCE PRESENTATIONS)

Awards

- Sue Watson research presentation award: 2nd Prize, University of Nottingham (November 2021)

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Publications

1. Sharma M, Murphy R, Doody GA. Barriers and facilitators for implementation of a national recommended specialty core-curriculum across UK medical schools: a cross-sectional study using an online questionnaire. BMJ Open 2022; 12: e053565. doi: 10.1136/bmjopen-2021-0535652.
2. Sharma M, Murphy R, Doody GA. Do we need a core curriculum for medical students? A scoping review. BMJ Open2019;9:e027369.doi:10.1136/bmjopen-2018-027369

3. Sharma, M., Scorer, M., Kent, D., Murphy, R. and Doody, G. Mapping the undergraduate dermatology curriculum: a useful tool towards implementation of national recommendations.2020. Clin. Exp. Dermatol., 45: 337-339. doi:10.1111/ced.14125

4. Design and development of the undergraduate dermatology teachers' survey: a national initiative. M. Sharma, R. Murphy, G.A. Doody. (2020), Dermatology Teachers. Br J Dermatol, 183: 187-190. https://doi.org/10.1111/bjd.19097

Presentations and Abstracts

1. Barriers and facilitators for implementation of the dermatology curriculum across UK medical schools: results of a national survey and recommendations. Oral Presentation National BAD Conference and BJD supplementary journal abstract, 2021.

2. Design & development of the undergraduate dermatology teachers' survey - a national initiative. Oral Presentation National BAD Conference and BJD supplementary journal abstract, Sept 2020

3. Scoping meeting for undergraduate dermatology training in UK, Oral presentation, General Medical Council meeting, June 2019

4. Sharma M, Scorer M, Murphy R, Doody GA. Mapping the undergraduate dermatology curriculum: a medical school experience, BJD supplementary journal abstract, Aug 2019

5. Mapping the undergraduate dermatology curriculum: a medical school experience. Oral Presentation, National BAD conference, 2019

6. Dermatology in the Medical Undergraduate Curriculum Approaches and Influences: Oral presentation at National BAD Undergraduate Teachers' Conference, London, 6th March 2018.

7. Implementation of a new dermatology undergraduate teaching programme: Oral presentation at Centre of Evidence Based Medicine, Nottingham 13th March 2018

8. Core curricula for UK medical undergraduates: a scoping review of literature and current status. Oral Presentation, ASME (Annual Scientific Meeting) Conference. Oral presentation at Newcastle, UK, 12th July 2018.

9. Dermatology Clinical Teaching Fellow- An educational and pastoral support for medical students, Poster presentation, European EADV Conference, August 2018.

10. Seeing is believing. Role of Patient Educators in undergraduate dermatology. Oral Presentation AMEE, Vienna 2019

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LIST OF ABBREVIATIONS IN THE THESIS

AAMC	Association of American Medical Colleges
AMA	Australian Medical Association
APPGS	All Party Parliamentary Group on Skin
BAD	British Association of Dermatologist
CPT	Clinical pharmacology and therapeutics
ED	Emergency Department
ENT	Ear, Nose and Throat
FHC	Future Hospital Commission
FOI	Freedom of information
GMC	General Medical Council
GMER	Global Medical Essential Requirements
GP	General Practitioner
IIME	Institute for International Medical Education
ILO	Intended Learning Outcome
IPE	Interprofessional education
MCQ	Multiple Choice Question
MCW	Medical Curriculum Wien
MLA	Medical Licensing Assessment

MMR	Mixed methods research
NICE	National Institute for Health and Care Excellence
NHS	National Health Service
OSCE	Objective structured clinical examinations
OSLER	Objective structured long examination record
PA	Professional Activity
PRISMA	Preferred reporting items for systematic reviews and meta-analysis
RCGP	Royal College of General Practitioners
RCOG	Royal College of Obstetrics and Gynaecology
RCP	Royal College of Physicians
RCS	Royal College of Surgeons
SPA	Supporting Professional Activity
TEF	Teaching Excellence Framework
UG	Undergraduate
UK	United Kingdom
UoN	University of Nottingham
UEM	European Union of Medical Specialists
WFME	World Federation for Medical Education
WHO	World Health Organisation

WTE	Whole Time Equivalent

1 MEDICAL CURRICULUM: THEORETICAL ASPECTS AND MODELS

This overview provides an introduction to what is meant by curriculum in terms of medical education and considers learning theories, with models used for the development of curricula in medical education. It provides an international perspective on medical education curricula emergence in different countries, and the challenges faced across medical schools. Examples of some specialties that have developed core curricula and others that struggle to be included in medical school curricula are discussed. The overview then focuses on the importance of including and implementing specialty-specific curricula in medical schools, using dermatology as a specific example.

1.1 WHAT DOES CURRICULUM MEAN?

Definition

Greek philosophers such as Plato and Aristotle had long debated about what should be taught and how best to teach, greatly influencing the western civilization's approach. The word curriculum saw its origin around 1824 AD from the Latin word currere, which means ''to run'' or a ''a running, course, career'' and has been used in the English Language at Scottish universities since the 1630s (Online Etymology Dictionary, 2018).

Harden (2001) defined curriculum as '*a sophisticated blend of educational strategies, course content, learning outcomes, educational experiences, assessment, the educational environment and the individual students' learning style, personal timetable and programme of work*'.

1.2 CURRICULUM IN MEDICAL EDUCATION

The meaning of the word curriculum widened over the years, especially in the world of medical education. Though in common use, it can be difficult to define. In the modern era, one of the first books designed for medical educators discussed curriculum to be made of objectives and experiences, anchored on the health needs of society, the scientific expertise and the desired professional characteristics of physicians (Miller et al., 1961). By the 1980s, emphasis moved to teaching methods, a systems approach, with active student involvement and providing learning relevant to clinical practice (Newble and Cannon, 1983; Balla, 1989). Harden (2001) explained it as 'curriculum is a programme of study where the whole is greater than the sum of its parts'.

The purpose of the curriculum document is to explain to students what to expect from their learning, advise teachers what content to deliver, and how to deliver it, help medical schools set up appropriate assessments and evaluation processes, and demonstrate to society how the school is delivering its responsibilities (Grant, 2014).

Three main ideologies were described by Kelly (1987) – curriculum as content and education as transmission, curriculum as a product and education as instrumental, and curriculum as process and education as development.

The influences on development of curricula have been rooted in what society requires for good health, focus on students' learning, economic limitations, as well as recognition of schools' responsibility towards students' preparedness for clinical

practice and responding to health requirements of the public (Apple, 2019). Such influences led to a curriculum being referred to as an ideological and dynamic document that reflected the values, beliefs and aspirations derived not only from local and social factors, but also from political, cultural and professional impressions (Apple, 2019).

For a medical curriculum to be contextual, views of how medicine is practised, the importance of core knowledge, professional and social values of the region, resources, and health service developments, as well as how students prefer to learn all have to be considered (Grant, 2019).

1.3 LEARNING THEORIES IN CURRICULAR MODELS

Decisions on the type of curriculum design, learning and teaching methods, as well as student assessments (Dong et al, 2021) are all informed by how medical educators have been influenced in their learning. They need to understand the many learning theories, and how best these could be applied to specific learning contexts.

The theoretical approaches as outlined by Dong et al (2021) are based upon cognitive psychology, humanistic psychology and social anthropology, which are explored further below.

Cognitive psychology approaches

In psychology, theories have been utilised to provide a model for understanding human thoughts, emotions and behaviours (Cherry, 2016). Cognitive psychology approach includes the learner's active engagement in information processing. As

humans, we seek meaning and acquire knowledge by organising, storing and retrieving information whilst building on cognitive structures (McKeachie, 1980). Learning is considered a constructive process in cognitivism, where meaningful connections are made as knowledge is gained on a given topic (Dong et al, 2021). Prior knowledge is vital in building new knowledge as learners come with previous experiences and pre-existing understandings to interpret new material presented as they attempt to interconnect and integrate them (McKeachie, 1980; Sweller et al., 1998). For a curriculum design using the cognitive learning approach, the basic aspects of the course material are presented at first (e.g. anatomy), with more complex material added to the basic foundational structure incrementally (e.g. use of anatomy to perform surgery) (Kay and Kimble, 2016). Cognitive scaffolding provided by teachers to assist student performance whilst performing complex tasks has been shown to foster deeper processing of course content (Cooper and Robinson, 2014).

In the educational field, Bloom's taxonomy (1956) highlights the cognitive processes involved in learning, which were later revised by Anderson and colleagues. These move from simple and concrete (remember, understand, apply) to complex and abstract processes (analyse, evaluate, create) (Anderson and Krathwohl, 2001). The taxonomy is useful for teachers to provide instructional objectives, teaching activities, and assessments to students where all the cognitive processes could be addressed (Dong et al., 2021).

In the context of medical education, retaining knowledge in a vast medical curriculum spanning over 5-6 years, students can be tempted to simply commit information to memory. This can be termed superficial learning, wherein the

student may not fully grasp the real significance or true meaning of what they have learnt (Biggs, 1999). Students find it challenging to recognise how new learning is constructing on previous knowledge and this can result in an assessment-focussed and task-driven approach. Students adopting superficial learning tend to be more receptive to learning by passive methods e.g. didactic lecture based teaching.

In contrast, in deep learning, students attempt to understand the study material, integrate their ideas, learn capitalising on previous knowledge and conceptualise to real-life scenarios (Hume, 1990). Deep learners actively seek understanding by using approaches like problem solving and attain knowledge through participation (Hume, 1990), for instance by using games to teach or conducting brainstorming sessions.

Active learning prioritises the student's perception of the information provided (student-centred), instead of the traditional teacher-centred approach to educational style (Kruschke, 2008). Examples of active learning include use of workshops, participating in debates, peer-led seminars, modelling and demonstrations or designing research projects The mastery learning approach ensures that students won't be exposed to more complex content until they've demonstrated progressive learning over the fundamental knowledge needed to grasp more complex concepts and their relationships to each other (Kay and Kimble, 2016).

Active learning has been shown to improve retention of knowledge, communication skills, self-directed learning and leads to deeper understanding of the study material (Bavishi et al., 2022). This recognition of active learning by

students and self-directed learning led to the introduction of novel practices such as problem-based learning (Fiorella and Mayer, 2015).

However, according to Grant (2019), active and passive learning, learning styles and adult learning are not considered cognitive theories (examined in further detail in following paragraph), but are instead thought to be descriptions of phenomena.

Cognitive Load Theory

The cognitive load theory has been based on the premise that human cognitive factors consist of limited working memory and an expansive long-term memory holding schemas (Van Merriënboer and Sweller, 2010; Lauria et al., 2017). Three main cognitive loads are placed on the memory when dealing with information- intrinsic, germane and extraneous. Intrinsic load is the level of difficulty of the material to be learnt, germane is the working memory to help make sense and manage the intrinsic load, whilst extraneous load is how the information is presented to the student schemas (Van Merriënboer and Sweller, 2010; Lauria et al., 2017).

From the medical student perspective, providing a clear, focussed delivery of the large curriculum content which is easy to understand would help to control the cognitive load. These could be through worked examples like clinical prescribing sessions where students could learn to set up treatment plans, critique case-based discussions or complete formative prescription writing assessments.

The COVID-19 pandemic, and the acceleration of the education system to a virtual or hybrid model, has resulted in many challenges and opportunities for educators (Schleicher, 2020a). Based on the cognitive load theory, a cognitive theory of multimedia learning has been developed and is relevant to the new models of

teaching and learning, which recommend design principles for use of multimedia as an instructional tool (Mayer, 2010). With auditory and visual processing regarded as separate cognitive entities, each has only limited capacity to organise, filter and integrate the knowledge and information provided (Mayer, 2003). Excluding extraneous material, use large print of words in presentations, providing words with pictures instead of text alone are some of the ways to reduce cognitive load when using multimedia. The different models provide options and choice in how to present teaching material, how to express learning and how to engage with education (Bray et al., 2023).

Humanistic psychology approaches

Adult learning & Instructional design models

Adult learning theory, also known as andragogy suggests 4 main principles on how adults gain new knowledge and skills (Knowles, 1984). Firstly, learners as adults can relate to and build on previous life experiences and learn through participating actively. Secondly, adult learners know how and what they want to be taught, by providing input into planning and evaluation. Adults consider the relevance of learning through understanding and how it may impact specific outcomes on their professional and personal lives. Finally, adults prefer a problem-centred approach to gaining new knowledge (Knowles, 1984).

Knowles proposed an andragogy model with several elements of instructional design (Knowles, 1984). These included ensuring a physically comfortable environment for students, alongside a psychologically supportive environment between teachers and students. Emotionally supportive qualities like trust, acceptance, openness, mutual respect would help make learning a pleasurable

task. This could be achieved by involving learners plan their work activities, encouraging them to focus on their learning objectives, and helping identify learning strategies or resources to achieve the same. Instructors or teachers could then help plan their learning and finally guide them through evaluation of their learning (Knowles, 1984).

Instructional design models can be particularly suited for training medical students, using simulated tasks to allow safe transition of knowledge and skills as they progress through their clinical course. Merrill's First Principles of Instruction, based on cognitive learning theories, proposed five key instructional principles for task-centred learning (Merrill, 2002). A possible scenario could be: (i) identification of a real clinical scenario, adapted to a simulation task (e.g. suturing on simulated skin pad or pork skin); (ii) prior knowledge activation could be initiated via lectures; (iii) demonstration of the task to be performed via the simulation exercise; (iv) students could then reflect on the newly acquired knowledge; and finally (v) integrate the new knowledge and apply it in real-life clinical settings (e.g. accident and emergency clinical placements). Based on cognitive learning principles, the instructional design models aim to optimise complex learning and learning transfer.

Problem based-learning (PBL)

The problem-based learning (PBL) approach encourages student learners to develop into adult learners and focus towards self-directed learning. Problem-based learning amongst adult students is considered a continuum of learning strategies using scenarios, cases or examples to stimulate learning instead of the traditional lecture-based teaching or passive style of learning, which has been

widespread. Passive style of teaching and learning as a conventional style for education has been predominant, using didactic lectures since the establishment of universities of Western Europe (Freeman et al., 2014). Superficial learners may often take the passive approach to learning, seeking knowledge and content to get to the right answers. This passive style of learning can also be attributed to cultural differences in ways to learning. PBL which is supported by constructivism, does not exclude lectures since constructivism as a learning theory suggests that students can also make meaning from activities considered as transmission model of teaching or passive style of learning (Richardson, 2003). Deep strategic thinking often occurs during this style and learners can adapt to new learning methods, given time and context (Hattie and Donoghue, 2016).

The PBL approach helps in outlining the core curricula, keeps content of a course relevant and allows active student participation (Davis and Harden, 1999). In the United Kingdom (UK), the medical regulatory body, the General Medical Council (GMC) recommends the adoption of a problem-orientated approach, which is learner centred for the purposes of undergraduate medical education (General Medical Council, 1993). The PBL approach also lends itself well to medical student assessments, where the student's deeper understanding and problem-solving skills ability can be assessed, to fulfil the curriculum's intended learning outcomes (ILOs). This may be achieved through use of extended matching questions (EMQs) to assess decision making skills and application of prior knowledge and data interpretation (Case and Swanson, 1993). Such skills become relevant and useful in the practice of medicine and managing patients. The use of objective structured clinical examination (OSCE) is another robust assessment method which allows for encompassing a range of curricular outcomes such as clinical

skills, communication and ethics, grasp of deeper understanding and interpretation of clinical data as well as problem solving skills (Harden and Gleeson, 1979).

As criticism of the PBL model, some students may find organising their knowledge using the PBL approach challenging if they are not provided a minimum level of structure. They may need to rely on expert tutors if they lack prior knowledge on the subject matter. The PBL approach can inhibit enthusiastic teachers, as their role changes more towards being a facilitator and poor implementation of the PBL model may lead to student disengagement (Schmidt, 1994).

Experiential Learning and Reflection

Experiential learning and reflection are also considered within the theoretical approaches based on cognitive psychology (Dong et al., 2021). According to Kolb (2014), the theory of experiential learning can be portrayed as a cycle of concrete experience, reflective observation, abstract conceptualization and active experimentation. In medical education, the concept of learning through observation, experience and reflection are widely accepted (Yardley et al., 2012). Examples for these include early patient contact for medical students to provide early experience in clinical or community- based settings, use of clerkships with variable student participation dependent on complexity of clinical work and learning during internship whilst gaining clinical experience and hands on training (Dornan et al., 2009). Self-reflection following experiential learning, identifying learning gaps and then formulating plans to address the gaps would apply to all stages of medical training, including undergraduate training (Schultz et al., 2016). This concept lends well towards *Self-directed Learning* in adult education, where students take initiative to identify their learning needs and goals, seek appropriate

learning resources, implement learning strategies and then evaluate the learning outcomes (Dong et al., 2021). For self-directed learning to be a successful model within curriculum design, it is important to signpost relevant resources and guide students via mentors, peers, facilitators and instructors (Knowles, 1984).

Behavioural theory in competency-based curricula

Given the societal needs and expectations, medical schools have an obligation to ensure the training of safe and competent doctors. There are different philosophical foundations to determine what may constitute competence. Noris (1991) presented three different theories or designs of competence: First, was the Behaviourist construct, where competence was regarded as an attribute of the person or something he should be able to do. It was descriptive of an action, behaviour or outcome that could be demonstrated whilst and undergoing an assessment. Second, was the Cognitive construct where competence was treated as what a person knows and can perform under ideal circumstances and finally, was the Generic construct which favoured the evocation of abilities associated with those seen in expert performers, elicited through behavioural event or critical incident interviewing.

A different view on the framework on competency was presented by Hager and Gonczi (1996). They distinguished between the three basic hypotheses of the nature of competency: the behaviourist, the generic and the holistic (Hager and Gonczi, 1996). For the Behaviourist view, competence was regarded in terms of the discrete and observable behaviours associated with the completion of specific tasks. Direct observation of performance provided the evidence of the possession of the competency. Performance of practical tasks in a course design helped to

conceptualise competencies in behavioural terms (Hager and Gonczi, 1996). This approach was not concerned with the interactions or relationships between the tasks, and ignored the possibility that the coming together of tasks could result in their transformation. It also ignored underlying attributes, group processes, and their effects on performance (Hager and Gonczi, 1996).

The generic conception of Hager and Gonczi's (1996) included underlying credits such as knowledge or critical thinking capability, and provided the basis for transferable or more specific attributes. In this model, competencies were thought of as general attributes, with little regard for the context in which they may be applied. Generic competencies were perceived as important by several professions and the names of competency domains were similar. However, it was argued that generic competencies were limited by the fact that they were taught and assessed in isolation from actual professional practice. They were somewhat disconnected from future professional performances and tended to be ignored for specific competencies (Hager and Gonczi, 1996).The combination of the two approaches was felt to create a more holistic, integrated, and relational approach (Hager and Gonczi, 1996). Hager and Beckett (1995) conceptualised integrated competencies in terms of knowledge, abilities, skills and attitudes which could be demonstrated in the context of a carefully selected set of practical professional tasks or intentional actions which could be generalised to an appropriate level. (Hager and Beckett, 1995). Thus the curriculum and its development in medical education means more than a mere list of topics or syllabus content and involves multiple stakeholders in its development.

Social anthropology as a theoretical approach to learning

Social anthropology as a theoretical approach to learning focuses upon the socio-cultural aspects in which the learner acquires knowledge (Dong et al., 2021). Whilst cognitive and behavioural theories dominated the landscape of learning theories, Lave and Wenger's situated learning theory (SLT) initiated new concepts of learning by highlighting the social and cultural participation (Lave,1991).

Learning occurs by active participation within a social community. Situated learning in communities of practice is relevant to medical education, as it helps frame the transformation of a novice medical student into a medical professional, where learners become full participants in the community of practice called medicine (Kaufman 2018).

Communities of Practice can be defined, in part, as a process of social learning that occurs when people who have a common interest in a subject or area collaborate over an extended period of time, sharing ideas and strategies, determining solutions, and building innovations (Lave and Wenger, 1998). These communities of practice require a shared common interest or domain (e.g. dermatology), a community where members engage in shared activities and the members are practitioners. These practitioners could include dermatology consultants, trainees, nurses, General Practitioners with Specialist Interest (GPwSI) in dermatology seeing patients with skin disease.

Various methods could be employed to develop the Communities of Practice, for example by problem solving, requests for information, sharing clinical experiences, coordinating resources, attending courses or conferences, mapping knowledge

and identifying gaps (Lave and Wenger, 1996). Lave and Wenger (1996) also analysed the legitimate peripheral participation in the apprenticeship of Yucatec midwives. The cases led to the model of learning in apprenticeship, with learning in apprenticeship seen to be specialised rather than simply following the order of smaller tasks whilst carrying out skilled work.

The cognitive apprenticeship model has four dimensions (Sawyer, 2008): firstly, the content or domain knowledge and domain-specific strategic knowledge; secondly the sequencing, i.e., the ordering of learning tasks with increasing complexity and diversity; thirdly sociology, which refers to situated learning, community of practice, intrinsic motivation driven by students' setting personal learning goals, and student collaboration; and lastly teaching methods—modelling, coaching, scaffolding, articulation, reflection, and exploration.

For students to understand, process, engage and develop new knowledge, skills and attitudes, it is relevant to highlight the theoretical frameworks that may be used when developing curricular models.

Thus, theories and the observation of phenomenon, influence the design of a curriculum (Grant, 2019). Whilst behaviour theory has declined, competency-based curricula appear to have become prominent in which behaviour aspects of the curriculum remains intact within assessment practice (Grant, 2019). A phenomenon which describes an observed behaviour which may or may not be content- or context-or person–specific was not considered enough upon which to base a curriculum (Grant, 2019). An example of the effect on curriculum design of the observation of phenomena, are the adult learning principles (Kruschke, 2008), which advance 'active' and 'self-directed' learning towards personally motivated

goals, but these are best regarded as an observation, instead of a theory (Grant, 2019).

Within education, learning theory and observation of phenomena are always progressing, dependent on the social and cultural change in ideas, reflective of social values (Grant, 2019). The global nature of medical education, also called ‘medical education imperialism’ (Bleakley et al., 2008) is seen to be rhetoric driven as opposed to local context driven, and can lack clarity. Hence, the curriculum prepared which acts as a guide for teachers, the learners, as well as the education management teams, needs to be contextual. For the implementation and design of medical curricula, medical teachers or educators need to be creative and be aware of the ‘dominant’, ‘emerging’, ‘oppositional’ or ‘alternative’ social ideas influencing educational thinking in their own context (Grant, 2019). Medical students as learners may have their own preference of learning, provided that both teachers and learners have clarity on what is to be achieved.

The ILOs which are specified in almost all cases, are considered non-negotiable, especially as the curriculum forms the basis for planning and developing the assessment system. Grant (2014) said ‘If there is no agreed curriculum, how can we develop an objective, representative, valid and reliable assessment system? Simply, we cannot’.

1.4 MODELS OF MEDICAL CURRICULA

The fundamental concepts and educational theories form the basis for curriculum designs, implementation and revisions. Bloom's taxonomy (1956) recognises cognitive, psychomotor, and affective as the three domains of learning. In medical education, these can be correlated with knowledge, skills and attitudes.

Curricular models can be classified on the basis of how disciplines, subjects and topics are arranged within a framework.

In a *traditional* medical school curricular model, basic science and foundation subjects are followed by clinical training (Flexner, 1910). Students learn basic science knowledge through lecture-based classroom teaching and having mastered these, progress to patient settings to learn clinical skills. The attitude aspect for medical practice (e.g. ethics, professionalism) is taught and learnt at all stages of training, both in class room and clinical settings (Brauer and Ferguson, 2014).

As educational theories can often overlap to inform curriculum, several curricular models can be adopted and included within a single medical curriculum. For example, Core & options, Integrated, Spiral and Modular can all form components of a single curriculum (Grant, 2014).

The *core curriculum* in undergraduate medical education means the minimum basic knowledge and skills to be acquired by a medical student. These are specified usually by medical school teachers, specialty subject clinicians or experts, and is guided by the medical profession and society (Harden and Davis, 1995). These differ from *optional or special study modules* (SSM) which allow for

more in-depth study of the core subjects. The SSM provides the ‘option’ to obtain supplementary knowledge and skills, or study topics unrelated to the core. The core topics however, need to be mastered at some point in the medical school course and allows all students to be assessed against a standard core.

An *integrated curriculum* organises teaching content to interconnect and unify subjects taught in other departments or disciplines (Harden et al, 1984). This inter-relation could be broad or narrow between topics and an ‘integration ladder’ or a student centred, problem based, integrated, community based, with electives and systematic apprentice based model better known as the SPICES model could be developed to reflect this (Harden et al., 1984; Harden, 2000). Integration in a curriculum could be horizontal, with different aspects of the same concept or subject aligning (e.g. suspected skin cancer being seen in primary care, then referred to dermatology for diagnosis and surgically removed by plastic surgery); or it can be vertical alignment with integration between basic and clinical science (e.g. histology findings of skin cancer).

The ultimate goal of integration could be considered to evolve as a spiral curriculum model achieved through careful planning and implementation and underpinned by educational theories (Brauer and Ferguson, 2014). In the spiral curriculum, as students progress through the medical course, topics within the curriculum are taught and learnt with increasing levels of depth and complexity, interlinking between foundational sciences with applied clinical course. For example, taking a history from a patient for suspected skin cancer may be taught and learnt from early years and increasing skills (e.g. learning the anatomy of the skin and being able to describe a lesion) and knowledge built (e.g. pathophysiology

of skin disease and associated risk factors) by repeating the task throughout the course.

To enable students' grasp and understanding of this perceived complex learning and education strategy, expert groups have developed hierarchical concept maps to assess integration in the student learning process (West at al., 2000). The Mind Map Assessment Rubric (MMAR) allows pictures and colours to be used in the hierarchical scoring and has demonstrated inter-rater reliability for medical students (D'Antoni et al., 2009).

The *modular component* is a self-contained unit of study (Grant, 2014), and could entail a single aspect of the selected curriculum framework. For example, a module on skin disease may have within its content, themes related to clinical skills, population science, interpersonal skills and professional behaviours.

Hidden curriculum

Frederic Hafferty (1998), originally defined the term hidden curriculum with respect to medical education as the 'set of influences that function at the level of organisational structure and culture.' This curriculum would be implicit within institutional policy, evaluation activities, resource allocation, and institutional slang (Hafferty, 1998).

The premise of this hidden or informal curriculum is that students learn such things as professional behaviour and communication skills not only in classes but also in their day-to-day interactions with faculty, residents, staff, and patients in the context of clinical care (Rosenbaum and Axelson, 2013) For example, amongst surgeons, the expressed curriculum of imparting knowledge and skills to their trainees and protégés is the unintended, often unrealized transmission of implicit

beliefs, attitudes, and modelling of behaviours (Gofton and Regehr, 2006). These attitudes and values unwittingly transmitted within specialties across the medical school curricula may have positive or negative views of other specialty or subjects. Previous findings have shown that the hidden curriculum of clinical experiences can have a negative impact on a student's future speciality choice (Parekh et al, 2021).

In addition, institutional agendas and organizational culture used within hidden curricula, to help with medical recruitment pressures, can impact student identity formation. Students recognized that institutions steering them towards specific professional identities to assist local recruitment (e.g. through increased exposure to primary care) have actually pushed them further from the acquisition of that identity. Institutional efforts to improve recruitment and retention to traditionally low recruitment specialties seem to be operating in a counterproductive fashion (Brown et al, 2020).

Recent research reveals some faculty attempt to deliberately manipulate the hidden curriculum to teach concepts such as professionalism 'by stealth' (Aka et al., 2018). The encouragement of appropriate skills, attitudes and behaviours could be used to be motivational, improving the culture, behaviours and attitudes amongst students. These benefits include student internalization of robust medical ethics as a professional value (Lynoe et al., 2008).

Universal Design for Learning

Universal design for learning (UDL) is a teaching approach aimed to accommodate the needs and abilities of all learners and eliminate barriers in the learning process. This means development of a flexible learning environment in which information

can be presented in multiple ways, students engage in learning in a variety of ways, and students are provided options for demonstrating their learning (Burgstahler and Cory, 2008).

The UDL framework was designed by the US organisation, CAST, in the 1980s and sets out three main principles: multiple means of engagement where students are provided with myriad ways to engage in learning; multiple means of representation where students are provided with choice in how they access their learning; and multiple means of action & expression where students are given choice and flexibility in how they demonstrate or share their learning (Bray et al., 2023; CAST, 2018).

International organisations recognise the need for the education system to be inclusive of every learner (Rao, 2020). Thus educational policies across different nations are emphasising the need for education systems to enable inclusive and equitable education for every student like the United Nations Convention of the Rights of People with Disabilities; United Nations Conventions on the Rights of the Child; and United Nations Sustainable Development Goals (Rao, 2020). This approach to education being inclusive to all, in particular vulnerable students is increasingly recognised as beneficial for all pupils (Global Education Monitoring Report Team, 2020). When these changes are reflected in international conventions and national education policies, innovative pedagogy is thought to encourage more inclusive education practice (Evans et al., 2015; Jwad et al., 2022; Takacs and Zhang, 2020). Universal Design for Learning (UDL) is one such framework intended to guide the design and implementation of flexible and

supportive learning experiences to meet the needs of all learners (Meyer et al., 2014).

The COVID-19 pandemic, and the acceleration of the education system to a virtual or hybrid model, has resulted in many challenges and opportunities for educators (Schleicher,2020a) The different models provide options and choice in how to present teaching material, how to express learning and how to engage with education (Bray et al., 2021).

For the principles of UDL to extend to the clinical learning environment, there needs to be consistency, whilst maintaining robust standards. This may mean allowing flexibility and variability of options for how to achieve the performance standards (Heelan et al., 2015). Rose, Meyer, and Gordon (2014) state that 'UDL happens both in the design, and in the use of design to facilitate the appropriate, dynamic interaction between learner and context' (p. 11).

Transitioning from an academic environment to applying knowledge and skills in a clinical setting is challenging. Managing the transition requires thought and planning for students to make the links between the academic learning environment and the clinical work placement and to consider the fitness to practice elements of a clinical workplace (Heelan et al., 2015).

The UDL design for a curriculum model would entail inclusive and equitable learning experiences, mitigating the predicted global worsening of equity gaps in higher education as a result of the COVID-19 pandemic (Marinoni et al., 2020; Montacute, 2020).

Incorporating an inclusive curriculum from the start, developing learning outcomes which are non-discriminatory by design and reflect a genuine measure of

achievable competence (Morgan and Houghton, 2011), diversifying the curriculum by addressing unconscious biases regards cultures, values and beliefs, engaging with learners and gathering perspectives from under-represented communities are some of the ways to consider for adopting UDL within curricula (Luke, 2021).

2 A REVIEW OF LITERATURE ON CURRICULUM IMPLEMENTATION AND GLOBAL STATE OF MEDICAL TRAINING

A literature review on the published studies spanning ten years (from 2000-2019) pertaining to barriers or facilitators for curricula development and implementation was undertaken, with the review question being: 'What literature is available concerning barriers and facilitators of curriculum implementation?' Articles in English over the last ten years (2000-2019) were reviewed. The database that were searched included: Evidence-Based Reviews: The Cochrane Library, International Guidelines; Healthcare Databases: MEDLINE, EMBASE, NICE Evidence, Google, Google Scholar, ERIC: Education Resources Information Centre.

The search terms included: Curriculum Barrier, Curriculum Development, Curriculum Implementation Curriculum ADJ6 implement*Education Medical, Graduate Facilitators, Education Medical, Undergraduate Implement*Implementation Science Postgrad* Medical Education, Undergrad*

Articles and publications covering both postgraduate and undergraduate medical education pertinent to curriculum development and implementation were included.

Results

20 studies were identified with titles and abstracts relevant to barriers or facilitators in curriculum implementation. Design or type of curriculum, role of regulatory bodies, cultural and political factors, and burden of disease with societal

expectations from the medical professional were the main themes identified which influenced curricula.

It appeared from the retrieved literature that these themes may act as both barriers and facilitators to successful implementation of curriculum changes or modules.

2.1 CURRICULUM DESIGN

Medical schools could be thought of as unique socio-cultural establishments by virtue of the individuals' research, scholarship, management, administration and patient care, often simultaneously (McLeod and Steinert, 2010). There was a requirement to construct a more sophisticated understanding of how and why curriculum change succeeded or struggled in medical schools which required context-specific research addressing curriculum change within its distinct setting (Venance et al., 2014).

The design or type of curriculum, teaching methods utilised, technology and resources used or required, time factors, including staff time and teaching time, funding and costs all influenced how the curriculum was being implemented. For example, for implementation of ultrasonography within the osteopathic medical curriculum, funding, limited access to trained faculty, and scheduling within the current curriculum were found to be the primary barriers to establishing a new ultrasonography curriculum (Dinh et al., 2016). Blueprint a term drawn from the field of architecture, meant a 'detailed plan of action' (Adkoli, 1995). Blueprinting maps and specifics on how the various components of the curriculum and educational aspects were covered by assessment programmes over a specified timeframe were important in curriculum designs (Adkoli, 1995).

2.2 ROLE OF MEDICAL REGULATORY BODIES IN CURRICULUM IMPLEMENTATION

There was a need to demonstrate competencies in the role that doctors would take in looking after their patients. Clinical Negligence Scheme for Trusts (2020) in the UK required that a formal process of recording competencies of doctors is undertaken at all teaching hospitals. Failure to meet this standard could have significant financial implications for NHS hospital trusts, since it directly related to the insurance a Trust can obtain against medical litigation claims (Carr, 2004). To increase accountability and responsibility, there was pressure worldwide to set standards for entry into clinical practice for all graduates (Southgate, 1999).

Review of literature on barriers and facilitators of curricula across medical and allied specialties highlighted the influence of national regulatory bodies and licensing assessments on curriculum implementation. Assessments relevant to the medical school course needed to be applied appropriately to check and ensure safe progression of the medical students with regards to their knowledge, skills and behaviours. In the review of literature, it was observed that the medical education programmes in North America had multiple organisations like the Liaison Committee for Medical Education (LCME), the Royal College of Physicians and Surgeons of Canada (RCPSC), and the Accreditation Council for Graduate Medical Education (ACGME) who were given the challenging responsibility of evaluating the educational quality of the medical education programmes (Davis and Ringsted, 2006).

For surgical specialties, the Royal Australasian College of Surgeons made use of ‘entrustable professional activities’, also known as EPAs in their postgraduate

surgical training programmes. For the successful implementation of the programme, it was considered important that trainees underwent an objective and reproducible assessment and that supervisors were to be adequately trained (Moore et al., 2017). Similarly, for successful ultrasound education, it was considered important to initiate a programme for the subject, integrate and develop it longitudinally within the curriculum, and to encourage student engagement and address competency (Chiem et al., 2016).

Another example of regulatory bodies influencing curricula was noted in the study during implementation of a health systems science (HSS) curriculum (Gonzalo et al., 2016). Students identified four barrier-related themes. These included the view of medical-board licensing examinations of basic science as 'core', conceptual framework related to the systems being considered important but not essential, a lack of sufficient knowledge and skills to perform systems roles amongst students and the culture of medical education and clinical systems not being aligned to a systems education (Gonzalo et al., 2016). The major linking challenge related to students' competing priorities, where students wanted to perform well in examinations and match into chosen residencies, and another to advance their systems-based skills (Gonzalo et al., 2016). As a result, HSS was perceived as an auxiliary and optional subject, greatly limiting student engagement (Gonzalo et al., 2016).

2.3 CULTURAL AND POLITICAL FACTORS

Competing tensions between individual values versus the institutional values, and perceived losses or gains amongst frontline teachers influenced the success of curriculum change or implementation (Venance et al., 2014).

A study exploring the residents' and physicians' perception of introduction of new bedside teaching curriculum, three main themes emerged (Rousseau et al., 2018). These were cultural, environmental and curriculum related barriers. Within cultural barriers, teaching bedside physical examination skills was influenced or hindered by the lack of hospital support, physicians' motivation and expertise, trainees' attitudes and dependence on technology. Chaotic nature, time limitations and conflicting clinical responsibilities made the environment for bedside teaching challenging. In addition, a structured physical examination skill or task within the curriculum felt restrictive and difficult to isolate patients with appropriate clinical findings (Rousseau et al., 2018). The authors suggested prioritising expert clinical teachers with recognition of their time and effort. Teaching was thought best to be delivered in a protected environment but with real patients with relevant clinical findings (Rousseau et al., 2018).

Student engagement and involvement; ownership; faculty engagement and involvement; incentives; staffing limitations were other factors influencing curricular development and implementation. In a systematic review for trauma and orthopaedic surgery in UK, a steady decrease in undergraduate orthopaedic training within the UK over the last 20 years was observed, leaving undergraduate

students and foundation doctors with a potentially substantial lack of knowledge in the subject (Poacher et al., 2022). This limited exposure made it unlikely for students to pursue trauma and orthopaedics as a career choice.

Burden of disease and societal expectations

Training of medical graduates and junior doctors has increasingly moved towards competency-based training. Several reasons were noted for this move, the most significant being patients' expectation to be seen and treated by competent doctors. High-profile medical incidents breaching patient trust and confidence whilst in the care of clinicians had made the governments, media and the general public aware that self-regulation of doctors may not be sufficient.

From the specialty perspective, in the UK, dermatology specialty representation in showed that a quarter of medical schools in 2015 had no dermatology and summative assessment was only mandatory in 57% (17) schools (Yaakub et al., 2015). These results showed no improvement from the survey conducted in 2009 (Yaakub et al., 2015).

A cross-sectional study to review the content of general practice consultations demonstrated a high frequency of dermatological conditions presenting to the community medicine practitioners (Le Roux et al., 2020). For a specialty like dermatology, with a high burden of skin disease in the community, it was anticipated to do well in the move from hospitals to community satellites.

However, cultural barriers were noted within medical school curricula towards dermatology. Medical students observed dermatology being seen as a niche specialty and not as part of general medicine, and thus not receive the same emphasis as other medical rotations in medical schools and hence lacking during

their training (Attubato, 2023). This meant students lacked vital knowledge and skills to deal with skin related emergencies or recognition of skin cancer. Graduates would lack the exposure to red flag and emergency presentations, expected to be identified and managed appropriately in other clinical settings like general practice (Attubato, 2023). The use of appropriate networks and evaluation and improvement of teaching programmes were other factors influencing curricula. The lack of teaching dermatology within general medicine could mean much of the clinical and experiential learning would likely take place within a GP setting, where time allocation towards skin conditions was already found to be scarce (Le Roux et al., 2020).

For the successful implementation of a curriculum, it was vital for all stakeholders to ensure that their values were aligned. An understanding of how medical educational activities were conducted, experience-related incentives and staff limitations could impact on how well a course was delivered (Venance et al., 2014).

To understand how curricula were developed and implemented across the world, a review of literature was conducted to explore the international standards for medical training.

2.4 INTERNATIONAL VIEW ON STANDARDISATION OF MEDICAL CURRICULA

Globalisation, migration, easy and accessible frequent travelling across continents has meant society expects sickness and health needs be met with an equivalent basic standard of care and expertise.

With the advent of ‘globalisation,’ and with physicians moving to different countries to practise and train in medicine, there was an urgency to define ‘global

competencies'. In 1999, the China Medical Board of New York, Inc. established the Institute for International Medical Education (IIME), whose Core Committee developed the necessary domains with learning outcomes which would define the 'global minimum essential requirements' (GMER) (Institute for International Medical Education Core Committee, 2002). Members of the Core Committee included groups of educational and health policy experts as well as representatives of significant international medical education organisations. Within the GMER, the standards were influenced by the expectations of the educators, where all graduating medical students were expected to demonstrate core knowledge acquisition, as well as the skills and behaviours expected of doctors internationally. There was an acknowledgment that establishing core competencies would have a far reaching impact on individual medical school curricula. The recommendation provided was that though each school may have different educational programmes as per their local requirements, all would incorporate the same core. Thus, there appeared to be a consensus that what constituted core was deemed 'essential, mandatory teaching and learning, with all medical graduates being able to demonstrate competency for the core curricula' (Institute for International Medical Education Core Committee, 2002). The curricular content as well as the educational processes across medical schools focussed on student competences as outcomes of medical education (Institute for International Medical Education Core Committee, 2002). The Core Committee (2002) grouped the essential outcome competency domains into seven groups:

1. Professional values, attitudes, behaviour and ethics
2. Scientific foundation of medicine
3. Communication skills

4. Clinical skills
5. Population health and health systems
6. Management of information
7. Critical thinking and research

These domains were set out to be undertaken keeping the social and cultural particularities into consideration within various regions of the world, with the concept of 'think globally, act locally' (Hodges, 2006). In response to increasing doctor and patient mobilisation, the intention was to provide comparable physician performances and move towards internationalisation of standards for physician competence (Stern et al., 2005).

The World Federation for Medical Education (WFME) also set standards to 'provide a mechanism for quality improvement in medical education, in a global context, to be applied by institutions, organisations and national authorities responsible for medical education' (World Federation for Medical Education, 2012). The structure of medical education and the regulatory framework in various countries is discussed as follows.

China

China being the most populous country and the second-largest economy in the world, has constructed the world's largest medical education system since the People's Republic of China was established in 1949 (Wang, 2021). Comprehensive universities were established from stand-alone medical institutes in 1998 (Hou et al., 2014). The accreditation of clinical medical education was established in 2008 (Accreditation of Clinical Medical Education in China, 2008),

and a national strategy for standardised residency training was undertaken in 2013 (National Health and Family Commission, 2013). In 2020, the Working Committee for the Accreditation of Medical Education (WCAME) of China was recognised as the accreditation body Accreditation of Clinical Medical Education in China (2008).

Australia

A study undertaken by Rolf et al (2002) attempted to establish a core curriculum of clinical conditions that all Australian medical graduates would be competent to manage. Intern supervisors, interns, registrars, academics and nurses in New South Wales, Australia were consulted. Four levels of skill at which conditions should potentially be managed were also identified: 'Theoretical knowledge only'; 'Recognise symptoms and signs without supervision'; Initiate preliminary investigations, management and/or treatment without supervision'; and 'Total investigation, management and/or treatment without supervision' (Rolfe et al., 2002). Interns felt the need to be competent in managing more than half that of the 106 conditions identified in the core curriculum (Rolfe et al., 2002).

Australian medical council (AMC) provided the national standards for primary medical programmes in Australia, in terms of assessment and accreditation. They broadly followed the principles and guidance as per UK's GMC guidance. The curriculum content of the medical programme were expected to align with AMC's Graduate Outcomes which were divided into four main domains: Science and Scholarship; the medical graduate as a scientist and scholar; Clinical Practice: the medical graduate as practitioner; Health and Society: the medical graduate as a health advocate and; Professionalism and Leadership: the medical graduate as a professional and leader (Australian Medical Council Limited, 2012).

USA & Canada

The Association of American Medical Colleges (AAMC) established in 1876 had under its membership all 151 accredited American and 17 accredited Canadian Medical Colleges (Association of American Medical Colleges, 2018).

The learning outcomes document published by the Association of American Medical Colleges (1998) set forth attributes that graduates needed to meet society's expectations of them as doctors (Association of American Medical Colleges, 1998). These were generic and covered four domains, namely: Physicians to be altruistic, Physicians to be knowledgeable, Physicians to be skilful and Physicians to be dutiful (Association of American Medical Colleges, 1998). More recently, medical education at all levels in America, including undergraduate levels had steered towards a competency based curricula, with incorporation of entrustable professional activities (EPA) into the curricula to determine the best path for students to follow in order to move the next level of training (AMA, 2022).

Canada's Royal Colleges of Physicians and Surgeons prepared the CANMEDS Competency Framework, which was designed primarily for postgraduate medical training and had been modelled and adopted by other nations (Frank, 2005). This competency based framework described the attributes and abilities of a competent physician under seven main domains (Frank, 2005), namely medical expert, communicator, collaborator, manager, health advocate, scholar and a professional. The additional new changes brought on from 2005 to 2015 were the CanMEDS milestones, which were educational statements written for any medical discipline (e.g. internal medicine), with the help of the Royal College of Medicine or Surgery, to demonstrate how a doctor's competence progresses over the span of their career from novice to mastery (CanMEDS 2015).

Europe

For Europe, the European Commission funded the Tuning Project which set out learning outcomes for primary medical qualifications in Europe (Cumming and Ross, 2007). In an attempt to bring about harmonisation amongst different institutions, the Bologna declaration was established whose aim was to develop learning outcomes or competencies for all degree programmes in Europe including primary medical degrees (Cumming and Ross, 2007). For medicine in Europe, comparable learning outcomes/ competencies for medical graduates and practice was undertaken as a new initiative. It was initiated in 2004, and led by the University of Edinburgh along with a local steering group and a European Task Force. The work was undertaken under the auspices of the MEDINE Thematic Network for Medical Education in Europe (University of Bristol, 2013). Authors Cumming and Ross (2007) felt it important to distinguish between quality standards and teaching and assessment of the learning outcome. The final output of the Tuning (Medicine) Project was to provide an outcomes based approach and framework with competences drawn from previous work on learning outcomes in medicine, and approved by the MEDINE Network and an Expert Panel (Cumming and Ross, 2007).

The University of Vienna medical school, one the largest medical schools in Europe, launched the Medical Curriculum Wien project (MCW) which planned a new curriculum with support from the Committee of Educational Affairs. With the school enrolling up to 1500 medical students per year, MCW outlined all the competencies that all medical graduates should possess (Merl, Csyani and Petta, 2000).

Breipohl et al (2000) discussed the need for harmonising the undergraduate medical curricula across Europe and moving away from individualistic and autonomous medical schools. They suggested sharing of resources towards common interests and themes, incorporation of virtual teaching modules and expertise into national curricula, identifying quality metrics and defining European mission statements (Breipohl et al., 2000). This would be challenging and required the collaboration of the multiple stakeholders involved. Specific to medical education, there was the European Union of Medical Specialists (UEMS), which represented over 50 medical disciplines and 37 countries in Europe. (*UEMS, 2013)*. The mission of the UEMS (2013) was to '[set] standards for high quality healthcare practice that are transmitted to the Authorities and Institutions of the [European Union] and the National Medical Associations stimulating and encouraging them to implement its recommendations.' The UEMS has remained active since 1958 at the European level to promote free movement of European medical specialists, whilst ensuring excellent quality care for European citizens (UEMS, 2013).

Collectively, these internationally recognized organisations in education (WFME, IIME, and UEMS) have, over the past two decades, made efforts to achieve their task of identifying global standards in medical education, including producing global curricula.

In summary, the above initiatives and activities indicated a growing awareness of the process of globalisation of medical education, with hopes of designing a suitable medical curriculum for all (Khanam and Chowdhury, 2015).

Though medical schools in countries like the USA had individual learning outcomes and curricula, there was a move towards standardisation for specialty subjects.

For example, the ageing population and long life-expectancy in western world has meant addressing new challenges for health services in a unified approach. There has been a need for preparedness amongst the medical fraternity to respond to the ‘age wave’ as baby boomers become senior citizens. The American Association of Medical Colleges thus recommended 26 geriatric competencies under 8 domains for all graduating medical students (Ramaswamy, 2013). A similar response was noted in Europe to look after their elderly and frail society members. A consensus was reached with geriatricians across 29 countries affiliated to the European Union of Medical Specialists on core learning outcomes for medical undergraduates in geriatric medicine (Masud et al., 2014). It was recognised that significant efforts would be required to implement these, given the large variation in the quality of geriatric teaching in medical schools. However, the development of a unified curriculum was thought to be a first step to improve teaching of geriatrics across medical schools, and help advancing postgraduate training for elderly care across Europe (Masud et al., 2014).

Countries across the world appeared to have a common vision – enabling medical students to become safe and competent doctors who would respond to the needs of the society.

2.5 THE STATE OF MEDICAL TRAINING IN UK AND CURRICULUM STANDARDS

The UK government recognises the need for more doctors to provide national healthcare services, and funded an increase in medical student numbers of 57% (from 3749 to 5894) (Higher Education Funding Council for England, 2001) between 1998 and 2005 (Howe et al., 2004). The government announced in 2017 that it was going to increase the number of medical places per year by 1,500 (RCP, London 2021). This was achieved by the number of student places being increased at existing medical schools; shortened programmes being developed which were open to science graduates; and adoption of 'twinning' arrangements, which meant hosting an existing curriculum at a new site and with the vision of establishing new medical schools (Howe et al., 2004).

The first 630 additional places were introduced in 2018/19 (Health Education England, 2018). As part of this expansion, five new medical schools were created: Edge Hill University, University of Lincoln Medical School, University of Sunderland School of Medicine, Anglia Ruskin University School of Medicine, and the Kent and Medway Medical School. Places were also allocated to pre-existing medical schools to allow them to expand (Health Education England, 2018).

The UK Medical Schools via the Medical Schools Council (MSC) recommend an increase in the number of medical students by 5,000 making a total of 14,500 graduating per year, based on the current numbers of doctors entering the NHS (Medical Schools Council, 2021).

The UK government and the National Health Service (NHS) also proposed initiatives to increase the number of primary care physicians in the UK. In 2016, NHS Health Education England along with partnership with Royal College of General Practitioners developed and published a document called General Practice Forward View (General Practice Forward View, 2016). NHS England would provide additional funding (over £500 million by 2020/21), additional to the current primary medical care allocations, to enable Clinical Commissioning Groups for General Practices to commission and fund extra capacity (General Practice Forward View, 2016). Hence, it was apparent that external political influences (e.g. GMC, NHS England, UK government health policies) could determine which topics, subjects or specialties have better representation within a medical school course.

In addition, there has been a significant reliance on international medical graduates to fill the gaps in the National Health Service (NHS) service provision and to cater to the health needs of the British population. The standard of knowledge, skills and behaviours for international medical graduates is expected to be equivalent to that of a UK medical graduate, overseen by the UK's medical regulatory body, the General Medical Council (GMC). Currently, the international medical graduates have to undertake the Professional and Linguistic Assessments Board test (PLAB) to ensure they have the adequate knowledge and skills to practise medicine in the UK (General Medical Council, 2023).

Standards for medical training in the UK

The GMC sets the standards and expected outcomes in the UK for both undergraduate and postgraduate medical education and training (General Medical

Council, 2018). The ‘Promoting excellence: standards for medical education and training’ (General Medical Council, 2015) document replaced the ‘standards for delivery of teaching, learning and assessment for undergraduate medical education’ in Tomorrow’s Doctors (2009) (General Medical Council, 2009), and the ‘standards for postgraduate training’ in The Trainee Doctor (General Medical Council, 2011). The ‘Outcomes for Graduates’ document by the GMC describes for the necessary knowledge, skills and behaviours to provide patient care in a competent and ethical manner for all medical graduates (General Medical Council, 2015). This was further updated and the Outcomes for Graduates document underwent significant changes in 2018 (Outcomes for Graduates, 2018).

The definition of curriculum adopted for postgraduate training by the GMC should be applicable to all levels of medical education and be seen as a statement of the intended aims and objectives, content, experiences, outcomes and processes of an educational programme (General Medical Council, 2017). It should include a description of the training structure, description of expected methods of learning, teaching, feedback and supervision. The curriculum should cover both generic professional and specialty-specific areas. The ILOs are the knowledge, skills, capabilities, behaviours and expected levels of performance a learner must acquire and demonstrate by the end of a period of education or training (Outcomes for Graduates, 2018).

Within the standards for medical education and training, there are five themes that the GMC promotes. These are: Learning environment and culture; educational governance and leadership; supporting learners; supporting educators; and,

developing and implementing curricula and assessments (General Medical Council, 2015).

Within the theme of developing and implementing curricula and assessments, the GMC states that ‘Medical school curricula and assessments are developed and implemented so that medical students are able to achieve the learning outcomes required for graduates’ (General Medical Council, 2015). The learning outcomes for undergraduates and their training requirements and curricular content should reflect the health needs of society and the burden of disease. The UK currently does not have a unified or a standardised medical undergraduate (UG) curriculum. Medical schools organise their largely generic curricula and learning outcomes autonomously, on the basis of the Outcomes for Graduates’ document of the General Medical Council (GMC) (General Medical Council, 2015).

Scotland

The ‘‘Scottish Doctor’’ document, published in 2002 and updated in 2008 was prepared with a view to ensure that medical graduates from all 5 Scottish medical schools were of an equivalent standard. The set standards and assessments would be used across all schools, irrespective of the individual school programmes (Scottish Deans’ Medical Curriculum Group, 2008).

Though the Scottish Doctor document closely followed the GMC Outcome for Graduates, issues were noted regarding the comprehensiveness of an outcomes based framework. Specifically, the concern was how completely it described all of the required intended outcomes of an undergraduate medical programme and the uniqueness of individual outcomes or their overlap with other outcomes. Equivalence between outcomes was left with curriculum managers for their

individual schools (Scottish Deans' Medical Curriculum Group, 2008). Currently, NHS Education for Scotland (2023), supports the undergraduate medical education and training delivered by Scotland's 5 medical schools, and ensures that resources are utilised appropriately to clinical teaching of undergraduates in hospital and general practice settings.

The MLA and its role in curricular implementation and development

The MLA is a new assessment being introduced by the General Medical Council in 2025-25. The assessment aims to ensure that all practising graduates, including new international doctors possess the necessary core knowledge, skills and behaviours to practise in the UK (General Medical Council, 2020). The test will entail two parts: a computer-based applied knowledge test (APT) to assess how students use their medical knowledge to apply towards clinical scenarios, as well as a clinical and professional skills assessment (CPSA). The clinical skills assessment would be similar to an Objective Structured Clinical Exam (OSCE) or Objective Structured Long Examination Record (OSLER) used across medical schools. These assessments will not include Prescribing Safety or Situational judgement tests. The GMC will instruct medical schools on the set requirements that all CPSAs must meet. (General Medical Council, 2019). The GMC has provided medical schools and students a 'MLA content map', which lists topics and areas that are likely to be covered in the exam (General Medical Council, 2019). The content map includes six domains (General Medical Council, 2019):

1. Areas of clinical practice (e.g. mental health, surgery)
2. Areas of professional knowledge (e.g. medical ethics and law)

3. Clinical and professional capabilities (e.g. assessing, treating & safeguarding vulnerable patients)
4. A list of practical skills and procedures
5. Patient presentations (e.g. chronic rash or lump)
6. Conditions (clinical diagnoses commonly seen within UK Foundation Programme) (General Medical Council , 2019)

To prepare for this licensing assessment, the GMC tells students that the exam will be based on the Outcomes for Graduates document (General Medical Council, 2018) and that ‘you won’t need to learn anything beyond what's already covered in your medical school’s curriculum.’ (General Medical Council, 2020).

2.6 MISMATCH BETWEEN SOCIETAL NEEDS AND SPECIALTIES TAUGHT IN MEDICAL SCHOOL CURRICULA

Though the GMC provides broad guidance on medical school curricula, individual schools decide on the content, delivery and assessment of specialty subjects. However, there has been insufficient guidance on what subjects need to be taught to medical students. This variation in exposure and experience to specialties can lead to an impact on the students’ knowledge and skills during their medical course. This has been illustrated by some examples below:

Emergency services

Concerns were raised regarding graduates going into emergency departments with none or little knowledge, experience or skills in managing acute emergencies such as burn injury victims (Al-Benna, Paten, and Al-Ajam Y, 2008). In the UK,

175,000 emergency department (ED) attendances were found to be burns related injuries and accounted for 15,000 hospital admissions per year (National Burn Care Review, 2002). Prioritising and ensuring effective assessment of acute burn patients, resuscitation and transfer of these patients has been shown to improve outcomes for the patients. Though the GMC recommends that schools should define ‘a core curriculum encompassing the essential skills and the appropriate attitudes to be acquired at the time of graduation’ (Tomorrow’s Doctors, 2003), a study conducted exploring all UK medical school curricula found that none of the schools had burns teaching explicitly mentioned in their core curricula (Al-Benna, Patani, and Al-Ajam, 2008).

The undergraduate curriculum for general surgery included the learning outcome of recognising and understanding emergency surgical presentations but was not specific to dealing with burns victims (Royal College of Surgeons, 2015). Students would thus only have opportunistic learning during placements in emergency departments or specific Plastic Surgery rotations placements where burns patients would be seen for assessment and management.

With deep concerns that society would expect all medical graduates to have the necessary knowledge and skills to deal with basic acute emergencies, the authors asked the expert organisation, ‘Does the European Burn Association support the statement that competency in burn care of acutely ill and injured patients should be one of the essential exit goals of medical schools?’ (Al-Benna, Patani, and Al-Ajam, 2008).

Clinical pharmacology and therapeutics (CPT)

Clinical pharmacology and therapeutics (CPT) is a clinical discipline which involves the application of pharmacological principles for all patients, and includes promoting rational drug prescribing, management of overdose or poisoning as well as regulation of drugs (Joint Royal Colleges of Physicians Training Board, 2010). Concerns were expressed that junior doctors were coming out of medical schools ill-prepared in their training and making dangerous prescribing errors (O'Shaughnessy et al., 2010). The British Pharmacological Society (BPS) recognised the need to develop an undergraduate core curriculum for prescribing to ensure patient and doctor safety.

A Delphi approach was used with a panel of clinical pharmacology, pharmacy and medical education experts from the UK and a consensus of 50 learning outcomes was formed for prescribing in the BPS curriculum (Ross and Loke, 2009). The GMC in the 2009 Tomorrow's Doctors Document recommended an emphasis on the inclusion of CPT in medical school curricula (General Medical Council, 2009). However CPT teaching in schools was found to be variable with most schools failing to assess their graduates as prescribers and teaching approaches not aligned to the development of prescribing skills (O'Shaughnessy et al., 2010). Furthermore, research via the EQUIP study was commissioned by the GMC to investigate the causes of prescription errors amongst foundation year trainees and its relation to medical education, and recommendations made to include specific prescribing related competencies in undergraduate medical school programmes (Dornan et al., 2009).

Surgery specialty: Urology

A national survey noted that despite urological conditions causing half of surgical emergency department admissions in UK admissions, only 7 of 19 medical schools (37%) taught urology as a core subject (Shah et al., 2002). The authors were also surprised to find that there was a lack of a standard urology curriculum across the UK. It was felt that generalisation of medical school curricula had a role to play in variation and absence of urology representation. It was also felt that lessons had not been learnt from previous warnings and quoted by Price et al (1971) as 'The principal defect in the current training procedures for physicians appears to be that medical educators have been generally unconcerned with the actual needs and performance of their graduates in practice'.

A national questionnaire survey of consultant urologists suggested guidelines for a core curriculum in urology and a need for standardisation with core-knowledge and skill items to teach and learn across UK medical schools (Shah et al., 2002).To help include urology into busy medical school curricula, there has been a drive to prepare innovative models of teaching and learning. In a learning package designed for teaching urology to 4th year medical students, 100% of those responding felt e-learning of core-clinical problems were relevant and helpful (Owen, Byrne and Ker, 2008). Also noted in the study was a 12% increase in knowledge at week 1 and 18% at month 1 after delivery of urology teaching compared to the previous academic year (Owen, Byrne and Ker, 2008).

Surgery: Ear Nose and Throat (ENT) specialty

A survey of UK medical undergraduates demonstrated the lack of ENT training in undergraduate medical education and its impact on junior doctors' clinical confidence to deal with ENT related problems in a clinical setting (Powell et al., 2011). The students in the survey felt less confident in ENT history-taking, investigations and management as compared to cardiology in clinical competencies (Powell et al., 2011). This lack of preparedness and confidence to practise ENT has been further reiterated in a systematic review undertaken to analyse provision of ENT undergraduate education in UK (Ferguson, Bacila and Swamy, 2016)

Psychiatry

The Royal College of Psychiatrists with the help of the College's Scoping Group on Undergraduate Psychiatry developed a core curriculum for UK medical schools (Royal College of Psychiatrists, 2011). A survey conducted on the taught and assessed characteristics of undergraduate psychiatry in UK and Ireland medical schools revealed significant differences in how psychiatry was taught to medical students (Karim et al., 2009). Though course content was broadly similar, course structure, duration of training and assessment methods showed great variability.

In summary, the above examples indicate a mis-alignment of medical school curricula and medical training needed to address the needs of society globally. For a specialty like dermatology in the UK, consultations in primary care are skin related and yet dermatology is not a core component of undergraduate curricula in all medical schools and when taught, represents only a minor component of learning and assessment (Yaakub et al., 2015). The apparent lack of foundational undergraduate dermatology training can make postgraduate trainees feel ill

prepared when considering a career as primary care physicians. A generalist approach within undergraduate curricula covering aspects seen in GP consultations and aligning them with minimum standards in specialty skills and knowledge may help address these training and societal needs.

2.7 DERMATOLOGY TRAINING NEEDS IN THE UK

Dermatology is a medical specialty which treats adults and children and requires diagnostic capability for skin cancer and surgery. Skin conditions affect all age groups. Around 25% of GP consultations are skin-related in the current medical practice, with skin disease considered the commonest new reason for presentations in primary care (Schofield et al., 2011). Skin disease represents 34% of disease in children and 20% infants suffer with atopic eczema (Schofield, 2009).

Occupational health conditions like hand eczema leads to significant disability resulting in loss of work time and this has an economic impact on individuals and society. Manufacturing industries account for the largest number of cases of contact dermatitis attended by dermatologists and occupational health physicians, followed by health care employment sector employees, contributing to a significant burden of disease amongst the workforce (Meyer et al., 2000).

Chronic skin conditions like eczema and psoriasis can have a major psychological impact on patients. The quality of life for patients affected by psoriasis has been found to be at par with other chronic diseases like diabetes, arthritis, heart disease, depression and even cancer (Rapp et al., 1999). Further, levels of stigmatisation

amongst people suffering with psoriasis have also been shown to be higher compared to other dermatological conditions (Vardy et al., 2002).

Deaths due to skin diseases in the UK amount to 4000 per year, with skin cancer melanoma being attributed to the most (Schofield, 2009). Melanoma skin cancer incidence rates in the UK since the 1990s, have increased by approximately 140%, with an average of 16,744 new cases being diagnosed each year, between 2014-2018 and attributing to 2341 deaths between the years 2017-2019 (Cancer Research UK, 2022).

At the national policy level for dermatology, a body called The All Party Parliamentary Group on Skin, also known as APPGS, was established in 1994 with the aim to increase an understanding about skin care related issues within the UK Parliament (The All Party Parliamentary Group on Skin, 2019*)*. The advisory members of the group include the Chair of Psoriasis Association, the President of British Association of Dermatologists (BAD), Executive Chair of Primary Care Dermatology Society, President of British Dermatological Nursing Group and the Chair Dermatology Council for England. To gauge the number of dermatology specialists across UK, the APPGS sent freedom of information (FOI) requests to all NHS Foundation Trusts across all England, with similar requests made by Dermatology Council of England to Scottish Regional NHS boards, Welsh Health Boards and Northern Irish Health and Social Care Trusts (The All Party Parliamentary Group on Skin, 2019). For England, it was found that in total, there were 695 whole time equivalent (WTE) Consultants and locums for a population of approximately 55.6 million. This would mean 1 WTE consultant would be needed to cater per 80,000 of the population. This large population coverage

would be 17,500 above the RCGPs' and BADs' recommended target. To reach adequate levels of staffing for England's population area, 194.6 WTE dermatologists would need to be trained and employed, with current staffing levels to be increased by 28% (The All Party Parliamentary Group on Skin, 2019). Scotland, Wales and Northern Ireland reported a similar need to increase dermatology specialist employment. The audit also revealed a worrying lack of dermatology services for inpatients on hospital wards and emergency departments during weekdays (The All Party Parliamentary Group on Skin, 2019).

With a significant lack of workforce to cater to large population groups, there is a need for safe clinical practice for dermatology patients amongst physicians and all medical graduates. Within the shape of training review and to ensure safe doctors for service for the next 30 years, a significant aspect involves careful consideration of undergraduate curriculum planning: 'Patients and the public need more doctors who are capable of providing general care in broad specialties across a range of different settings. This is being driven by a growing number of people with multiple co-morbidities, an ageing population, health inequalities and increasing patient expectations' (Greenaway, 2013).

A Future Hospital Commission report (FHC) (Future Hospital Commission, 2013), through the Royal College of Physicians (RCP) promoted the re-introduction of generalism into medical training: 'Medical education and training will develop doctors with the knowledge and skills to manage the current and future demographic of patients' (Royal College of Physicians, 2013). This meant that medical graduates would have to be adequately prepared to diagnose, investigate and manage patients they are likely to come across in their day-to-day clinical

practice. The report further stated that: ‘The curriculum of undergraduate training (at medical school) must emphasise the importance of acute and (general) internal medicine. Community placements for medical students and trainees will be required. Such a broad-based training programme might include acute and/or (general) internal medicine, community care, psychiatry and general practice. Consideration should be given to when community care rotations, supervised by specialists, are most useful for trainees and patients’ (Future Hospital Commission, 2013).

Whilst the programme brought many successes for quality improvement projects like service provision deliveries at a local level, it was not considered sustainable for the RCP to resource alone, and needed a high investment, patient-driven innovation and facilitation in the long term (Future Hospital Programme, 2017).

The increased prevalence of skin conditions, national shortage of skin experts and the government’s move towards generalism, means that the essential knowledge and skills in specialties like dermatology needs to be embedded into medical school curricula to train to enhance patient safety and improve medical competency. The UK government with the help of Health Education England (HEE), NHS improvement and NHS England plans to expand healthcare workforce, in particular for general practice and cancer care (NHS long term plan, 2019). Regarding dermatology and burden of skin disease, the Lambeth study estimated that the proportion of the population with any form of skin disease was 55%, with 22.5% considered need of medical attention (i.e. thought to be moderate or severe) (Schofield, 2009). Thus a significant proportion of this burden of disease is being seen by GPs. Despite deaths due to skin disease and skin cancer being

on the rise (Melanoma skin cancer mortality statistics, 2022), dermatology teaching remains sparse in undergraduate and postgraduate curricula.

The importance and relevance of dermatology in the undergraduate medical curriculum is not unique to the UK. In Canada, like the UK, the majority of skin problems are seen by non-dermatologists. A survey conducted at all 17 Canadian medical schools regarding undergraduate dermatology revealed limited time dedicated to the specialty. The recommendation was to move towards a national dermatology curriculum to ensure uniformity and consistency within Canada (Kirshen et al., 2011). As a result, dermatology undergraduate education appears to be moving in a positive direction in Canada. A national survey of all undergraduate dermatology directors of the 17 Canadian medical schools revealed that 59% of the schools covered core curriculum topics, there was an increased number of teaching hours and faculty members, and recommendations made for an online atlas of resources to standardise the curriculum (Hu and Vender, 2017).

The BAD has provided a national recommended undergraduate core curriculum to guide UK medical schools on the minimum competencies required of a graduate for the safe care of patients with skin disease (British Association of Dermatologists, 2016), recently been updated (Singh et al., 2021). However, a national survey across UK medical schools for undergraduate dermatology delivery has shown striking variation and notable absence in some school curricula (Yaakub et al., 2015).

A survey of trainee doctors to evaluate diagnostic skills for common skin conditions in UK district general hospitals revealed concerning results. Very few junior doctors

could recognise malignant melanomas (5/42; 12%) and basal cell carcinomas (20/42; 47%), especially relevant as early identification and excision is the most effective treatment for skin cancers with the potential for complete cure. The survey also demonstrated a lack of diagnostic acumen for other skin conditions with reduced dermatological teaching as medical students (Zafiriu and Yesudian, 2010). Chiang et al (2011) conducted a survey to assess the educational experience and the confidence levels in dermatology amongst final year medical students in the UK. The study showed that those receiving teaching from dermatologists ($P<0.01$), specialist nurses ($P<0.001$) and expert patients ($P<0.001$) reported higher confidence levels. Learning from specialist clinics and small group teaching were the most influential on their development of confidence in dermatology. Students nearing graduation felt less confident in their ability to assess and treat skin conditions, suggesting a need for more emphasis on the specialty (Chiang et al., 2011).

Similar findings had been seen in medical residents in the USA where residents could correctly diagnose common skin disorders only 43% of the time and attending internal medicine physicians diagnosed only 52% of dermatological conditions correctly (Federman et al., 1995). Little or no training in dermatology is likely to lead to poor evaluation of skin disease by non-dermatologists and a lack of basic dermatologic competence in diagnosis and management, impacting safety and quality of patient care (Whitaker-Worth, Susser and Grant-Kels, 1998).

As outlined above, Dermatology as a specialty is not alone in its concern regarding variation and inadequate representation in medical school curricula. Other specialties and subjects have expressed concerns and embarked on developing

a national core-curriculum for their respective subjects to guide medical schools. It is unclear how medical education leads and medical schools balance the drivers for university education cognizant of the need to produce doctors with the medical competence needed for the patient population they diagnose and manage. There appears to be variable adoption of a standardised core- curriculum for specialties and subjects across UK medical schools. Appropriate implementation of a core curriculum could help ensure the minimum knowledge, skills and competencies are achieved by all medical graduates to practise safely.

3 RESEARCH QUESTION

Medical schools in the UK develop and follow individual curricula, with guidance from the regulatory body, the GMC. Some subjects and specialties like dermatology, have developed a specialty specific core curriculum with recommendations for its implementation in UK medical schools. It is unclear as to which specialties or subjects provide similar guidance and what factors or drivers lead to the development of specialty-specific core curricula and their implementation. The main function and ultimate aim for undergraduate medical education and delivery of a comprehensive curriculum is to ensure safe, knowledgeable and effective medical practitioners.

Research Question for the Study

What is the current level of understanding of specialty core curriculum implementation in undergraduate medical education in the UK, using dermatology as an example, and what may be the facilitators and barriers to its implementation?

4 METHODOLOGY OF THE RESEARCH STUDY

Research methodology has been defined by Buckley and Chiang (1976) as ‘a strategy or architectural design by which the researcher maps out an approach to problem-finding or problem-solving.’ According to Crotty (1998), research methodology is a comprehensive strategy ‘that silhouettes our choice and use of specific methods relating them to the anticipated outcomes’. However, the choice of research methodology is guided by the type and features of the research problem (Noor, 2008).

4.1 LEARNING THEORIES IN MIXED METHODS RESEARCH DESIGN

For the purpose of this research study, a mixed methods research (MMR) approach was used. MMR design uses both quantitative and qualitative research methods to understand and analyse data in a consistent manner to a specific research question, rationale and aims.

Mixed methods research as a research methodology has emerged rapidly in the last few years with a distinct identity (Denscombe, 2008). The use of this methodology has gained popularity and purpose especially in fields relevant to education, health sciences, psychology and sociology, alongside the more traditional qualitative and quantitative research (Johnson and Onwuegbuzie, 2004; Tashakkori and Teddlie, 2021).

Mixed methods provide the advantages of corroboration of findings from use of one method by elaboration, expansion or clarification from another method.

A number of theoretical paradigms are discussed in the literature such as: positivist (and postpositivist), constructivist, interpretivist, transformative, emancipatory, critical, pragmatism and deconstructivist (Mackenzie and Knipe, 2006).

Positivism and postpositivism

Positivism is sometimes referred to as 'scientific method' or 'science research', which ‘reflects a deterministic philosophy in which causes probably determine effects or outcomes’ (Creswell, 2003, p.7). Positivists aim to test a theory or describe an experience ‘through observation and measurement in order to predict and control forces that surround us’ (O'Leary, 2004, p.5).

O'Leary (2004), provides a definition of postpositivism which aligns in some sense with the constructivist paradigm claiming that postpositivists see the world as ambiguous, variable and multiple in its realities - ‘what might be the truth for one person or cultural group may not be the ‘truth’ for another’ (p.6). Postpositivism is considered to be intuitive and holistic, inductive and exploratory with findings that are qualitative in nature (O’Leary, 2004).

Constructivism

Constructivism is one of the learning theories where knowledge is actively constructed as learners give meaning and understanding to their lived experiences. According to Piaget’s research, learners inherently attempt to organise thinking processes into psychological structures, when exposed to life experiences (Kamii and Ewing, 1996). Piaget believed that to understand the nature of knowledge and learning, it was important to understand its formation, and not merely the end product (Kamii and Ewing, 1996).

Learners when exposed to new experiences, learners build on previous information they may have gathered, which helps to develop more complex understanding and constructs. This knowledge is constructed when learners interpret new experiences and is called assimilation (Bayles, 1966; Wood and Bandura, 1989). Where new information does not fit the existing understanding or experience, learners have to rethink or consider redesigning new constructs to fit the new knowledge gained. This process is called accommodation (Bayles, 1966; Wood and Bandura, 1989). Both assimilation and accommodation are needed for cognitive development. Thus, for a constructivist approach, activation of prior knowledge is vital to the learning process as learners interpret their current experiences based on what knowledge they have already gained (Bayles, 1966; Wood and Bandura, 1989). In this way new knowledge is gained through active and inquiry- based learning and reflection.

The interpretivist/constructivist researcher tends to rely upon the 'participants' views of the situation being studied' (Creswell, 2003, p.8) and recognises the impact on the research of their own background and experiences. Constructivists do not generally begin with a theory, rather they 'generate or inductively develop a theory or pattern of meanings' (Creswell, 2003, p.9) throughout the research process. The constructivist researcher is most likely to rely on a combination of both qualitative and quantitative methods (mixed methods). Quantitative data may be utilised in a way, which supports or expands upon qualitative data and effectively deepens the description.

The three common models for conducting mixed methods research are pragmatism, transformative-emancipatory, and the multiple paradigm position (Tashakkori and Teddlie, 2021).

In pragmatism, concepts like 'truth' and 'reality,' are replaced with a focus on 'what works' regarding the research question. Researchers intentionally engage in multiple sets of paradigms, to 'examine the tensions that emerge from the juxtaposition of these multiple diverse perspectives' (Tashakkori and Teddlie, 2003). One of the more popular models for conducting educational research is *pragmatism*, which acknowledges that the question would be considered more vital than the method used to answer it or the paradigm that shapes the method (Tashakkori and Teddlie, 2003). Questions that might be studied under a pragmatic paradigm include, 'What are the reasons that Strategy A is more effective than Strategy B?' (Pole, 2007). Researchers answering such a question use quantitative data such as test scores and demographics, and qualitative data like field notes and interviews (Pole, 2007)

The second most common paradigm in mixed methods research is called transformatory-emancipatory, where repression, for example due to racial, gender, ethnic, disability and the like is considered the root of social problems, and asks questions such as, 'When teachers are not sensitive to cultural diversity in their classroom, what is the impact on achievement and future options for the student?' (Pole, 2007).

Finally the multiple paradigm position simply states that researchers use the methods that are most likely to answer their questions (Pole, 2007).

4.2 WHICH MIXED METHODS DESIGN?

Experts in Mixed-methods research (MMR) seem keen to have a standardised methodological framework for combining methods (Timans et al, 2019). However, it is suggested that research novices should consider mixing of methods as one research approach as keeping them epistemologically separate within MMR may complicate stages of data integration and interpretation (Dawadi et al., 2021). Several MMR experts (Plano Clark & Ivankova 2016; Terrell, 2012; Wilkinson & Staley, 2019) have listed various types of MMR design. Creswell and Plano Clark (2018) consider these core designs as parsimonious and practical since they have the potential to make researchers understand the best possible options of mixed methods research designs.

Convergent Parallel Mixed-Methods Design

In this MMR design, which uses pragmatism as its theoretical approach, both quantitative and qualitative studies are used and then data triangulated to get results (Dawadi et al., 2021). The two types of data sets are collected concurrently, and then are analysed independently using quantitative and qualitative analytical approaches (Schoonenboom and Johnson, 2017; Shorten & Smith, 2017; Creswell and Plano Clark, 2018; Wisdom and Creswell, 2013). Within a convergent design, the integration of both data sets enables the researcher to gain understanding of the one provided by the quantitative or qualitative results alone. It is an approach in which two data sets are combined to get a complete picture of the issue being explored and to validate one set of findings with the other (Creswell and Plano Clark, 2018). Integration in convergent design can be done two ways: results of the qualitative study is followed by the quantitative study or vice versa or

by transforming the qualitative data into counts, thus transforming the qualitative dataset into quantitative data (Creswell & Plano Clark, 2018). This method can be used if there are time limitations for the research study and participants could provide both quantitative and qualitative data (Creswell & Plano Clark, 2018). The challenges of adopting this method can be with issues of different sample sizes, the need to merge a text and numeric database and the need to explain divergence when comparing results as the challenges of convergent design.

Explanatory Sequential Mixed Methods Design

The theoretical approach suggested for this design is to move from a post positivist assumption to a constructivist one. There are two separate interactive parts to the Explanatory Sequential design: the initial part involves the collection and analysis of the quantitative data to expand the first phase quantitative results followed by the second, qualitative phase on the basis of the quantitative findings (Creswell & Plano Clark, 2018; Schoonenboom and Johnson, 2017; Shorten and Smith, 2017; Wisdom and Creswell, 2013). The qualitative design helps explain certain quantitative results that include unexpected findings in more detail (Terrell, 2012). This design is useful when the research issue is more quantitatively needed or aligned; when the researcher has already identified a variable to measure; has access the participants to collect the qualitative data; is not time bound to collect data in two phases; and when only sole investigator is collecting and analysing the data one at a time (Dawadi et al., 2021).

Exploratory Sequential Mixed Methods Design

Exploratory Sequential Design adopts a three-phase study using the theoretical approach of constructivism (Dawadi et al., 2021). During the first phase, a researcher explores an issue in-depth, and as they reach the second phase, they shift to the post-positivist principle to identify and finally measure the variable and statistical trend (Creswell & Plano Clark, 2018). In this design, at first, the qualitative data are gathered and analysed, and later quantitative data are collected and tested (Schoonenboom and Johnson, 2017; Shorten and Smith, 2017). Building from the qualitative findings, quantitative measures or instruments are developed (Terrell, 2012; Wisdom and Creswell, 2013), and finally, a researcher quantitatively tests the variable that they have identified and interprets in what ways the quantitative data generalises and extends the qualitative findings (Creswell and Plano Clark, 2018). To enable integration of this design, a quantitative measure is developed based on the qualitative results. The exploratory sequential design is useful when a researcher and a research issue are more qualitatively oriented; when the required amount of time to conduct a three-phase study is available; when the research needs to demonstrate transferability or generalizability of the findings; and when the researcher wants to test a larger sample, based on the initial small sample (Creswell and Plano Clark, 2018).

4.3 STRENGTHS AND LIMITATIONS OF MIXED METHODS RESEARCH METHODOLOGY

Researchers hold different views with regard to the use of both quantitative and qualitative methods within a single study. The strengths and limitations of using MMR approach emerge from advantages and limitations of quantitative or qualitative approaches. For example, well-executed sampling or focus on individuals, treatments, time points, and settings would provide ways to enhance the generalizability and ecological validity of findings (Chatterji, 2010). Ecological validity refers to the realism with which a design of evaluation setup matches the user's real work context (Hartson and Pyla, 2012). It is about how accurately the design or evaluation reflects the relevant characteristics, providing context and its relationship to its environment (Hartson and Pyla, 2012). Qualitative tools allow for a more detailed study of processes which are changing or contextual, with attention to particular and unique cases. Experimental designs, scaffolded with descriptive and qualitative methods allow for causal inferences to be made.

The goal of quantitative studies has been described by Hoepfl (1997) as seeking ‘causal determination, prediction, and generalisation of findings’. Conversely, it has also been argued that qualitative studies focus on ‘illumination, understanding, and extrapolation to similar situations’ (1997, para. 5). Onwuegbuzie and Teddlie (2003) maintained both quantitative and qualitative approaches had their strengths and weaknesses. They suggested that ‘quantitative researchers tend to be more preoccupied with results than with their interpretations’ (p. 361). However, they observed that qualitative research often lacks attention to ‘the analytic technique used and the major features of the analysis’ (p. 362). To this end, the authors

viewed MMR to be a middle ground that offered value of both approaches (Onwuegbuzie and Teddlie, 2003).

The methods employed by MMR allow for a more flexible evaluation design option, with the possibility of amalgamating evidence in different ways, as guided by the purposes of an investigation or the research question. Despite the challenges, there has been a movement in favour of promoting 'mixed-methods' that combines qualitative and quantitative approaches (Hammersley, 2014).

Using data coming from a number of methods, or converging data from multiple sources produce more credible findings which could strengthen research conclusions and implications (Dawadi et al., 2021). Thus, results from one method could inform or develop the findings from another.

Merging qualitative and quantitative data can pose several practical challenges as explored by David et al. (2018); Dawadi (2019); and Fauser (2018). Firstly, data collection and analysis might be a very lengthy process, posing a risk in terms of cost and time. The timeline of recruitment can be demanding, followed by labour intensive data collection (David et al., 2018; Linnander et al., 2019). Secondly, researchers can find integrating qualitative and quantitative data to be difficult (Wisdom and Creswell, 2013). Existing literature offers limited guidance on how to merge data from different sources. Thirdly, quantitative and qualitative methods are guided by different epistemological and philosophical frameworks. The concerns in integrating them ‘include whether the assumptions in each paradigm get the same value or attention in the study and whether the data derived from the two methodologies are viewed as incommensurable’ (Salehi and Golafshani,

2010, p.189). The fourth challenge with the use of mixed-methods research is the choice of the design and maintaining the quality in data integration.

Sometimes, one method may influence data collection and interpretation of another method. For instance, in a sequential design, the findings drawn from the first method (e.g., survey data) may influence the second method (e.g., interview) (Dawadi et al., 2021).

The fifth and the most vital challenge for MMR is deciding which design is appropriate for a particular study. Suitability of a design will largely depend upon the purpose of the study and perceived priority given to the qualitative and quantitative strand (i.e., whether the equal priority is given to both data sets or one is dominated by another) (Dawadi et al., 2021).

4.4 CHOICE OF RESEARCH METHODS FOR THE RESEARCH STUDY

The use of MMR in health education and research has become relevant as it becomes apparent that challenges of implementing evidence-based and other innovative practices, treatments, interventions and programmes are complex and that a single methodological approach may not be sufficient (Palinkas et al., 2011). As in other areas of research, MMR designs are viewed as preferable in implementation research because they provide a better understanding of research issues than either qualitative or quantitative approaches alone (Palinkas et al., 2011). This is particularly true of efforts to implement evidence-based practices (EBPs) in state wide systems where relationships among key stakeholders extend both vertically (from state to local organisations) and horizontally (between organisations located in different parts of a state) (Palinkas et al., 2011).

MMR can be particularly useful in the understanding of applied research. This could apply to the health policies put in place to cater to the population needs, as well as the political frame of reference with regards to government health policies, educational institutions, like medical schools and interest groups for examples representing different specialties (Bergman, 2008). Medical school undergraduate curricula are complex in their design and even more challenging in their implementation. The interface between academic research and policy community needs greater engagement and follow through to promote the application and adoption of the research findings. Recognising how policymakers use research and place it in the political process provides an enhanced understanding of the policy and research interface (Bergman, 2008). Multiple methods research or mixed methods research appeals to policymakers and institutions, due to the common sensible approaches as well as the 'evidence based policy' that can be implemented or planned by government departments and other institutions (Bergman, 2008).

For example, in the UK, National Health Service (NHS) England is an executive non-departmental public body of the Department of Health and Social Care (Health and Care Act 2022). Its duties and responsibilities include the budget, planning, delivery and day-to-day operation of the commissioning side of the National Health Service in England as set out in the Health and Social Care Act 2012 (Health and Care Act 2022). It also directly commissions NHS general practitioners, allied health professionals like dentists, and optometrists as well as some specialist services.

Getting It Right First Time (GIRFT) is a national programme designed to improve the management and care of patients through in-depth review of services, benchmarking, and presenting a data-driven evidence base to support change (GIRFT, 2023). The programme undertakes clinically-led reviews of specialties, and includes dermatology (Dermatology 2022). A wide-ranging data analysis is merged with the input and professional knowledge of senior clinicians to evaluate the current patient care being provided and how this could be improved. GIRFT is aligned to NHS England (NHS choices 2023) and has the support of the Royal Colleges and professional associations like the BAD (GIRFT, 2023). The application of MMR methods would provide cohesiveness between evidence-based findings and health policies impacting medical institutions and society at large. Use of both quantitative and qualitative research methods would help check the validity of the data, using triangulation (Yin, 1994).

By methodological triangulation, what is unknown or sufficiently uncertain and needs checking, interpretation of data from different sources or methods would help with coherence and understanding (Eisner, 1991, p. 110). Several aspects to the use of mixed methods as a methodological framework needed to be considered as a choice for the research study.

When conducting research using a mixed methods framework, there are certain unpredictable constraints which may be encountered. The analyses and results from the previous research method guides the next and with research being done sequentially, instead of all being conducted simultaneously or concurrently, more time and resources may be needed to achieve the results or goals, for gathering

the data, interpretation as well as implementation towards the sequential research project generated (Bryman, 2007; Creswell and Plano Clark, 2018).

The purpose of this research study was to explore what may be the facilitators or barriers to specialty curriculum implementation in medical schools. For the purpose of addressing the research question, the information gathered by the first method and the data analyses determined the next method for answering the research question as a sequential design, as opposed to conducting studies at the same time i.e. concurrent design (Molina-Azorin, 2016). The sequential design was adopted as an explanatory process guided the decision on the next research method and data analysis as trends became evident in the study.

The two key factors that determined the type of mixed methods design best suited to the research study were the priority of gathering the findings that best helped address the research question and implementation of data collection towards this (Molina-Azorin, 2016). It determined if qualitative and /or quantitative data would be collected, identified practical constraints anticipated for data collection, and understood one form of data before proceeding to the next. Implementation of data collected and the findings generated were through the use of collecting both quantitative and qualitative data.

To aid understanding and knowledge on the current state of specialty curricula, an initial first step was to conduct a scoping review of literature for medical undergraduate core curricula in the UK. The scoping review could identify the currently available recommended specialty curricula, provide clarification on how and why specialty-specific core curricula have developed and what gaps or overlaps exist in the current specialty core curriculum development.

Scoping review as a research method

By definition, Mays (2001) defines scoping studies as ‘an aim to map rapidly, the key concepts underpinning a research area and the main sources and types of evidence available, and can be undertaken as stand-alone projects in their own right, especially where an area is complex or has not been reviewed comprehensively before’.

Traditionally, systematic reviews have been used in medical research for evidence synthesis since the 1970s and 1980s (Bastian, 2010; Chalmers, 2002). Cochrane, established in 1993, is a global non-profit network of more than 50,000 people from more than 130 countries, researchers, educators and clinicians who collaborate towards research in clinical treatment worldwide to provide scientific evidence that is unbiased, independently assessed and quality checked (Academic Consortium, 2023). The Cochrane handbook describes a systematic review as a review which ‘uses explicit, systematic methods that are selected with a view to minimising bias, thus providing more reliable findings from which conclusions can be drawn and decisions made’ (Higgins, 2011). They require rigorous methods to ensure reliable and meaningful results, using a definite and predetermined process.

Despite the rigorous, and very specific indications for undertaking a systematic review, there are cases where a broader scoping exercise may be needed to guide preliminary searches and/or provide a wider focus on emerging evidence. Scoping reviews also follow a structured approach, with some key methodological differences (Arksey and O'Malley, 2005; Peters, 2015; Levac, 2010; Colquhoun et al., 2014). Whilst systematic reviews require rigorous methods to ensure reliable

and meaningful results, using a definite and pre-determined process, scoping reviews examine broader topics and may include varied study designs (Dijkers, 2015). Scoping reviews do not have ‘well established criteria’ or framework seen for example when undertaking a Cochrane review (The Cochrane Collaboration, 2023). Instead scoping reviews may resemble systematic reviews, but do not involve the assessment of the ‘quality’ of the primary studies (Arksey and O'Malley, 2005). They are undertaken to address exploratory research questions by reviewing types of evidence, key concepts, and gaps in research related to a defined area or field by systematically searching, selecting and synthesising existing evidence and knowledge (Colquhoun et al., 2014). The search criteria in scoping reviews are broadly defined through group or team consultations and inclusion and exclusion criteria are developed with its practical application and use, once familiarity with the literature has been gained and data is then collected on a data extraction form (Daudt, 2013; Levac, 2010). The data collated and synthesised in scoping reviews is a narrative or descriptive approach instead of a more systematic data extraction or analytic method, as seen in systematic reviews (Munn, 2018). To aid understanding and knowledge on the current state of specialty curricula, an initial first step was to conduct a scoping review of literature for medical undergraduate core curricula in the UK. The scoping review could identify the currently available recommended specialty curricula, provide clarification on how and why specialty-specific core curricula have developed and what gaps or overlaps exist in the current specialty core curriculum development.

In addition, a pilot curriculum mapping exercise at a medical school of specialty curriculum against national guidelines would provide key aspects on how well specialty specific curricula was being implemented at a local level.

Role of curriculum mapping in curriculum implementation

Curriculum mapping has been described in the literature as distinguishing the standards and then plotting the content on a map to that standard (Linton, 2019). It is an essential tool through which key elements of a curriculum can be identified, displayed and made explicit for all stakeholders- students, teachers, managers, curriculum designers, public, as well as regulators (Harden, 2001). This is achieved by making the curriculum more transparent and linking with other aspects of the curriculum like (Harden, 2001): Expected learning outcomes; Curriculum content or areas of expertise covered; Learning opportunities; Learning locations; Learning resources; Assessment; Staff and Students.

To fulfil the ILOs for students, curriculum mapping outlines the learning and teaching methods, as well as the planned practical and clinical experience, including sites (e.g. hospital-based, community-based, and specialist clinics). Thus curriculum mapping fulfils two main roles: makes the curriculum more transparent (e.g. for students, teachers and education managers), and demonstrates links between expected learning outcomes, curriculum content and student assessments (Brauer and Ferguson, 2014).

Any established or developing curriculum needs constant review and evaluation. A well-designed ‘declared’ (or assumed) curriculum may not be a well ‘delivered’ (or taught) curriculum (Al-Eyd et al., 2018). Discrepancies seen between the declared (i.e., what the students are supposed to learn) curriculum, the delivered (i.e., what is taught) curriculum, and the learned ‘tested’ curriculum could be due to challenges observed in the areas of learning expectations (objectives versus outcomes), topic selection (gaps/unwanted redundancies), integration of topics,

how students learn, time scale and logistics of organising scheduled activities, and assessment strategies (Al-Eyd et al., 2018). For medical students, clinical teachers and faculty, transparency and communicability is important in demonstrating when, how and what is being taught and in what ways it could be assessed (Al-Eyd et al., 2018).

Mapping a specialty-specific curriculum requires ownership and initiative and the process needs to be demystified and simplified for all users (Harden, 2001). In the postgraduate field, for example in the Netherlands when introducing a national paediatric curriculum for postgraduate trainees, the authors recommended the following: to keep the learners' need in mind when designing the curriculum; allow sharing of knowledge; prioritise support for educational activities; contextualise the national curriculum to the local placements; and promote networking between regional and inter-organizational bodies between hospitals (Jippes et al., 2012).

A scoping review of literature and a curriculum mapping study would guide the next phase of the research, which would be to develop a cross-sectional questionnaire study for undergraduate leads on facilitators and barriers to curriculum implementation.

Document analysis as a research method

Document analysis is a cost-effective method to gain empirical data as part of a process that is unobtrusive and nonreactive (Bowen, 2009). On several occasions, evidence gathered from documents is combined with data collected from interviews and observations to mitigate bias and help with credibility (Bowen, 2009). Analyses of relevant documents requires that data examination and

interpretation is done to extract meaning, gain understanding, and develop empirical knowledge (Corbin and Strauss, 2008).

The rationale for performing a document analysis would be to act as an adjunct with other qualitative research methods as a means of triangulation—'the combination of methodologies in the study of the same phenomenon' (Denzin, 1970, p. 291). Often, documentary evidence is combined with data from interviews and observation to minimise bias and establish credibility (Bowen, 2009). This method could be used to help develop, for example, a cross-sectional questionnaire on barriers and facilitators for specialty curriculum implementation.

Expert opinion as a research method in education

The expert method is widely applied not only in social sciences and psychology, but also in education. In medical education in particular, introduction of incompetent, scientifically improper and voluntary decisions influence the life of many people and patients and the learning experience which may influence the professional and personal development of students negatively, including the system of attitudes and values, motivation to study and future plans, professional activities and a career on the whole. Therefore, an opinion and competence of several experts is necessary. It is even better if there is unanimous opinion among experts.

The expert opinion method provides validity and reliability of the research when it is necessary to obtain evidence of the research (Bogner et al., 2009; Cohen et al, 2007; Cuhls, 2005). Therefore, the results of the expertise, i.e., evaluation and opinion of competent and experienced experts on the subject matter becomes the basis for adopting serious decisions, including implementation of innovation

recommended by a researcher in order to obtain the necessary results. It is considered to be one of the most appropriate for collecting, analysing and evaluating of information (Bogner et al., 2009; Lewthwaite and Nind, 2016; Muskat et al., 2012; Protasevich, 2014; Rieger, 1986; Severin, 2014). The expert opinion method is used in the sociological and pedagogical research to carry out the following tasks (Bogner et al., 2009; Helmer, 1983; Kaynak et al., 1994; Waissbluth and De Gortari, 1990):

• create forecasts if the information about the object of the research is unavailable or not precise;

• create forecasts if the research object is new and there is none equivalent available;

• describe the research method requirements, explain the rationale of the research, select methods and types of obtaining and processing data;

• evaluate validity of surveys and adjust surveys at a large scale;

• analyse in detail the results and forecast changes of psychological and pedagogical phenomenon of the research;

• confirm and revise data obtained by means of other methods;

• clarify factors influencing development of the object of the research included in the models;

• analyse the results, particularly, if there is an opportunity to have different interpretations.

Cross –sectional survey as a research method

Cross-sectional studies are characterised by the collection of relevant information (data) at a given point in time. The cross-sectional design is the most relevant design when assessing attitudes and knowledge among health personnel, in validation studies comparing, for example, different measurement instruments, and in reliability studies. When attitudes and opinions are being taken into consideration, the term ‘survey’ is occasionally used. These studies may use data from an entire population (e.g. national registry) or a sample of the relevant sub-population (Kesmodel, 2018). For reviewing data of free text responses for opinions or attitudes, the constant comparative method, alongside theoretical sampling, provides the foundation of qualitative analysis in the grounded theory approach (Glaser and Strauss, 1967). The method of contrasting and comparing is adopted for most tasks during analysis, for example when allocating categories and sub-segments within these categories, summarising the content of each category, connecting or delineating them with the ultimate aim to refine, discriminate or discover patterns (Tesch,1990).When the sampling in a reasonably homogenous sample is performed well, there is a good basis for generalising the concepts and the relationships between them that may be absent from the sample, but could be representative of the same phenomenon (Tesch, 1990).

Validity of the data used in any study design is paramount. While validity is used with slightly different meanings in different areas of research, generally validity of a measurement instrument is considered to be the degree to which the instrument measures what it purports to measure, and the validity of available data refers to the degree to which the data correspond accurately to the real world. The usual

study design for validation studies is a cross-sectional design, even if it is part of a larger study design (Messerlian & Basso, 2017).

The results seen in the cross-sectional questionnaire data could be used to check for triangulation with the data drawn from semi – structured interviews with medical education deans.

Semi-structured interviews as a research method

Qualitative research methods are being increasingly utilised to explore aspects of nursing and medical education. These methods often involve the use of unstructured or semi-structured interviews as a principal methodology (Burnard, 1991). Qualitative interviews provide a framework in which the practices and standards are not only recorded, but also achieved, challenged and as well as reinforced (Oakley, 1998). If using a mixed methods approach, semi-structured interviews can also be used in a qualitative phase to explore new concepts to generate hypotheses or explain results from a quantitative phase that tests hypotheses (DeJonckheere and Vaughn, 2019).

Semi-structured interviews are considered more powerful than other types of interviews for qualitative research as it allows researchers to acquire in-depth information and evidence from interviewees while keeping the focus of the study. It also allows flexibility and adaptability for researchers to hold their focus on the research question as compared to an unstructured interview, where its direction may not be fully considered (Gray, 2021). The intention of using semi-structured interviews for data collection is to gather information from a selected group of participants who have personal experiences, attitudes, perceptions and beliefs related to the topic of interest, particularly in health services research

(DeJonckheere and Vaughn, 2019). Researchers can use semi-structured interviews to collect new, exploratory data related to a research topic, triangulate other data sources or validate findings (Lincoln and Guba, 1985).

Semi-structured interviews are an effective method for data collection when the researcher wants: (1) to collect qualitative, open-ended data; (2) to gather the thoughts, feelings and beliefs of the participants regarding a particular topic; and (3) to delve deeply into personal and sometimes sensitive issues (DeJonckheere and Vaughn, 2019). Semi-structured interviews include a 'topic guide' which prepares a list of questions that are supplemented by follow-up and probing questions that are dependent on the interviewee's responses (Kallio et al., 2016; Britten 2006). All questions should be open ended, neutral, and clear and avoid leading language. In addition, questions should use familiar language and avoid jargon.

The next stage is the selection or sampling of the interviewees. There are several ways that sampling can be performed. These include (1) snow-ball sampling—where initial informants are identified and the subsequent sample is built by asking for key recommendations from these informants, (2) theoretical sampling—where a few informants are interviewed, and transcription and, analysis looks for key patterns, which may then identify further participants based on emergent themes, (3) key informant sampling- key people are selected that are knowledgeable about the issue, (4) representative sampling—where a sample is chosen to be representative of the total population (involves stratification), and (5) random sampling—where people are spoken to at random (Newing, 2010).

Within the collection of qualitative data, purposeful sampling is a technique widely used to identify and select information-rich cases for the most effective use of limited resources (Patton, 1990). This involves identifying and selecting individuals or groups of individuals that are especially knowledgeable about or experienced with a phenomenon of interest (Cresswell & Plano Clark, 2007). Bernard (2017) and Spradley (1979) also noted the importance of availability and willingness to participate, and the ability to communicate experiences and opinions in an articulate, expressive, and reflective manner.

There are seven principles to bear in mind when conducting a single stage strategy for purposeful sampling within the qualitative aspect of the MMR research design. These are: the sampling strategy should be logical from the conceptual framework as well as the research question; the sample should generate a database on the type of phenomenon under study; the sample should allow the possibility of drawing clear inferences and credible explanations from the data; the strategy must be ethical; the sampling plan should be feasible; the sampling plan should allow the researcher to transfer or generalise the conclusions of the study to other settings or populations; and the sampling scheme should be practical and efficient (Tahakkori, A. and Teddlie, C., 2003).

Ritchie and Spencer (1994) adopt five stages to analyse the qualitative data. Firstly, *familiarisation*, where the interviewer acquaints themselves with the interview transcripts and looks for emerging themes. *Identifying themes* is the next stage in the framework analysis, where the interviewer looks for themes and subthemes using both the inductive approach, as well as the deductive approach, using the interview topic guide and previous literature analysis. *Indexing* can then

be performed taking the themes and subthemes and assigning a code, in the form of a word or short phrase. Once the themes and subthemes are identified, a *matrix* is developed to chart and summarise the findings. Finally, *interpretation*, using charting and summarisation matrices provide insight and development of a more thorough understanding of the data, exploring themes, and linking narratives and categories.

In theoretical sampling, the main principle is for the researcher to decide what data needs to be gathered next and where to find them based on provisional theoretical ideas. The data collected by one method may provide answers upon analysis and reflection on previous data and can compare with new data. Comparison and reflection can be repeated several times upon new and old material. Highly regarded comparisons increase the internal validity of the findings. The literature does not clarify how one should to 'go about' constant comparison, nor does it address whether different types of comparison can be distinguished. The art of comparison comes through the creative processes and the interplay between researcher and data gathering and analysis (Strauss and Corbin, 1998). Thus, data collected and analysed in this way, may allow comparisons to be made from a single interview for one Dean or within a group of Deans of medical education in the UK. Using an open coding processes, to develop codes and determine categories internal comparisons can be made. This would allow a framework to interpret the issues the interviews highlighted with respect to key research areas such as curriculum implementation or how best to facilitate specialty input.

Qualitative research can be assessed on trustworthiness, which relates closely to validity and reliability (Lincoln and Guba, 1985; Shenton 2004). To determine

trustworthiness, it is helpful to check for credibility (whether the findings accurately and fairly represent the data), transferability (whether the findings can be applied to other settings and contexts), confirmability (whether the findings are biased by the researcher) and dependability (whether the findings are consistent and sustainable over time) (DeJonckheere and Vaughn, 2019).

The choice and design of the mixed methods employed for this research required integration to allow synergy between the quantitative and qualitative methods to provide meaningful and applicable results (Cresswell and Plano Clark, 2007). The choice of methods were intentional in order to keep moving towards the main research question of what are the barriers and facilitators to specialty core curriculum implementation for undergraduates at UK medical schools. Any discrepancies could be reviewed to understand the reasons and further study of the data.

In summary, for the purpose of the research study, gathering of both qualitative and quantitative data would help understand what hinders or facilitates specialty-specific curriculum implementation in UK medical schools. Thus triangulation of data using mixed methods could support complementary information or challenge assumptions and provide different perspectives.

The mixed methods approach may thus enable development of strategies and practical approaches on how implementation of specialty core curricula may be improved and explore how barriers to implementation could be mitigated.

Medical school curricula of countries are foundational to the healthcare of the nation, should cater to the burden of disease in society, and reflect the societal expectations on health and wellbeing. For the purpose of healthcare research, this

methodology was thought to benefit from the opportunity to employ a dynamic approach to address the complex and multi-faceted challenges, often encountered in the medical curricula, linked to the health care sector (Slevitch, 2011). The methods used in achieving the aims and objectives of the research study will be discussed in the respective individual chapters.

5 AIMS AND OBJECTIVES OF THE RESEARCH STUDY

This research study, using the MMR approach aimed to provide an evidence-based understanding on the current status of core curricula for UK medical schools, using dermatology as an example. The objective of the research study was to help understand what factors would help facilitate implementation of a specialty core curriculum at medical schools and which factors create barriers to its implementation. It was also aimed to provide an understanding on the roles of the different stakeholders who may impact and influence specialty specific core-curriculum implementation at medical school levels. These stakeholders may include, the regulatory body for medical graduates and doctors, the GMC, UK medical schools, specialty undergraduate leads, medical students and ultimately patients with their health needs. The research study aimed to create new knowledge and provide strategies in facilitation of specialty core curricular implementation across medical schools. By facilitating the implementation of recommended specialty core curricula, there may be some quality assurance across medical school teaching to a standardised curriculum. The medical graduates could be assessed to achieve minimum standard core competencies for the specialty as part of assessments. The implementation of specialty-specific core knowledge, skills, and competency assessments could help with early diagnosis and management for patients, and ultimately improve patient safety and care (Figure 1).

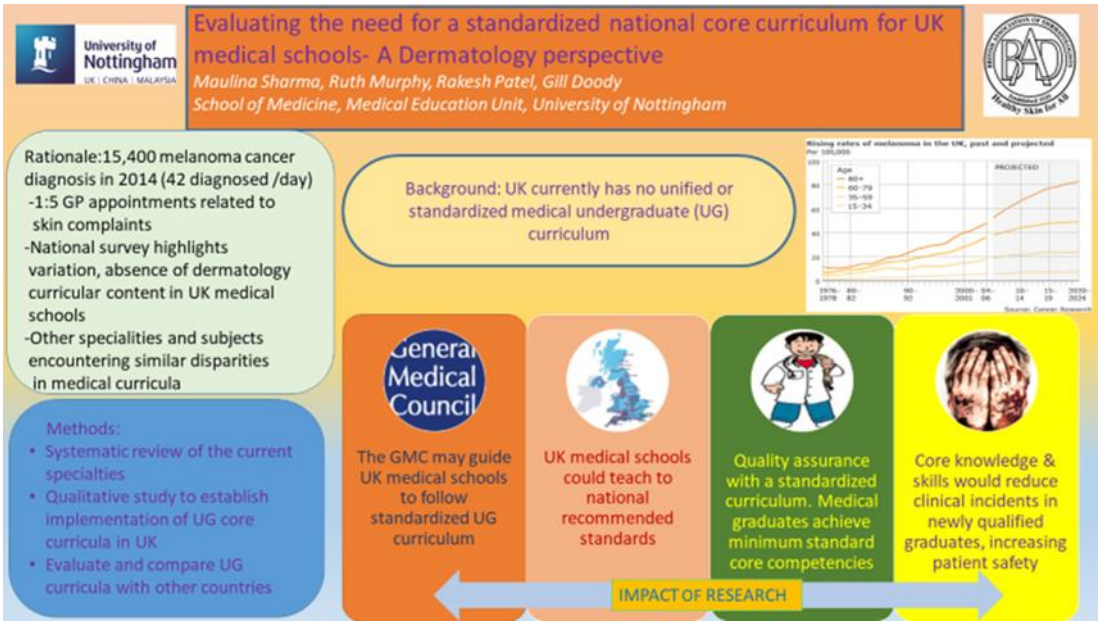

Figure 1: Evaluating the need for a standardized dermatology core-curriculum for UK medical schools

Aim 1 of research study

To gain understanding of the current status of specialty core curriculum in undergraduate medical education in the UK, the first part of the study aimed to explore the domains of undergraduate specialties which developed a core curriculum and recommended implementation across UK medical schools. The study aimed to determine how undergraduate curricula for specialties for UK medical schools have developed and evolved.

Objective 1 of research study

The objective of conducting a scoping review was to identify the specialties or subjects which had developed a national core curriculum and were recommended for UK undergraduate medical schools. The review also sought to explore the drivers for the development of these curricula and to identify specialty related gaps in national undergraduate curricula.

Aim 2 of research study

The primary aim of the study was to map local dermatology curriculum at a large UK medical school against national recommended BAD 2016 curriculum (British Association of Dermatologists. Undergraduate Dermatology Curriculum, 2016; Cohen et al., 2016) ILOs and GMC Outcomes for Graduates 2018. The study would help determine how the school's specialty curriculum ILOs were being fulfilled, delivered or matched the published national learning curricular outcomes.

Objective 2 of research study

To conduct a pilot curriculum mapping study using dermatology as a specialty of interest at a UK medical school to determine the specialty curriculum alignment to national recommendations and GMC outcomes for graduates. The mapping study would determine how the specialty specific knowledge and skills 'expert mapping' were being taught and assessed as well as being blueprinted within the curricula. The study would demonstrate how a mapping exercise for specialty core curricula could be undertaken by medical school undergraduate specialty leads and act as a template for conducting similar exercises for other specialties.

Aim 3 of research study

To identify and understand from the perspective of undergraduate specialty teaching leads across medical schools, as to what maybe the possible barriers and facilitators for implementation of a curriculum, specific to a clinical specialty (dermatology) with a national (UK) core-curriculum.

Objective 3 of research study

- Develop the questionnaire using the review of literature on barriers and facilitators of curriculum implementation, results of scoping review and

curriculum mapping studies, document analyses of curriculum meeting minutes and expert opinions.

- To conduct an online cross-sectional questionnaire survey of dermatology undergraduate specialty teaching leads, to identify the likely facilitators and barriers to implementation to a national undergraduate specialty core-curriculum (dermatology) across UK medical schools.

Aim 4 of research study

To pursue a more detailed enquiry, gather reactions and opinions on specialty-specific core curriculum implementation from a UK medical school perspective.

Objective 4 of research study

To conduct semi-structured interviews with deans of medical education at UK medical schools, to gain their perspective on the possible facilitators and barriers to implementation of specialty specific core curriculum using dermatology as a specialty at medical schools.

6 CORE CURRICULA FOR UK MEDICAL UNDERGRADUATES: A SCOPING REVIEW OF THE LITERATURE AND CURRENT STATUS

Background

The GMC sets out the learning outcomes for graduates. Medical schools in the UK develop and implement their own curricula, to ensure medical students can demonstrate these standards set out by the GMC (Promoting excellence, General Medical Council, 2015). These standards are set out in the Promoting of Excellence document under 5 themes and includes developing and implementing curricula and assessments. In addition, the GMC also plans to introduce a Medical Licencing Assessment (MLA) in 2024-25, applicable to medical graduates who want to practise medicine in the UK.

Currently medical schools in the UK conduct their individual school assessments and the GMC grants a provisional licence to practise once students graduate successfully. Though medical schools are expected to comply with the GMC's outcome for graduates' curriculum, the introduction of the MLA is to create a 'common threshold for safe practice' (Outcomes for graduates, 2018).

With the current generalist trend as well as plans to introduce a MLA for all medical graduates in the UK, medical schools are likely to be influenced on what they teach according to the MLA content map (General Medical Council, 2019).

For students to fulfil the MLA requirements, schools may be tempted to 'teach to test' (Grant, 2019), covering the list of conditions related to the content map (General Medical Council, 2019). By providing guidance on the curricular content

map, the GMC intends to define a core curricular framework with minimum standards of knowledge, skills and competencies for a medical graduate. The UK currently lacks a unified or standardised undergraduate medical curriculum.

Specialties and specialty subject bodies have expressed concerns that their core curricula are not being represented, taught or implemented in medical schools, and that schools have developed individual curricula. This study seeks in the first instance to identify the specialties in the UK which currently recommend and have developed an undergraduate core curriculum for UK medical schools.

6.1 METHODS FOR CONDUCTING THE SCOPING REVIEW OF LITERATURE

In this review, the Methodological Framework of Arksey and O'Malley (2005) was adopted for conducting the scoping approach to appraise the existing literature. Though dermatology as a specialty recommends a core curriculum for UK medical schools via their national body, the BAD (Singh et al., 2021), it was unclear as to how many similar specialty-specific undergraduate curricula were currently being recommended for UK medical schools.

Thus, within the first stage of the methodological framework, the research question posed for the scoping review was ‘What are the current specialties in the UK which recommend and have developed an undergraduate core curriculum for UK medical schools?’ This framework was used to identify the specialties, or subjects, which recommended and had developed an undergraduate core curriculum for UK medical schools; select and search for relevant studies; chart and collate the data and summarise the results.

Search strategy

The second stage of the framework was to identify key articles suitable for answering the scoping review question.

A literature search was conducted using online databases (EMBASE, MEDLINE, HMIC (searched via NICE Healthcare Databases Advanced Search), PubMed, The Cochrane Library and ERIC (Education Resources Information Centre). Other online search engines (Google & Google Scholar) were then searched as well as the Department of Health, GMC and BMA websites for relevant articles from 1996 to May 2017 (i.e. the past 20 years). The literature search was updated till 5th March 2019 for any further recent relevant articles.

Keywords or terms used in the search included: General medical council (GMC), medical student, medical education, undergraduate, curriculum, standards and national (UK and individual countries e.g. England). An example of search strategy is included in Appendix 1.

Study selection

The third stage of the framework of the scoping review was study selection. Our initial perusal of the citations indicated that the search strategy had picked up a large number of irrelevant studies. Our scoping study adopted methods similar to systematic reviews, although criteria were devised post hoc, based on increasing familiarity with the literature, that we could then apply to all the citations to determine their relevance.

Inclusion criteria: Eligibility criteria included all published reports, studies or articles which had a recommended core-curriculum for UK medical undergraduates for a specialty or subject on a national level. Any national body, society, college or organisation specific and pertinent to UK medical undergraduates were included. The most recent studies which had been revised or updated (up to 19/05/17) were included (Sharma et al., 2019).

Exclusion criteria: Post graduate curricula or studies or articles not pertaining or specific to UK medical undergraduates were excluded.

Study design

Electronic search results were managed using a reference manager. Titles and abstracts of all citations were first screened by the author (MS), those that were not related to undergraduate curricula or the UK were excluded. Full articles were requested from the library, when it was not possible to eliminate them from reading either their title or abstract. Two reviewers screened the study abstracts for inclusion and exclusion and any disagreement was resolved by in-depth review of the articles. The recommending bodies for the specialties or subjects, the year of curriculum update, and alignment of these core curricula to GMC learning outcomes were extracted from full text articles and recorded on an electronic data collection table (Sharma et al., 2019).

The full text of all potentially eligible articles was then obtained and assessed against the inclusion criteria (MS and RM). Where the full text of an article was not available, the authors were contacted to request a copy. Any ambiguities about

whether or not a study met the inclusion criteria were resolved by a consensus between authors (MS, RM, and GD).

Data management

In the fourth framework of conducting a scoping review, data was charted, collated and reported using PRISMA flow diagram. Characteristics of each study were recorded in an electronic data collection table and included the name of specialty, or subject, in alphabetical order, organisational body for developing the curricula, year of curriculum update, and whether studies were aligned to GMC learning outcomes were then extracted and recorded on an electronic data collection table.

Reporting of data and analysis

In the fifth stage and final stage of the framework, data was collated, summarised and reported.

After preparing a chart of information from studies, the findings were presented as a narrative account in two ways. First, attention was given to basic numerical analysis of the extent, nature and distribution of the studies included in the review. A PRISMA chart was produced identifying the records screened, reviewed, found irrelevant, excluded and included studies. In addition, a table was produced as a template to categorise and summarise the basic characteristics of all the included studies. The different subjects or specialties which recommended and had a core curriculum for UK medical schools were tabulated in an alphabetical order, the year these were published or updated recorded, alongside the organisation or

body which produced it and whether these aligned to the GMC's Outcome for Graduates document

The second aspect of the reporting of results was via a narrative synthesis. The key concepts derived were broadly grouped into the following: categories of core curricula and their timing within the school course; organisations involved in development of the core curricula; drivers for development of core curricula; and curriculum overlaps and gaps.

Ethics

As this was a scoping review of available undergraduate core curricula, patients or public were not involved and no ethics approval was needed.

6.2 RESULTS OF THE SCOPING REVIEW

Database searches and additional online searches identified a total of 1,267 articles. A reference management software (EndNote from Thompson Reuters) was used to identify and remove duplicates (n=21). Titles, abstracts and web pages were reviewed for inclusion. Full articles were requested from the library where it was difficult to decipher and decide from title or abstracts. A total of 1,246 records were screened and 108 relevant articles were reviewed for eligibility. Among these, 78 were excluded with reasons recorded (curricular recommendations pertinent to non-UK countries study n=27, not pertaining to undergraduate medical core curriculum n=14, review articles n=22, past/old version curricula n=15). A total of 30 articles were included in the qualitative synthesis which comprised 26 specialties or subjects included in the final review (Figure 2) (Sharma et al., 2019).

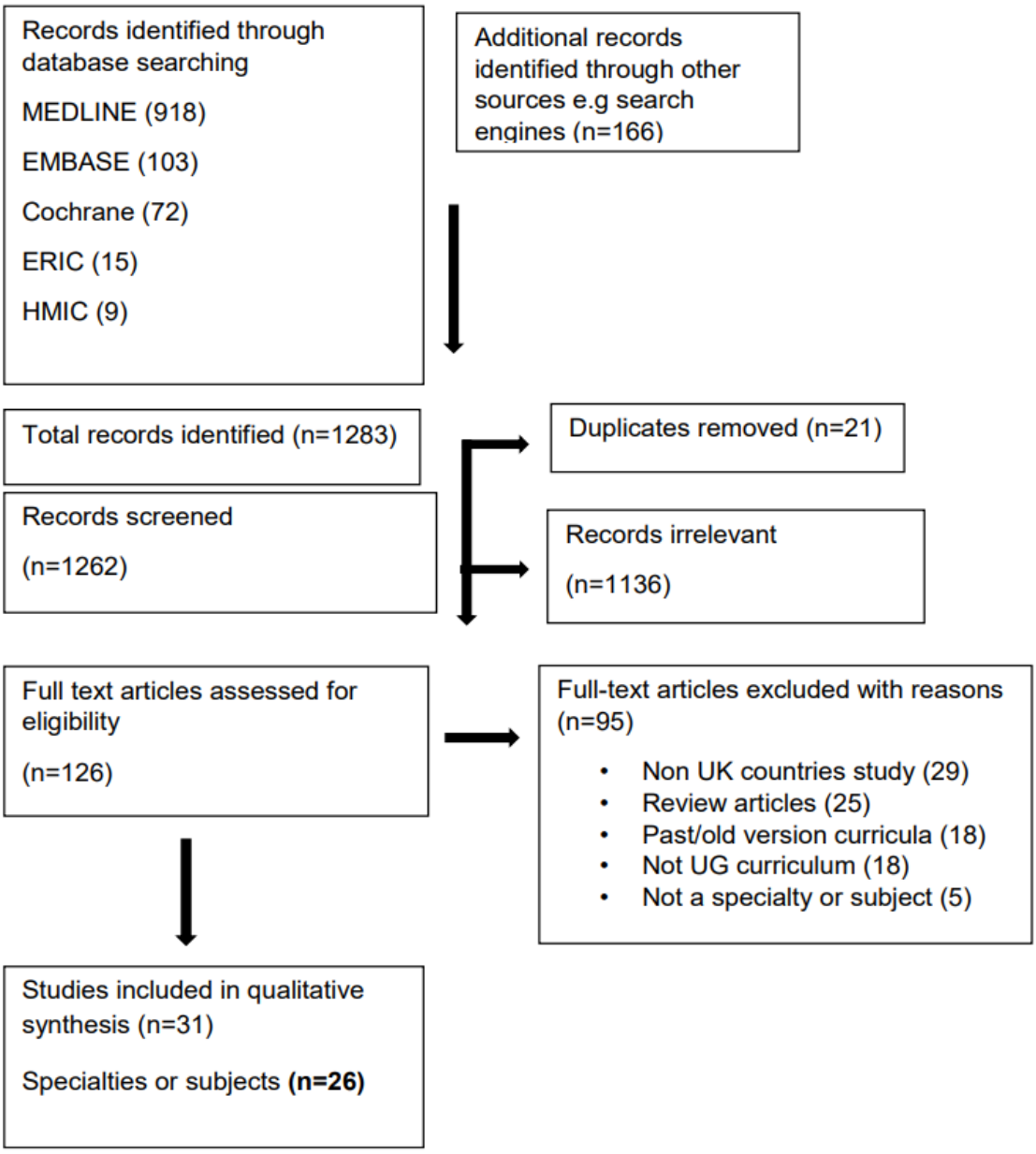

Figure 2: PRISMA (preferred reporting items for systematic reviews and meta-analysis) flow diagram of the scoping review UG= undergraduate (Adapted from Sharma et al., 2019)

Categories of specialties or subjects

The core curricula recommended for undergraduate medical schools in the UK could be grouped under three main categories: *foundation subjects* (such as anatomy), *professionalism* related topics (such as communication skills) and *clinical specialties* (such as dermatology).

Of the 26 recommended curricula, 17 were aligned to clinical specialties, 6 were on foundation subjects, while 3 related to professionalism (Table 1) (Sharma et al., 2019).

Table 1: Specialities with core-curricula and their alignment with GMC outcomes

	Specialty with curriculum (alphabetical order)	**Year**	**Body/College**	**Alignment with GMC outcomes**
1.	**Acute care**	2005	Resuscitation Council UK	Y
2.	Regional **Anatomy**	2016	Anatomical Society	Y
3.	**Clinical pharmacology and prescribing**	2012	British Pharmaceutical Society	Y
4. a **b**	**Core communications curriculum** **Communications curricula**	2013 2018	European study using Delphi process U. K. Council for Clinical Communication Skills Teaching in Undergraduate Medical Education	Y
5.	**Dermatology**	2016	British association of dermatologists	Y
6.	**ENT**	2014	A Delphi survey (UK) of ENT consultants and specialist	Y

			registrars, accident and emergency consultants and specialist registrars, general practitioners and paediatricians.	
7.	**General Practice**	2018	Royal College of General Practitioners	Y
8. a **b**	European undergraduate curriculum in **geriatric medicine** **Geriatric medicine** for undergraduates	2014 2013	European Union of Medical Specialists British Geriatrics Society	Y Y
9.	**Medical Ethics and Law**	2010	Medical Education Working Group of the Institute of Medical Ethics and associated signatories	Y
10.	**Medical Humanities**	2006	Peninsula medical school	Unclear
11. a	**Musculoskeletal system (MSK)**	2004	The Bone and Joint Decade (BJD) Undergraduate Curriculum	Y

			Development Group UK representation of the four specialties-	
b	**Regional Examination of the Musculoskeletal System (REMS)Medical Humanities**	2004	Rheumatologists, Orthopaedic Surgeons, Geriatricians and General Practitioners	Y
12.	**Neurology**	2017	Association of British Neurologists	Y
13.	Human **Nutrition**	2001	National Nutrition Task Force	Y
14.	**Obstetrics & Gynaecology**	2015	Royal College of Obstetricians and Gynaecologists (RCOG)	Y
15.	**Ophthalmology**	2015	Royal college of Ophthalmologists	Y
16.	**Oncology**	2014	The Royal College of Radiologists	Y

17.	**Paediatrics**	2015	Royal college of paediatrics and child health	Y
18. a	**Palliative Care**	2014	Scottish Palliative Medicine Curriculum Development Group	Y
b	**Palliative Medicine**	2008	Association for Palliative Medicine	Y
19.	**Pathology**	2014	The Royal College of Pathologists	Y
20.	**Patient safety**	2011	World Health Organisation (WHO)	Y
21.	**Psychiatry**	2011	Royal college of psychiatrists	Y
22.	**Public Health**	2014	Faculty of Public Health	Y
23.	**Radiology**	2017	Royal college of radiologists	Y

24.	**Sociology**	2016	Behavioural & Social Sciences Teaching in Medicine (BeSST) Sociology Steering Group	Y
25.	**Surgery**	2015	Royal college of Surgeons	Y
26. a **b**	**Urology** **Urology syllabus**	2002 2012	Journal article in Urology British Association of Urological Surgeons	Unclear Unclear

Narrative synthesis of results

Having identified publications from learned bodies who have developed a core curriculum for UK medical schools, we identified the following themes and drivers for curricular development and implementation and summarised areas where there are gaps and overlaps which may influence future approaches to curricular development and implementation.

Organisations involved in development of specialty specific curricula

A number of organisations, international, national and regional with relevant stakeholders' participation were involved in the development of the specialty curricula. The Delphi process for consensus agreements was the preferred method of achieving the core curricular recommendations in the included studies (Masud, 2014; Baldock, 2005; Linklater, 2014; Paes, 2008; Association of British Neurologists,2017; Bachmann et al., 2013; von Fragstein et al., 2008; Smith et al., 2016, Sharma et al., 2019)

International Bodies

Four subjects, namely communication skills, geriatric medicine, musculoskeletal medicine and palliative care had a core curriculum developed by two different international and national bodies (Bachmann et al., 2013; von Fragstein et al., 2008; Woolf and Walsh, 2004; Coady et al., 2004; Masud, 2014; Gordon 2013; Paes and Wee, 2008; Linklater et al., 2014). The international collaborations encompassed the previously developed national curricula as seen for Geriatric Medicine (Masud, 2014; Gordon 2013, Sharma et al., 2019).

National Bodies

Royal Colleges of UK and national specialist consultant societies and bodies, developed specific curricula related to 12 specialties (Table 1) (Myles, P. *et al.* *(*2014), Stirrat, 2010, Gordon, 2013, Baldock 2005; Paes and Wee 2008; British Association of Dermatologists, 2016; Ross and Maxwell, 2012; von Fragstein et al., 2008; Turner and Brewster, 2002; Association of British Neurologists, 2017; Smith et al., 2016; The British Association of Urological Surgeons, 2013). The core curricula were developed on foundation subjects (e.g. Anatomical Society for anatomy), clinical specialties, (e.g. British Association of Dermatologists for dermatology), and professionalism (e.g. UK Council of Clinical Communication Skills Teaching in Undergraduate Medical Education for communication) (Smith, C.F. *et al.*, 2015; British Association of Dermatologists, 2016; Bachmann et al., 2013, Sharma et al., 2019).

National Specialty Experts

Guidelines for a core curriculum in Urology were developed through a survey of consultant Urologists and the British Association of Urological Surgeons developed a Urology syllabus for medical undergraduates (Turner and Brewster, 2002; The British Association of Urological Surgeons, 2013, Sharma et al., 2019).

Regional

At the regional level, there were two medical schools which developed and recommended a curriculum for alcohol related disorders and medical humanities (Steed et al., 2010; Bleakley et al., 2006).

Timing of curricular subjects in school course

Curricula related to professionalism, like medical ethics and law, and foundation subjects like pathology and nutrition were evolved to be meaningful throughout medical school education (Jackson, 2001; Royal College of pathologists, 2014). Clinical specialty curricula were applicable to more specific points in clinical training such as paediatric, adult and maternal health and geriatric medicine (The Royal College of Paediatrics, 2015; Royal College of Obstetrics and Gynaecologists, 2015; Masud et al., 2014; Gordon, 2013, Sharma et al., 2019).

Others focussed on broad clinical skills applicable to all age groups such as acute care with resuscitation and end-of-life- care (Baldock, 2005; Linklater et al., 2014).

Some specialties had developed curricula with a system-based approach like neurology and dermatology, whilst others targeted specific health issues such as alcohol abuse or inequality in health access (Steed, 2010; Association of British Neurologists, 2017; British Association of Dermatologists, 2016; Royal College of General Practitioners, 2013, Sharma et al., 2019).

Drivers for curricular development in specialties with core curricula

There were several drivers that were accountable for the development of core curricula for the above specialties and subjects.

GMC outcomes for graduates

The GMC recommends that the medical school curricula must help students develop knowledge, skills and behaviour for clinical practice (Promoting excellence, General Medical Council 2015).

In the review, almost all specialties and subjects attempted to harmonise their curricula to the GMC learning outcomes for graduates.

Seven specialties had their core curricula developed by the Royal Colleges of the UK, which are professional bodies that set standards for specialty training (The Royal College of Pathologists, 2014; Royal College of Obstetrics and Gynaecologists, 2015; Royal College of Ophthalmologists 2015; Royal College of Psychiatrists, 2011; The Royal College of Radiologists, 2017; The Royal College of Surgeons, 2015).

Society needs and Burden of Disease

With cancer affecting 1 in 3 people in the UK, medical graduates are likely to interact with patients or carers with a history of cancer. (The Royal College of Radiologists, 2014). Thus, a non-surgery oncology curriculum was developed by the Royal College of Radiologists, in addition to the radiology undergraduate curriculum, and with the collaboration of Royal College of Physicians' Joint Collegiate Council for Oncology (JCCO) (The Royal College of Radiologists, 2014). The non-surgical oncology curriculum was developed to ensure that all junior doctors were adequately prepared to deal with cancer patients, and this joint approach to curriculum development ensured competency in a multidisciplinary approach to patient care (The Royal College of Radiologists, 2014, Sharma et al., 2019).

An ageing, frail population cohort with complex societal and medical requirements including mobility needs were important factors for development of a core curriculum for geriatric medicine and musculoskeletal system (Masud, 2014; Gordon, 2013; Woolf and Walsh, 2004; Coady et al., 2004, Sharma et al., 2019)

The importance of preventive medicine and healthcare promotion, human nutrition and its relevance in health and sickness, as well as recognising the healthcare inequalities helped develop specific undergraduate curricula to address these (Myles, P. *et al. (*2014); Jackson 2001; Royal College of General Practitioners 2013).

Patient safety

Patient safety and resuscitation were a recurring theme amongst clinical specialty curricula, as well as foundation subjects like pharmacology with safe prescribing and aspects on professionalism like communication and medical ethics and law (Stirrat et al., 2010; Ross and Maxwell, 2012; Bachmann et al., 2013; von Fragstein et al., 2008, Sharma et al., 2019).

Lack of adequate representation and preparedness amongst graduates

A lack of representation in medical school curricula, for both teaching and assessments was felt by multiple specialties (British Association of Dermatologists, 2016; Turner and Brewster, 2002; Lloyd et al., 2014). These concerns were reinforced by feelings of deficiency amongst junior doctors and general practitioners due to lack of adequate exposure in medical schools for some specialties, contributing to these specialties developing their own curricula (Lloyd et al., 2014; Burge, 2003). This was particularly seen amongst specific core curricula like ENT, surgical specialty and Dermatology. Both specialties noted diseases and conditions that would be common presentations to general practitioners in the UK and have an impact on patient care in relation to these conditions (British Association of Dermatologists, 2016; Lloyd et al., 2014). As a

consequence, their specialty specific outcomes for learning were developed, outlining the minimum knowledge and skills needed (Association of British Neurologists training and education sub-committee, 2002; Wilkinson, 1991, Sharma et al., 2019).

Curriculum: overlaps and gaps

Based on a review of curriculum theories, its relevance and context with regards to medical education and its stakeholders i.e. students, teachers and regulators, the GMC defines a curriculum as a statement of the intended outcomes, encompassing content, teaching, learning and assessment methods, feedback and supervision as part of the educational programme (General Medical Council, 2018). In this review, Royal Colleges, like the Royal College of Surgeons (RCS) and Obstetrics and Gynaecology (RCOG) highlighted the curricular content, and demonstrated how to achieve the learning objectives with structure and assessment methods, thus elaborated the curricular requirements comprehensively (Royal College of Obstetrics and Gynaecology, 2015; The Royal College of Surgeons, 2015). Though there was representation of surgical sub-specialties like ENT and Urology in the RCS curriculum, both specialities felt specific core content was important to be included in the medical school curricula (Lloyd et al., 2014; The British Association of Urological Surgeons, 2013, Sharma et al., 2019).

Curricula developed by several clinical and foundation subjects focussed primarily on core content or syllabus, and left medical schools to decide how best to include these within their medical course, so as to allow adaptability in their implementation, delivery and assessment (British Association of Dermatologists,

2016; Royal College of General Practitioners, 2013; Lloyd et al., 2014; Smith et al., 2016; The British Association of Urological Surgeons, 2013).

Overlapping of core content was noted between several specialities. For example, the geriatric curriculum discussed the importance of 'the diagnosis, pathophysiology, management and preventative strategies for specific disease processes: dementia, delirium and depression…' amongst other old age-related conditions (Gordon, 2013, Sharma et al., 2019). The psychiatry curriculum also focussed on dementia, delirium, and depression (Royal College of Psychiatrists, 2011).

Interestingly, the Royal College of Physicians (RCP), one of the oldest colleges of UK which provides standards for specialty medicine physicians in UK and the Royal College of General Practitioners (RCGP), one of the largest medical royal colleges of UK which sets out standards for family doctors in UK did not have a specific undergraduate medical curriculum for medicine or general practice (Royal College of Physicians, 2017; Royal College of General Practitioners, 2017, Sharma et al., 2019). However, more recently, guiding principles for undergraduate general practice curricula in UK medical schools have been developed, which provides a teaching framework for medical students in GP placements (Royal College of General Practitioners, 2018). The guiding principles defer to the GMC documentation for the core clinical knowledge and skills expected of all medical students (Royal College of General Practitioners, 2018).

7 SPECIALTY SPECIFIC CURRICULUM MAPPING AT A UK MEDICAL SCHOOL: A PILOT STUDY

Background

It is unclear what proportion of the recommended specialty core curricula are being implemented in UK medical schools. A curriculum mapping exercise would help identify where and how specific content is being covered, the learning outcomes, and which areas of expertise are addressed.

Dermatology is one such specialty with a national core curriculum, recommended by the BAD for all UK medical schools to guide them on basic competencies required in dermatology for all medical graduates (British Association of Dermatologists, 2016) (Singh et al., 2021). Despite national recommendations and standards, representation, consistency and its lack of implementation across UK medical schools has remained a matter of concern (Yaakub et al., 2015). Dermatology undergraduate education in the UK remains under-represented, and variable in medical schools. Twenty five percent of medical schools have no compulsory dermatology and only about half (57%) have assessment in dermatology (Yaakub et al., 2015). Dermatology undergraduate education needs to be prioritised within medical school curricula to cope with chronic skin disease which are a significant burden of disease in the community, and often in need of complex management strategies, both in primary and secondary care settings.

Specialty core curriculum mapping would provide four key aspects related to curricular content: its completeness and proportion of national curriculum

implemented compared to local standards, areas for improvement, gaps, and material presented more than once and considered redundant (Linton, 2019).

Along with generic aspects of professionalism, for specialty-based curricula like dermatology, ‘expertise mapping’ could be used to describe and include minimum competencies and skills in a competency-based model for medical education (Harden, 2001; Novak and Gowin, 1984).

A pilot curriculum mapping exercise at a medical school of a specialty curriculum against national guidelines would provide key information on how well specialty-specific curricula was being implemented at a local level.

7.1 RATIONALE FOR CHOICE OF MEDICAL SCHOOL FOR MAPPING STUDY

University of Nottingham (UoN) medical school was the first new medical school to be set up in the 20th century in the country, with the first intake of 48 students graduating in 1975 (University of Nottingham, 2022). When it opened, Queen’s Medical Centre was the biggest purpose-built hospital in Europe. Student intake has steadily increased to a current level of 330 students per year, including 90 from the satellite graduate-entry school at Derby, which opened in 2003 (University of Nottingham, 2022).

The mission of the school of medicine is ‘to improve human health and quality of life locally, nationally and internationally through outstanding education, research and patient care’ (University of Nottingham, 2022). One of the priorities of the medical school is ‘Teaching and learning, particularly training tomorrow’s doctors and teaching specialised postgraduates’ (University of Nottingham, 2022).

University of Nottingham is a leader on teaching and learning, and has achieved a Gold award in Teaching Excellence Framework (TEF). The Teaching Excellence Framework Gold award is given to educational establishments that continuously deliver excellent teaching, learning and outcomes for their students (What's the teaching excellence framework? 2021).

The School of Medicine at UoN undertook a curriculum review as the curriculum was in need of an update, after almost a decade. Curriculum mapping at a medical school showing the relationships of all aspects of the curriculum, is considered the linchpin to attain the learning outcomes of any curriculum (Al-Eyd., 2018). The mapping exercise provides transparency by demonstrating the relationship between the different components of the curriculum so that all the connections are easily visualised and communicated to facilitators as well as students (Harden, 2001).

The curriculum mapping can act as a vital tool during curriculum reviews at medical schools, as it can inform learning expectations, learning events, pedagogies, and assessments. Analysis of the curriculum map can also show discrepancies or duplications between the delivered and tested curricula (Hege et al., 2010; Plaza et al., 2007).

In addition, the mapping exercise can look at content for gaps and redundancies and help verify compliance of the course content with national standards (Al-Eyd., 2018). Thus, curriculum mapping study at UoN's medical school would observe alignment and to identify gaps in the curricular content. The curriculum review at UoN took into consideration the national standards of GMC's new Outcome for Graduates document (Outcomes for Graduates, 2018).

For specialty curriculum mapping, the national standards outlined by the BAD (British Association of Dermatologists. Undergraduate Dermatology Curriculum., 2016) were mapped against the local curriculum or learning outcomes.

7.2 PARTICIPANTS AND DESIGN

Role of researcher as dermatology specialty lead for curriculum mapping exercise

The presence or absence of an undergraduate specialty lead at a medical school and their position within the different hierarchical levels at the institution could determine how well a specialty is represented within the school course. The level and seniority at which the undergraduate specialty lead represents their specialty (e.g. University level, Curriculum Programme Director level, Trust level) may influence, guide or advise medical school boards on specialty-specific learning outcomes.

The lead researcher for the study was also the undergraduate lead for dermatology at University of Nottingham School of Medicine. The researcher had previous experience in medical education achieving a Masters in Medical Education, as a teaching fellow during specialty training. The researcher being the undergraduate lead for dermatology at the University of Nottingham was routinely involved in the teaching, planning and assessments for dermatology at the medical school. The prior knowledge in medical education provided an opportunity to gain further experiential learning in undertaking a curriculum mapping exercise for the specialty. In addition, as a co-author for the national BAD core-curriculum for dermatology recommended to all UK medical schools (Singh et al., 2021) and a member of the BAD Undergraduate (UG) Education Work stream committee the

researched was able to critically review the medical school syllabus compared to the national recommendations. The assimilation, reflection and scaffolding of knowledge over past experience gained through participation at specialty leads meetings for curriculum planning and assessments allowed linking the expected learning outcomes, the curriculum content and assessment methods. As a consultant dermatologist the researcher was able to identify the clinical placements where learning opportunities could occur, the teaching methods and faculty involved to provide the expertise, and the specialty knowledge and skills expected of medical graduates.

Participants and Methods

The lead researcher (Specialty Lead, Dermatology) and a medical education teaching fellow who was a member of the University curriculum review team conducted a pilot study mapping the undergraduate dermatology specialty curriculum. An electronic searchable database tool was created to map six key areas of the UoN local dermatology objectives or ILOs. These were aligned against the ILOs as per the BAD 2016 document as well as the GMC's Outcomes for Graduates 2018 (Outcomes for Graduates, 2018). In addition, the core syllabus content was mapped against learning opportunities for knowledge and skills; teaching delivery and assessments methods. The location for teaching delivery and the medical educators involved were mapped for each dermatology-specific ILO (Figure 3).

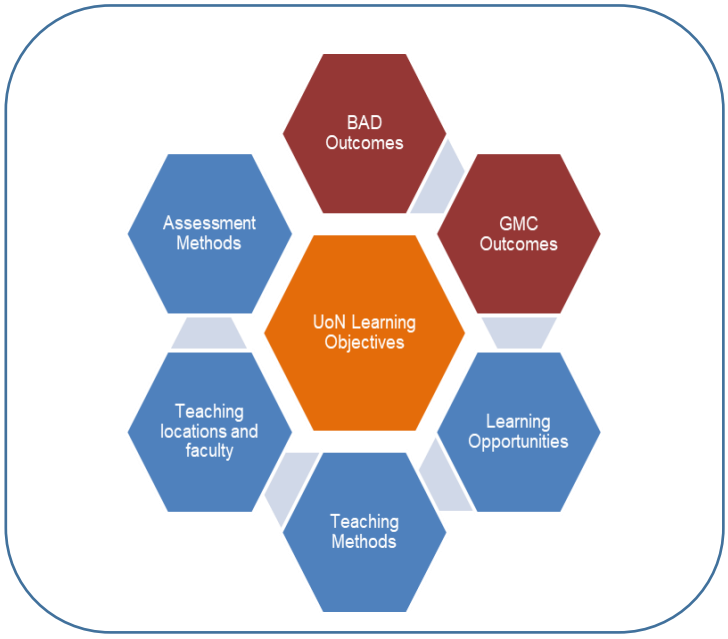

Figure 3: Diagrammatic representation of the key elements of curriculum mapping of dermatology UG curriculum at UoN

Ethics

As this was a curriculum mapping study observing specialty specific curricula within a medical school, patients or public were not involved and no ethics approval was needed.

Sampling and analysis

A list of all the educational elements and objectives present in the current UoN dermatology attachment was created. Each ILO was then mapped against the BAD national objectives and the GMC Outcomes for Graduates domains (Table 2). Example related to skin cancer and other benign lesions and the teaching staff and assessments involved are elicited in Table 3 and Table 4 respectively.

Table 2: Dermatology Curriculum Mapping of ILOs

N.B:							
#	**Code**	**Domain**	**Subdomain**	**Current UoN Objective**	**BAD Objectives**	**OfG 2015**	**OfG 2018**
20	DE04-001	Dermatology	Benign and Malignant Melanocytic Lesions	Know the different types of benign melanocytic naevi	Describe the epidemiology and pathophysiology of benign, premalignant and malignant melanocytic lesions	8b, 11f	22b, 25e
21	DE04-002	Dermatology	Benign and Malignant Melanocytic Lesions	List the risk factors for the development of malignant melanoma	Describe the epidemiology and pathophysiology of benign, premalignant and malignant melanocytic lesions	8b, 11f	22b, 25e
22	DE04-003	Dermatology	Benign and Malignant Melanocytic Lesions	Recognise and describe the features of a typical melanoma (using the ABCD rule)	Develop the ability to make and test differential diagnoses, by comparing and contrasting the features of benign and suspicious melanocytic lesions.	14b,e	14d,g,h
23	DE04-004	Dermatology	Benign and Malignant Melanocytic Lesions	Be familiar with the different sub-types of melanoma	Develop the ability to make and test differential diagnoses, by comparing and contrasting the features of benign and suspicious melanocytic lesions.	14b,e	14d,g,h
24	DE04-005	Dermatology	Benign and Malignant Melanocytic Lesions	Know the differential diagnosis of benign and malignant pigmented lesions	Develop the ability to make and test differential diagnoses, by comparing and contrasting the	14b,e	14d,g,h

					features of benign and suspicious melanocytic lesions.		
25	DE04-006	Dermatology	Benign and Malignant Melanocytic Lesions	Be able to discuss prognosis and management of pigmented lesions with patients, **including the two week wait pathway.**	Explain the determinants of prognosis for melanoma recognising its life-threatening nature	8b, 11f	22b, 25e
26	DE04-007	Dermatology	Benign and Malignant Melanocytic Lesions	Be able to give appropriate sun protection advice	Counsel patients on appropriate sun protection behaviours with the correct use of sunscreens (protecting for both UVA and UVB).	11i, 14g	14l, 25g
27	DE05-001	Dermatology	Non-Melanoma Skin Cancers and Benign Skin Tumours	Recognise and describe the clinical features of the pre-malignant lesions: actinic (solar) keratosis and intra-epithelial carcinoma (Bowen's disease)	Describe the epidemiology and pathophysiology of benign, premalignant and malignant melanocytic lesions	8b, 11f	22b, 25e
28	DE05-002	Dermatology	Non-Melanoma Skin Cancers and Benign Skin Tumours	Recognise and describe the clinical features of the malignant lesions: basal cell carcinoma (including different subtypes) and squamous cell carcinoma	Diagnose these benign lesions and, where relevant, recognise potentially more serious differential diagnoses	14b	14d,h
29	DE05-003	Dermatology	Non-Melanoma Skin Cancers and Benign Skin Tumours	Recognise and describe the clinical features of the following benign lesions: dermatofibroma, neurofibroma, epidermoid and pilar cysts, keratocanthoma, haemangioma (strawberry naevus, cherry angioma, pyogenic granuloma), seborrhoeic keratosis, viral wart	Compare and contrast the epidemiology, clinical features and management of the following benign lesions: viral warts, epidermoid and pilar cysts, seborrhoeic keratoses, dermatofibroma, lipoma, common vascular lesions.	14b,e	14d,g,h

30	DE05-004	Dermatology	Non-Melanoma Skin Cancers and Benign Skin Tumours	Demonstrate a knowledge of the risk factors for skin cancer.	Diagnose these benign lesions and, where relevant, recognise potentially more serious differential diagnoses	14b	14d,h
31	DE05-005	Dermatology	Non-Melanoma Skin Cancers and Benign Skin Tumours	Discuss the different treatment modalities available for the management of pre-malignant and malignant skin cancers.	Develop the ability to make and test differential diagnoses, by comparing and contrasting the features of benign and	14b,e	14d,g,h
32	DE05-005	Dermatology	Non-Melanoma Skin Cancers and Benign Skin Tumours	Be able to plan appropriate treatment for patients with the above conditions	Apply the above knowledge to assess a patient presenting with a pigmented lesion, using a holistic approach, including	14a-g	14a-d,g,h
33	DE05-006	Dermatology	Non-Melanoma Skin Cancers and Benign Skin Tumours	Be familiar with the indications and practicalities of punch biopsy, curettage and simple excision techniques.	Explain the indications for and practicalities of punch biopsy, curettage and simple excision	8d	22c

Table 3: Dermatology curriculum mapping: teaching staff

Dermatology Curriculum Mapping								
N. B:					Staff			
#	Code	Domain	Subdomain	Current UoN Objective	Consultant dermatologist	Teaching fellow	Specialty registrar	Volunteer patient
20	DE04-001	Dermatology	Benign and Malignant Melanocytic Lesions	Know the different types of benign melanocytic naevi	Consultant dermatologist	Teaching fellow	Specialty registrar	Volunteer patient
21	DE04-002	Dermatology	Benign and Malignant Melanocytic Lesions	List the risk factors for the development of malignant melanoma	Consultant dermatologist	Teaching fellow	Specialty registrar	Volunteer patient
22	DE04-003	Dermatology	Benign and Malignant Melanocytic Lesions	Recognise and describe the features of a typical melanoma (using the ABCD rule)	Consultant dermatologist	Teaching fellow	Specialty registrar	Volunteer patient
23	DE04-004	Dermatology	Benign and Malignant Melanocytic Lesions	Be familiar with the different sub-types of melanoma	Consultant dermatologist	Teaching fellow	Specialty registrar	Volunteer patient
24	DE04-005	Dermatology	Benign and Malignant Melanocytic Lesions	Know the differential diagnosis of benign and malignant pigmented lesions	Consultant dermatologist	Teaching fellow	Specialty registrar	
25	DE04-006	Dermatology	Benign and Malignant Melanocytic Lesions	Be able to discuss prognosis and management of pigmented lesions with patients, **including the two week wait pathway.**	Consultant dermatologist	Teaching fellow	Specialty registrar	Volunteer patient
26	DE04-007	Dermatology	Benign and Malignant Melanocytic Lesions	Be able to give appropriate sun protection advice	Consultant dermatologist	Teaching fellow	Specialty registrar	Volunteer patient
27	DE05-001	Dermatology	Non-Melanoma Skin Cancers and Benign Skin Tumours	Recognise and describe the clinical features of the pre-malignant lesions: actinic (solar) keratosis and intra-epithelial carcinoma (Bowen's disease)	Consultant dermatologist	Teaching fellow	Specialty registrar	
28	DE05-002	Dermatology	Non-Melanoma Skin Cancers and Benign Skin Tumours	Recognise and describe the clinical features of the malignant lesions: basal cell carcinoma (including different subtypes) and squamous cell carcinoma	Consultant dermatologist	Teaching fellow	Specialty registrar	Volunteer patient
29	DE05-003	Dermatology	Non-Melanoma Skin Cancers and Benign Skin Tumours	Recognise and describe the clinical features of the following benign lesions: dermatofibroma, neurofibroma, epidermoid and pilar cysts, keratocanthoma, haemangioma (strawberry naevus, cherry angioma, pyogenic granuloma), seborrhoeic keratosis, viral wart	Consultant dermatologist	Teaching fellow	Specialty registrar	Volunteer patient
30	DE05-004	Dermatology	Non-Melanoma Skin Cancers and Benign Skin Tumours	Demonstrate a knowledge of the risk factors for skin cancer.	Consultant dermatologist	Teaching fellow	Specialty registrar	Volunteer patient
31	DE05-005	Dermatology	Non-Melanoma Skin Cancers and Benign Skin Tumours	Discuss the different treatment modalities available for the management of pre-malignanct and malignant skin cancers.	Consultant dermatologist	Teaching fellow	Specialty registrar	Volunteer patient
32	DE05-005	Dermatology	Non-Melanoma Skin Cancers and Benign Skin Tumours	Be able to plan appropriate treatment for patients with the above conditions	Consultant dermatologist	Teaching fellow	Specialty registrar	
33	DE05-006	Dermatology	Non-Melanoma Skin Cancers and Benign Skin Tumours	**Be familiar with the indications and practicalities of punch biopsy, curettage and simple excision techniques.**				

Table 4: Dermatology Curriculum Mapping: Assessment methods

N.B:						**Assessment**			
#	**Code**	**Domain**	**Subdomain**	**Current UoN Objective**		Mandatory assessment of core clinical skills	CP2 MCQ/EMQ exam (summative)	CP2 OSCE (summative)	Formative OSCE
20	DE04-001	Dermatology	Benign and Malignant Melanocytic Lesions	Know the different types of benign melanocytic naevi		Mandatory assessment of core clinical skills	CP2 MCQ/EMQ exam (summative)	CP2 OSCE (summative)	Formative OSCE
21	DE04-002	Dermatology	Benign and Malignant Melanocytic Lesions	List the risk factors for the development of malignant melanoma		Mandatory assessment of core clinical skills	CP2 MCQ/EMQ exam (summative)	CP2 OSCE (summative)	Formative OSCE
22	DE04-003	Dermatology	Benign and Malignant Melanocytic Lesions	Recognise and describe the features of a typical melanoma (using the ABCD rule)		Mandatory assessment of core clinical skills	CP2 MCQ/EMQ exam (summative)	CP2 OSCE (summative)	Formative OSCE
23	DE04-004	Dermatology	Benign and Malignant Melanocytic Lesions	Be familiar with the different sub-types of melanoma		Mandatory assessment of core clinical skills	CP2 MCQ/EMQ exam (summative)	CP2 OSCE (summative)	Formative OSCE

24	DE04-005	Dermatology	Benign and Malignant Melanocytic Lesions	Know the differential diagnosis of benign and malignant pigmented lesions		CP2 MCQ/EMQ exam (summative)	CP2 OSCE (summative)	Formative OSCE	
25	DE04-006	Dermatology	Benign and Malignant Melanocytic Lesions	Be able to discuss prognosis and management of pigmented lesions with patients, **including the two week wait pathway.**		CP2 OSCE (summative)	Formative OSCE		
26	DE04-007	Dermatology	Benign and Malignant Melanocytic Lesions	Be able to give appropriate sun protection advice		Mandatory assessment of core clinical skills	CP2 MCQ/EMQ exam (summative)	CP2 OSCE (summative)	Formative OSCE
27	DE05-001	Dermatology	Non-Melanoma Skin Cancers and Benign Skin Tumours	Recognise and describe the clinical features of the pre-malignant lesions: actinic (solar) keratosis and intra-epithelial		Mandatory assessment of core clinical skills	CP2 MCQ/EMQ exam (summative)	CP2 OSCE (summative)	Formative OSCE

				carcinoma (Bowen's disease)					
28	DE05-002	Dermatology	Non-Melanoma Skin Cancers and Benign Skin Tumours	Recognise and describe the clinical features of the malignant lesions: basal cell carcinoma (including different subtypes) and squamous cell carcinoma		Mandatory assessment of core clinical skills	CP2 MCQ/EMQ exam (summative)	CP2 OSCE (summative)	Formative OSCE
29	DE05-003	Dermatology	Non-Melanoma Skin Cancers and Benign Skin Tumours	Recognise and describe the clinical features of the following benign lesions: dermatofibroma, neurofibroma, epidermoid and pilar cysts, keratocanthoma, haemangioma (strawberry naevus, cherry angioma, pyogenic granuloma),		CP2 MCQ/EMQ exam (summative)	CP2 OSCE (summative)	Formative OSCE	

				seborrhoeic keratosis, viral wart					
30	DE05-004	Dermatology	Non-Melanoma Skin Cancers and Benign Skin Tumours	Demonstrate a knowledge of the risk factors for skin cancer.		CP2 MCQ/EMQ exam (summative)	CP2 OSCE (summative)	Formative OSCE	
31	DE05-005	Dermatology	Non-Melanoma Skin Cancers and Benign Skin Tumours	Discuss the different treatment modalities available for the management of pre-malignant and malignant skin cancers.		CP2 MCQ/EMQ exam (summative)	CP2 OSCE (summative)	Formative OSCE	
32	DE05-005	Dermatology	Non-Melanoma Skin Cancers and Benign Skin Tumours	Be able to plan appropriate treatment for patients with the above conditions		Log Book & Portfolio assessment	CP2 OSCE (summative)	Formative OSCE	CP2 MCQ/EMQ exam (summative)

Each of the learning objective was mapped against the learning opportunities, teaching faculty and staff involved, and how the learning objective was being assessed. Table 5 provides an example with one of the learning objective ‘be familiar with the different presentations of psoriasis’.

Table 5: Objective: 'Be familiar with different types of presentations of psoriasis'

Learning Location	Staff	Assessment
Outpatient dermatology general clinics	Consultant dermatologist	Mandatory assessment of core clinical skills (MACCS)
Expert volunteer patient clinic	Dermatology teaching fellow	MCQs/EMQs formative
Nurse led biologic clinic	Dermatology Specialty registrar	MCQs/EMQs summative
Small group tutorial (teaching room)	Dermatology Specialist nurse	Formative OSCE
Computer room/library (Moodle lectures)	Expert volunteer patient (with psoriasis)	

7.3 RESULTS OF CURRICULUM MAPPING STUDY

The curriculum mapping study revealed how the core outcomes aligned to the national curriculum, the learning opportunities both in clinical and non-clinical aspects, teaching methods used, the faculty members involved in delivery of the teaching and the assessment methods undertaken to assess dermatology at the medical school. The results are discussed as follows:

Core outcomes

Dermatology was noted to be a compulsory two-week attachment for all fourth year medical students in the clinical phase of the curriculum, with delivery of teaching for majority of students at one site, Derby (14-16 per fortnight) and the remaining at the second site, Lincoln (two per fortnight) in the respective departments.

Of the 70 ILOs for dermatology in the medical school curriculum, 55 (79%) were mapped to the BAD curriculum, 14 (20%) required modifications to align them with the BAD learning outcomes, two were not specified in the current curriculum and one objective was identified as redundant (Figure 4) (Sharma et al., 2020). All ILOs which were originally aligned to the Outcomes for Graduates 2015 were also updated to the Outcomes for Graduates 2018.

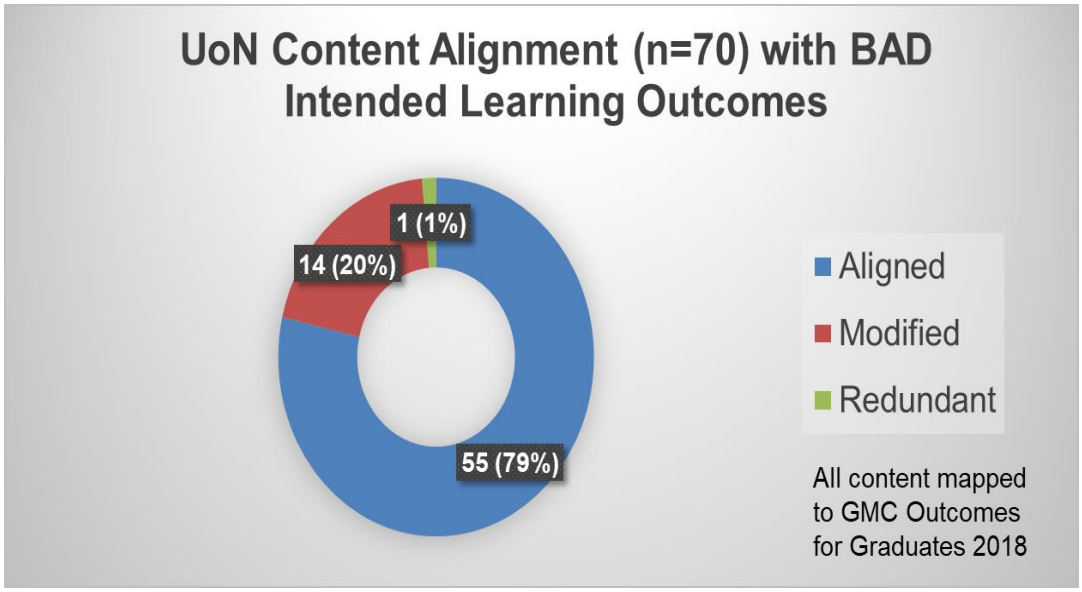

Figure 4: UoN content alignment with BAD ILOs

Learning opportunities

For learning opportunities, 67/70 (96%) ILOs were mapped to clinical face-to-face learning from patients presenting in outpatient dermatology clinics. These experiential learning opportunities were supplemented with web- based electronic or e-learning modules, teaching in small groups of 8-14 students, and practical skills sessions (Table 6) (Sharma et al., 2020). The core dermatology syllabus in the medical school curriculum corresponded to all domains of the BAD curriculum.

Table 6: Learning opportunities at UoN

Results

Clinical
Skin cancer clinics
General dermatology clinics
Patch testing clinics
Paediatric dermatology clinic
Observing skin surgery
Nurse-led acne clinics
Nurse-led biologics clinics
Nurse-led phototherapy
Expert patient clinics

Non-Clinical
Tutorial 1 - skin lesions
Tutorial 2 - psoriasis, acne & rosacea
Tutorial 3 - Eczema & skin infections
Tutorial 4 - Leg ulcers & systemic disease
Online e-Lectures (interactive)
Online recorded lectures
Practical skills session
Case presentation/topic review
Nurse-led tutorial: phototherapy
Nurse-led tutorial: dressings & wound care
Nurse-led tutorial: leg ulcers
Revision slides/lecture notes

Teaching Methods

The teaching methods used varied from observing and demonstrating clinical practice in outpatient clinics and expert patient teaching clinics to simulated

role play, practical skills on taking swabs and suturing and supplemented by seminars, lectures and computer assisted as well as peer led learning.

For example, one of the BAD objectives of 'Develop the ability to make and test differential diagnoses, by comparing and contrasting the features of benign and suspicious melanocytic lesions' was covered and taught by all of the methods below (Table 7) (Cohen et al., 2016).

Table 7: Example of teaching methods used for BAD ILO of 'ability to make and test differential diagnosis, comparing and contrasting benign and suspicious melanocytic lesions'

Outpatient clinic	Observing clinical practice
Surgical theatre	Observed clinical practice
Lecture theatre	Lecture
Small group room	Small-group Seminar
Clinical skills lab	Demonstration of practical skill
Computer room/library	Simulation/role-play
	Computer assisted learning
	Peer-led teaching

Teaching Faculty

The medical teaching faculty included consultant dermatologists, specialty doctors, specialty trainees and a dermatology teaching fellow. Dermatology specialty nurses contributed to teaching 20/70 (29%) of ILOs (Figure 5) (Sharma et al., 2020).

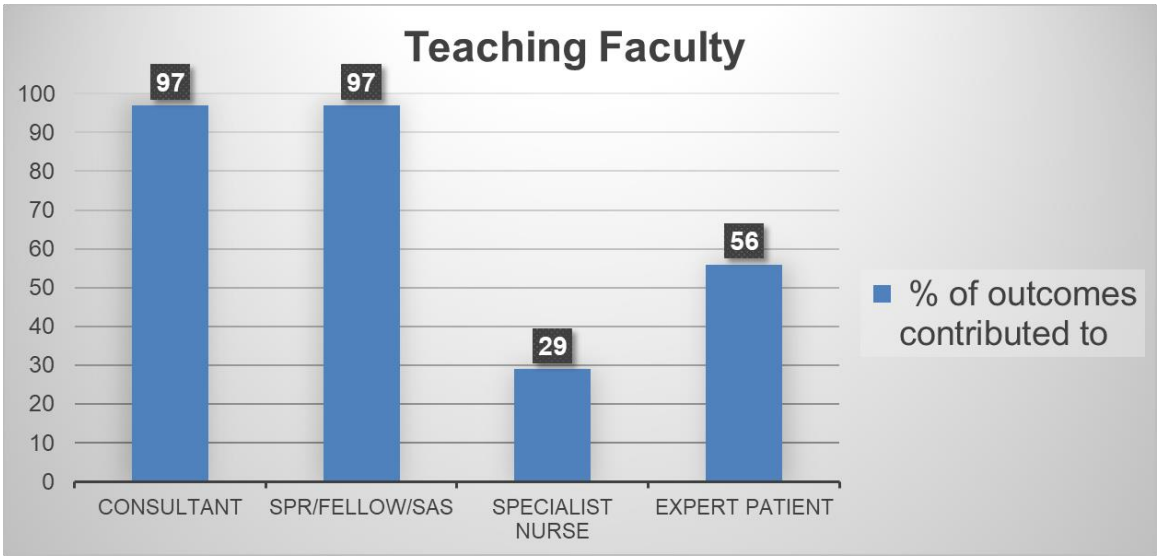

Figure 5: Teaching faculty contributing to dermatology teaching

Assessment methods

68/70 (97%) of the ILOs were assessed in the form of either formative and/or summative assessments (Figure 6). These included students undergoing end of the year written exams and an OSCE station specifically to assess dermatology knowledge and skills (Sharma et al., 2020). The dermatology undergraduate teaching lead and teaching fellow participated in preparing the formative and summative assessments which were peer reviewed, standard set, blueprinted to ILOs and reviewed by an external examiner. Though only a small proportion of outcomes could be assessed in any one year, since dermatology made up a relatively small part of the overall curriculum, the assessment methods had the potential to broadly sample the dermatology curriculum in knowledge exams, clinical exams in the form of a dermatology OSCE station, and be observed for clinical skills assessment with real patients during the dermatology clinical placements. Any assessment gaps could then

be identified and addressed in the development of new OSCE stations and Multiple Choice Questions (MCQs) for the question bank (Sharma et al., 2020)

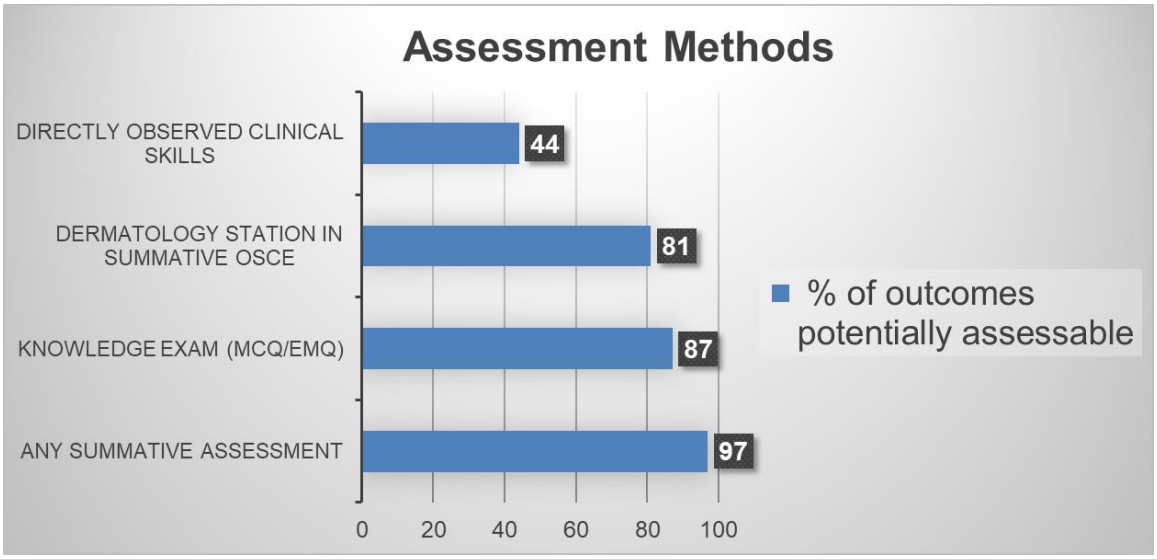

Figure 6: Summative assessment methods used for dermatology at UoN

Curriculum mapping study acted as a visualisation tool for the local dermatology medical school curriculum and demonstrated relationships between key areas highlighted by the BAD and the GMC's Outcomes for Graduates 2018 (Sharma et al., 2020). The curriculum map exercise helped delineate content gaps or overlaps, compared the ILOs against the national BAD curriculum, as well as the GMCs Outcomes. The role of undergraduate specialty lead undertaking the mapping exercise was important as they could provide content expertise, identify the relevant teaching and assessment methods employed to achieve the ILOs, as well as consider how to adopt changes to address the knowledge gaps identified. Other medical schools could perform a mapping exercise to assist in the implementation of a nationally recommended undergraduate curriculum to ensure academic standards (Sharma et al., 2020).

8 DOCUMENT ANALYSIS

It would thus be important to explore from the UK undergraduate specialty teaching leads perspective, on what may help or hinder specialty curriculum implementation at their respective medical schools. A document analysis of curriculum meetings at a medical school (University of Nottingham) would provide further insight on what specialties and the other stakeholders consider important for implementation.

8.1 METHODS

Consent was sought and gained from the University of Nottingham Clinical Phase Undergraduate Curriculum Committee Lead (Appendix 2) to review and analyse the curriculum meeting minutes. The meeting minutes were related to specialty clinical curriculum meetings held at the medical school level at the University of Nottingham between the years of 2015-2019 (Appendix 3).

The minutes were considered a remnant of the University or medical school proceedings, providing context to the organisation's processes, outcomes, situations and limitations. These were considered as authentic as minutes were taken by an administrative officer and included in the official records of the organisations.

Data and Analysis

Data was extracted and analysed from documents as part of theoretical sampling, that is, ‘sampling on the basis of concepts that have proven theoretical relevance to the evolving theory’ (Strauss & Corbin, 1990, p. 176).

The constant comparative method (Glaser & Strauss, 1967) guided the data analysis, which was based on an inductive approach focussed on identifying patterns and discovering theoretical properties in the data. In a back-and-forth interplay with the data, elemental codes and concepts were checked and rechecked.

A thematic analysis was performed utilising the set of documents to gather any common observations linked to curriculum implementation. The document analysis helped to refine ideas, identified conceptual boundaries, and signposted the aspects that were fit and relevant to the different domains (Charmaz, 2003).

8.2 RESULTS

From the document analyses, a total of 21 documents were reviewed for curriculum meetings held from 2015-2019. The meetings were held at University or medical school level for clinical specialties and included dermatology.

Lines, phrases, sentences, and paragraph segments were reviewed from the documents to code the data. The thematic properties in the data content of the documents was grouped into 5 main domains: (1) Curriculum alignment to

GMC and upcoming MLA, (2) Role of specialty lead, (3) Political influences, (4) Student factors, and (5) Funding

The minutes provided an understanding of the challenges faced regarding curriculum delivery, its inclusion of other specialties within school curricula and activities undertaken at national or local levels to improve curriculum implementation.

1) *Curricular alignment to GMC, MLA and assessment*

Review of the curriculum committee meetings, references to GMC and MLA were found on several occasions. Medical school committee members regarded the GMC and its Outcomes for Graduates (Outcomes for Graduates, 2018) document as a guide to fulfil their curricular development and implementation.

Specialty teaching leads discussed how MLA and blueprinting of specialty-related assessments were important points of discussion at the UoN. These included discussions on how it was under the GMC's remit on what the curricular content would be included across medical schools, and how MLA could influence on what would be taught and assessed within undergraduate curricula including dermatology curricula. The lack of uniformity and standardisation across UK medical schools' curricula made it challenging to know how individual schools would respond to implementation of specialty-specific curricula.

Organising workshops for creating exam questions for MLA would encourage the possibility of inclusion of specialty specific questions. Discussions included measures to ensure the students were adequately prepared, and the school

needing to adjust their assessments to align with the MLA. It highlighted the methods in which specialties and specialty leads were considering their clinical course in terms of knowledge, skills and competencies with MLA requirements, and included use of both formative and summative assessments.

2) Role of specialty lead

The need for a specialty lead was considered important in the document analysis review of meeting minutes of the UoN undergraduate leads committee as well as discussions and expert opinions of other specialty leads. Concerns were expressed regards lack of expertise teaching within general practice for the specialty teaching. It was expressed that much needed skills should be taught to appropriate standards by specialists in order for the learning to be embedded correctly. The presence or absence of an undergraduate specialty lead at a medical school and their position within the different hierarchical levels at the institution could determine how well a specialty is represented within the school course. The level and seniority at which the undergraduate specialty lead represented their specialty (e.g. University level, Curriculum Programme Director level, Trust level) could influence, guide or advice medical school boards on specialty-specific learning outcomes. Funding and engagement of medical school with specialties appeared to influence curriculum implementation and were considered important.

3) Political influences

Document analysis of committee meeting minutes of the medical school revealed the importance of engaging with the Government, the regulatory body (GMC) as well as medical school deans to enquire how best to improve representation and to influence adequate dermatology curriculum within medical school.

Internal political influences (e.g. institutional, departmental, hospital Trusts) also appeared to matter. From the review of minutes taken during discussions with specialty lead experts (e.g. palliative care), successful curriculum implementation required engagement with medical school staff and committees, engagement with consultant colleagues, juniors and nursing staff.

4) Student factors

In the document analyses, student feedback was considered significant regards specialty specific teaching and could be used to demonstrate evidence of good practice and use of student funds for consultants teaching time. Where student representatives were present, medical students had expressed disappointment that they had limited clinical exposure to ENT surgical specialty via specialty study modules and the specialty lead expressed that teaching for the modules had been paused whilst negotiations were being made for funding the module between the NHS Trust and the University.

5) Funding

Transparency of funding between Universities and NHS Hospital Trusts towards promoting and undertaking undergraduate educational activities and provision of resources including teaching staff (e.g. juniors, teaching fellows,

and specialist nurses) were recurring themes noted in undergraduate leads committee meetings. On the ground level, the logistics of organising content, teaching and assessments was heavily dependent on cooperation among team members and the conflicting clinical or patient workload demands. Facilities, information technology, clinical or laboratory space, time for teaching and funding towards educational activities all contributed to a successful programme. From the document analyses of the medical school's undergraduate lead committee meetings, it was apparent that sophisticated computer aided mapping tools could help integrate and navigate across specialty- specific curricula.

Translating external demands of healthcare policy makers, medical regulatory bodies and patient expectations meant the medical school needed to align their curricula to changing needs. Producing safe competent doctors required dedicated coordinated effort from team members comprising of clinicians, educators, administrators, as well as ancillary staff and facilities to engage constructively and collaboratively specific curricula (Appendix 3).

9 EXPERT OPINION

Expert opinion method allows: 1) to use heuristic ability of experts; 2) address the research question/problem, assess it from different aspects since each expert represents his/her area of activities, accumulated experience and competence; 3) it is possible to forecast scenarios with the help of experts; 4) to express information provided by experts in statistical data using various assessment scales; 5) receive valuable recommendations or commentaries; 6) make decisions dividing responsibility for the decision; 7) improve the 'product' before it's experimental application in pedagogical/academic practice (Iriste and Katane, 2018). Validity of experts' evaluation is achieved by means of logical and statistical procedures, selection of experts, a survey organisation and data processing (Iriste and Katane, 2018). In order to prepare a cross-sectional survey to gather the views of other undergraduate dermatology leads across UK medical schools, expert opinions were sought to help develop the questionnaire.

9.1 METHODS

The selection of the experts was based on the specialties they represented, had a background in medical education and the specialties had a national recommended core curriculum. Thus they could provide a unique insight from the educational as well as specialty perspective on the challenges or facilitators to curriculum implementation. The iterative design of study incorporated collaboration with the expert panel for multiple reviews of the cross-sectional survey. Specifically, the structure for the collaboration was an

initial expert review of developed materials, one day face-to-face meeting with the expert and subsequent expert review of revised materials to ensure that feedback was captured and incorporated accurately. In addition, the academic vocabulary and content relevance of the survey was scrutinised by the expert panel and time taken to complete the questionnaire was determined (Appendix 4).

9.2 RESULTS

There was a selection of six clinical specialty experts who evaluated the cross-sectional questionnaire. These included specialty undergraduate teaching lead Consultants for Paediatrics at two teaching hospital hub sites, Palliative Care Medicine Consultant, three Dermatology Consultants and one ENT Consultant. All experts had held the University position for their respective specialty for undergraduates. All had experience in medical education of more than 5 years. They all also acted as content experts for their specialty curricula.

Five broad themes were noted to be important to capture within the questionnaire for undergraduate leads. These were leadership skills, transparency in funding, curriculum related to specialty, school engagement with specialties and influence of external stakeholders.

a) Leadership

Details of the undergraduate leads who were in the role was thought to be relevant as the involvement of the undergraduate leads could determine and influence the specialty curriculum instead of a non-specialty lead. They were considered to have an impact on delivery of teaching and assessments. In

addition to medical education qualifications, the need for administrative or IT support or help with curriculum mapping or assessment preparation was considered relevant.

b) Funding

Lack of transparency and clarity on how funding worked and how it is being utilised within departments to support teaching was important to explore within meeting minutes. This was determined through allocation of time for teaching in consultant job plans and ways to support teaching through specialist nurse led or teaching fellow teaching. Funding towards equipment and tools for skill development (e.g. fundoscopes) were important to be ring-fenced.

c) The specialty curriculum itself (local or national)

It was important to determine the views of specialty leads and stakeholders if the national/local specialty curriculum itself was too big to deliver within the allocated time. Hence, there was need to understand what proportion of the curriculum was being taught, or assessed and how the teaching was supported. Need for specialty specific curriculum mapping and blueprinting to assessments to ensure alignment was also considered important.

d) School related issues

Rise in student numbers being taught impacted on how teaching may be being delivered and determined the teaching methods or staff being involved were important in discussion with experts. Participants in the meetings felt there cultural barriers or facilitators within school with respect to prioritisation of

specialties, or communication between staff and It was important to explore engagement between specialties and with medical school.

e) External influences

The role of GMC, MLA and implementation of specialty specific curricula were common external influences expressed as important towards curriculum implementation.

10 FACILITATORS AND BARRIERS TO CURRICULUM IMPLEMENTATION FROM THE SPECIALTY LEADS PERSPECTIVE: A CROSS-SECTIONAL QUESTIONNAIRE SURVEY

To provide specialty specific guidance on basic foundational standards needed in terms of knowledge and skills for all graduates in the UK, 26 specialties developed national core curricula (Sharma et al., 2019), including dermatology (Singh et al., 2021). Medical schools are constantly challenged to respond to changes in clinical practice, provide a contextual curriculum and ensure that students are comfortable dealing with the content load. This has meant that clinical exposure as a method of learning is often absent and the blueprint for assessment is often overlooked (Wilkinson, 1991). In the last chapter, curriculum mapping undertaken and conducted by an undergraduate specialty teaching lead, showed mapping as a tool could identify how specialty specific core learning outcomes were being or could be taught, delivered and assessed at a UK medical school. The involvement of an undergraduate specialty lead at the medical school provided the necessary expertise on content and knowledge of the subject and how the core curriculum could be implemented. The perspective of specialty leads across other UK medical schools would be important to explore for specialty curriculum implementation.

10.1 DEVELOPMENT OF THE CROSS-SECTIONAL SURVEY

A constructivist approach was used to develop the cross-sectional survey by building on previous knowledge, reflection and understanding the reasons that contribute or hinder a curriculum implementation. Using the themes which

emerged from previous research studies and a critical reflection provided a deeper meaning and understanding to challenges in curriculum implementation.

Multiple approaches were used to build the evidence for development and design of a robust questionnaire survey study. These were:

- A review of literature exploring the barriers and facilitators for curriculum implementation as elaborated in chapter two.
- The scoping review of literature (chapter four) on the need for a core curriculum for UK medical schools helped in critical reflection on factors which resonated across specialities attempting to implement their curricula across medical schools.
- Curriculum mapping, and its vital role in curriculum implementation was discussed in chapter five. Active engagement as specialty lead to conduct a curriculum mapping study at a medical school using dermatology as a specialty-specific curriculum led to improved understanding on specialty-specific mapping, its relevance in the wider context of curriculum implementation and construction of new schemes to enable inclusion of specific ILOs.
- Within document analyses of curriculum meetings it became even more apparent that the GMC with its recommendations under Outcomes for Graduates document and introduction of a UK wide MLA for all graduates to practise medicine in the UK were two significant factors which could facilitate or hinder implementation of a specialty- specific curriculum. In the questionnaire survey, it was considered pertinent to ask if participants were aware of these upcoming changes and how the

GMC's Outcomes for graduates and MLA would facilitate or hinder specialty-specific (dermatology) curriculum implementation;

- Expert opinions of other specialty undergraduate leads were sought on the design use of the questionnaire and checked for credibility, resonance and usefulness amongst their specialties.

Published articles suitable for research in medical education were used to help design and develop the questionnaire survey (Ramani and Mann, 2016; Burge, 2002).

Thus, multiple sources of evidence were gathered to develop the domains relevant for the cross-sectional online questionnaire for undergraduate specialty teaching leads (Figure 7).

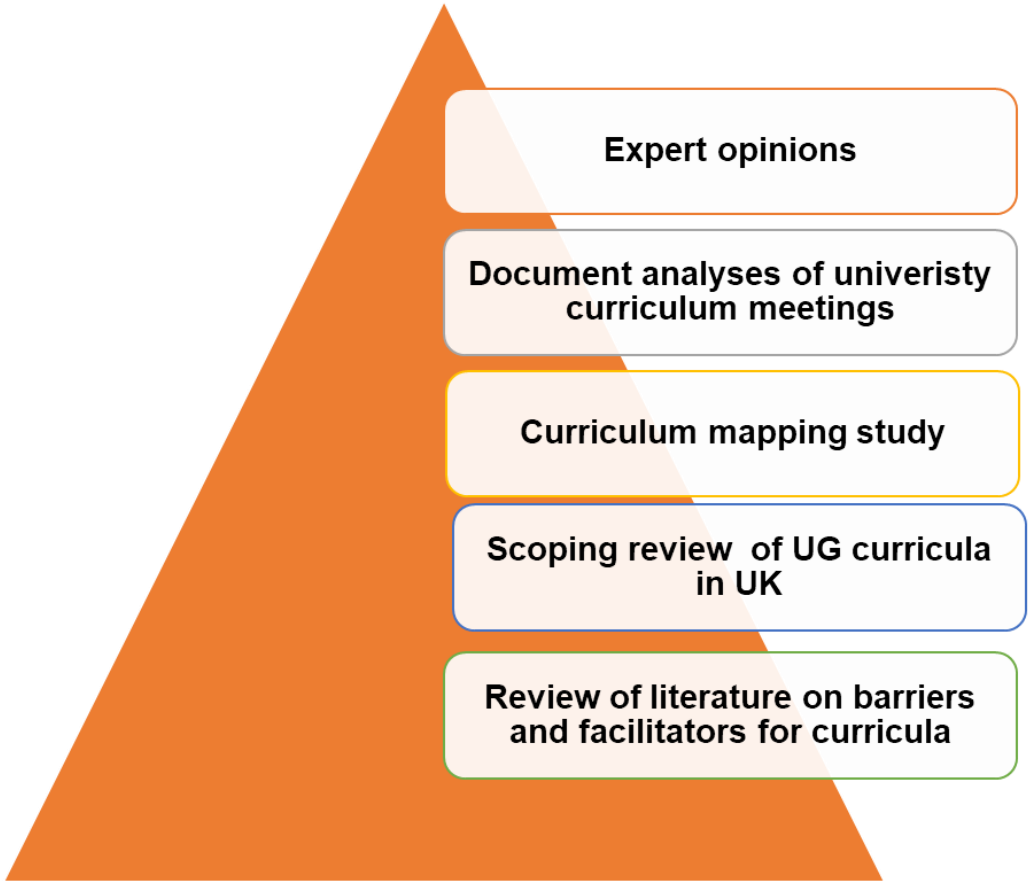

Figure 7: Schematic representation of constructivist approach to development of domains for the cross-sectional survey

Using the constructivist approach and multiple methods as elicited in previous chapters, several broad domains were considered likely to influence implementation of a specialty-specific curriculum at a medical school. These included cultural and political factors which could be external (e.g. GMC, MLA) as well as internal influences (e.g. medical school undergraduate lead, mapping, blueprinting and assessment of curricula) which could impact the implementation of a specialty specific curriculum and were included in the questionnaire survey (Figure 8).

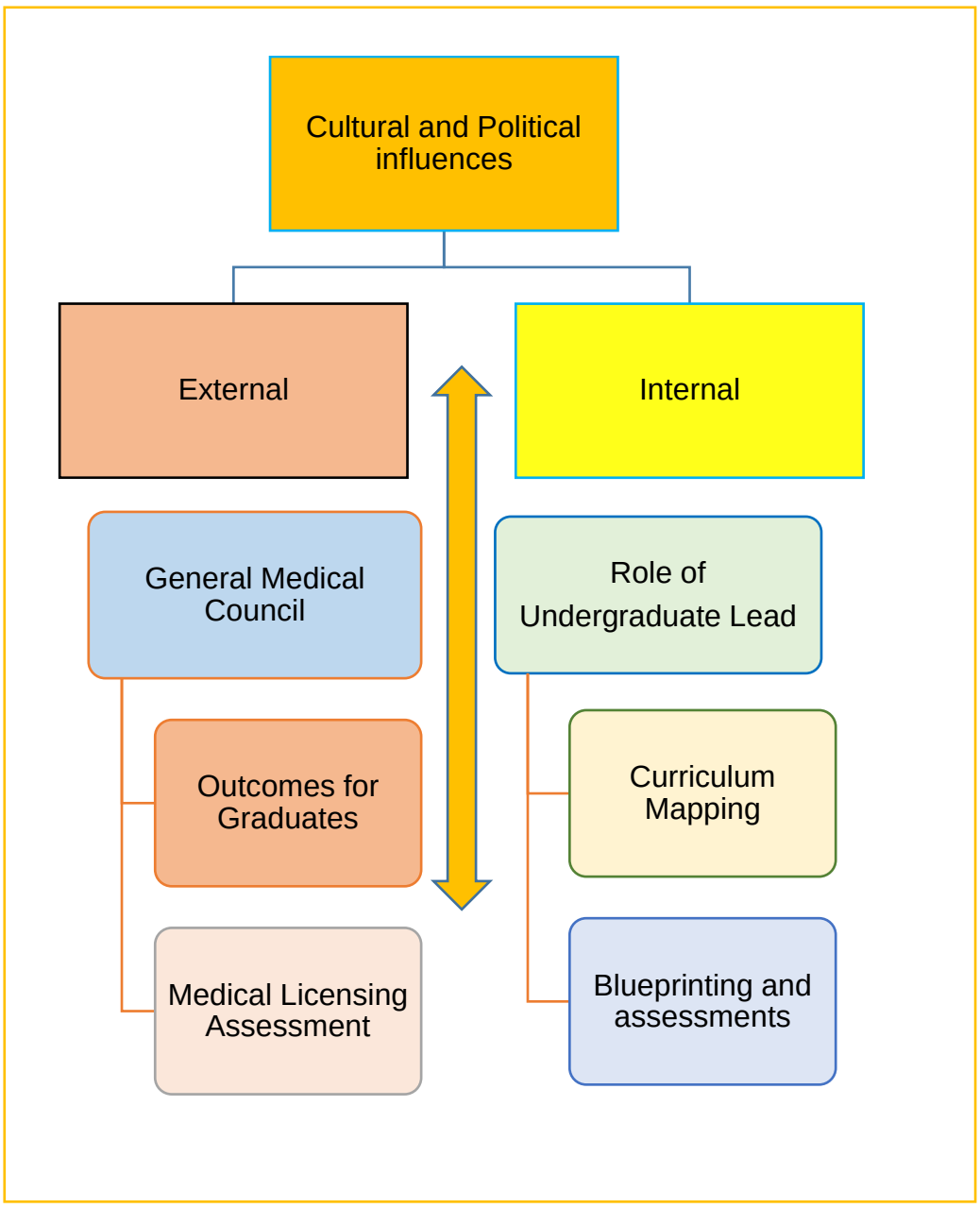

Figure 8: Domains for facilitators and barriers to undergraduate specialty core-curriculum implementation questionnaire survey

10.2 METHODS FOR THE CROSS-SECTIONAL SURVEY

Sample selection (participants) for the questionnaire

Undergraduate teaching leads for dermatology at respective medical schools or their equivalent who were involved in dermatology teaching were considered the most appropriate responders to the questionnaire study. Undergraduate leads for specialties (like dermatology) at medical schools were most likely to be familiar with their national body's (e.g. BAD) specialty undergraduate curriculum. They would be able to identify core specialty-specific learning, teaching and assessments. Their clinical and teaching experience of dermatology would provide a unique insight on what they considered were barriers or facilitators to the national BAD curriculum implementation. Dermatology undergraduate leads would be best placed to answer questions related to duration of dermatology clinical placements, settings and faculty used for teaching dermatology and what factors would help facilitate or hinder the BAD undergraduate curriculum implementation.

Study Design

The questionnaire survey was constructed and designed using examples applicable to medical education research where research is intended to gather data about a medical education programme. Examining the evidence in literature pertaining to barriers and facilitators for curricular implementation helped determine pertinent questions to be included within the survey.

To support their role as medical educator leads, it was considered important to establish if undergraduate leads had experience in medical education or qualifications to enable them to take on the educational responsibilities. It was prudent to ask if undergraduate leads felt whether they had adequate time or funding to support their role, and what other factors influenced implementation of dermatology specific core-curriculum at their medical schools (e.g. NHS service commitments, engagement with medical school). The questionnaire survey would explore if the undergraduate teaching leads at medical schools were dermatologists and if they had any formal medical education training to support their role. It was also important to query if teaching leads responsible for dermatology teaching delivery and curriculum planning were aware of the BAD undergraduate curriculum recommendation and if so, whether dermatology at their respective schools was mapped to national guidance. Also, if teaching leads felt confident in undertaking a mapping exercise and what factors would support and motivate them in doing so. With the expansion of student numbers across medical schools in UK, and a diminished consultant dermatology workforce, it was important to determine the current staff engagement (e.g. dermatology teaching fellows, specialty trainees, specialist nurses) for teaching and assessment delivery of the curriculum and what factors could help specialty representatives to teach dermatology (e.g. Mapping tools, IT and administrative support time & funding etc.)

Ethics

The questionnaire survey was approved by the University of Nottingham Research Ethics Committee (reference number 401-1910) (Appendix 5).

Consent

Participant information was provided and written consent obtained before starting the questionnaire. All questions in the questionnaire were optional i.e. the participant could choose not to answer any question they felt were sensitive or unaware or for any other reason. The nature and subject matter of the questionnaire was deemed not to put the participants at risk.

Piloting of the questionnaire

The questionnaire was sampled, reviewed, revised and piloted by expert panel members to check for suitability, language, relevance (Sharma et al., 2022). The pilot for the questionnaire survey was done amongst six undergraduate teaching leads (previous or current) representing specialties which also had a national undergraduate core curricula developed and recommended for medical schools. These included specialty undergraduate teaching lead Consultants for Paediatrics at two teaching hospital sites, Palliative Care Medicine Consultant, three Dermatology Consultants and ENT Consultant. Paediatrics and ENT were covered within the same academic year for the medical students, with ENT having two weeks' clinical placement like dermatology. Palliative care medicine, though considered important, had no specific clinical placements within the academic year at UoN. A variation in the clinical placements for these specialties allowed a varying perspective from the undergraduate leads on what could determine the barriers or facilitators to specialty curriculum implementation.

The questionnaire was divided into 4 parts. The first part was the role of the dermatology undergraduate lead, the second about dermatology placement at

the respective medical school, the third about dermatology assessments and the fourth about influencers which may impact curriculum implementation (Appendix 6). Questions on clinical placements for students, teaching and assessment methods, faculty involvement and familiarity with specialty specific core curricula and GMC's Outcomes for Graduates document were all considered relevant and could be generalised across other specialties. The approximate time noted for completing the questionnaire during the pilot was 10 minutes. Both open and closed questions were used to help triangulate the data and better understand the perspectives of the respondents at local level as to the challenges faced by them.

In addition, there were three specialty (consultant dermatologists) experts in the content area to test the content validity. After receiving the responses from experts, each item was edited until accepted as highly relevant by experts.

Participant identification and dissemination of the questionnaire

The questionnaire survey study aimed to identify the possible barriers and facilitators to implementation of a recommended national core curriculum using dermatology as a specialty across medical schools.

The questionnaire survey study used 1) undergraduate leads for dermatology at respective medical schools (n=41)

Or 2) equivalent relevant staff or medical deans involved in providing undergraduate dermatology if no undergraduate lead is identified.

Permission was taken from the BAD contact the undergraduate teaching leads who were also BAD members to invite them for participation in the

questionnaire study. In the absence of a designated undergraduate specialty lead, medical school deans were contacted via email to identify the undergraduate lead overseeing dermatology or equivalent person responsible for dermatology at those schools.

Role of BAD administrative support team

The BAD administrative team was formally requested to support the study by helping to identify the participants and for dissemination of the questionnaire (Appendix 7). The participation information sheet and consent (Appendix 8) was followed by the questionnaire which was circulated and disseminated online by the BAD administrative team, as per the BAD Policy for questionnaire surveys using the online survey tool design called Jisc questionnaire (Online surveys, formerly BOS, 2021) supported by University of Nottingham (Sharma et al., 2022).

Adherence to BAD Policy stated: The BAD will not circulate surveys to BAD members on behalf of external organisations.

• *The survey request must be submitted by a consultant or SAS member of the BAD;*

• *The BAD accepts no responsibility for the content of the survey;*

• *Any publication of results should not be attributed to the BAD or its membership and should quote the response ratio of the survey;*

• *The survey itself must contain key information about who is collecting the data and for what purpose;*

The questionnaire study was open for a duration of six weeks in January 2020 (Start date: 20th January 2020 to End date: 3rd March 2020) and reminder emails sent to complete at week four and week five. The anonymised results were sent to the lead researcher. The On-line questionnaire survey (using Bristol online survey (BOS) or JISC questionnaire supported by UoN) was sent to undergraduate leads in dermatology across all UK medical schools by BAD via email. Where no undergraduate lead for dermatology was identified, the questionnaire was sent to the relevant equivalent relevant person /medical deans.

Location of study: Medical Education Centre, University of Nottingham, Queens Medical Centre campus & Nottingham University Hospitals NHS Trust.

Length of study: The length of the study was six weeks

Data analysis

All participants were anonymised in the questionnaire and no personal data was collected. The responses were stored as per the Bristol online questionnaire that is password protected. All data was password protected and stored on a UoN Microsoft OneDrive facility. SPSS and NVivo or equivalent software was used for data analysis, which was also password protected.

Data was stored in accordance with the General Data Protection Regulation (GDPR) and Data Protection Act 2018 and analysis performed using Microsoft Excel software (Sharma et al., 2022). Both quantitative and qualitative data

was collected and analysed. A MMR was used with closed questions and open free text responses to provide quantitative as well as qualitative data and analyses considered with use of SPSS Statistical analysis software (Arkkelin, 2014) and NVivo software (Wong, 2008).

Descriptive statistics was used to describe participant characteristics. Categorical data were presented as percentage and frequency.

For the free text responses, content analysis was used to identify and code emergent themes that captured the perception of barriers or facilitators for curriculum implementation. To ensure the rigour of the analysis, constant comparison methods were used to assess similarities and differences in the themes gathered via the open-text responses (Hewitt-Taylor J, 2001). Identified themes were documented and discussed with co-authors and a final coding framework was developed. A single response could be coded to more than one theme.

For the thematic analysis on free text responses, a contextual framework for comments and responses of participants' own experience at their school was constructed by: (1) factors that determined if dermatology was taught and assessed at their school, (2) barriers to specialty curriculum implementation, and (3) facilitators to dermatology implementation (Sharma et al., 2022). The analysis helped to identify aspects the undergraduate teaching leads considered helpful or hindered implementation of undergraduate dermatology curriculum at their respective schools. The content of the comments helped derive the coding and sub-themes that emerged. Codes with similar meaning were merged into subthemes and these were mapped onto

overarching themes. In addition, free-text comment boxes provided throughout the questionnaire asked participants if there were thoughts or opinions they would like to add about their experiences. The Standards for Reporting Qualitative Research (SRQR) guidelines to report the qualitative findings were used (O'Brien et al., 2014, Sharma et al., 2022).

10.3 RESULTS OF THE CROSS-SECTIONAL SURVEY

Analyses of the results of the study was conducted under the sub-headings of the questionnaire: role of teaching leads, current practice for dermatology undergraduate education and placements, the role of GMC and upcoming MLA, tools to help curriculum implementation (e.g. mapping, blueprinting and assessments) and any perceived barriers and facilitators for specialty core curriculum implementation at respective schools (Sharma et al., 2022).

Quantitative descriptive analysis of the cross-sectional survey

Characteristics of teaching leads

Thirty out of forty two schools responded to the questionnaire survey (71%). No comment could be made about geographical spread of individual medical schools, since the results of the questionnaire were returned anonymously . (Sharma et al., 2022). Of the 30 sites which responded to the survey, 29 reported having an undergraduate lead for dermatology at their medical school. 23/30 (69%) responders reported having an undergraduate lead for dermatology, of which 16 responders (53%) were currently in their role as

dermatology undergraduate teaching leads. Eight led at University level, seven each at Trust level or Department level and one represented all three levels i.e. University, NHS Hospital Trust and Department levels. Of the remaining 14 responders to the survey, who were not the undergraduate lead at their medical school, more than half of them (8) had either current or past experience in undergraduate teaching either as teachers in undergraduate dermatology. These were dermatology consultants with dual roles as clinicians as well as responsible for dermatology teaching at their respective schools (Sharma et al., 2022). Five others had either been an undergraduate lead or had taken on academic roles as curriculum director or senior lecturer. One survey participant reported dermatology being taught in the general practice module (Sharma et al., 2022).

Teaching qualifications amongst the undergraduate leads to support their role was variable. More than half of the responders had attained further medical education qualification towards enhancing their role as educators. Eleven (36%) reported having no teaching qualifications; nine had a postgraduate certificate in medical education; five had a masters in medical education, three had a postgraduate diploma, one had supplemented their medical education through online courses and one was a fellow of the higher education academy (FHEA) (Figure 9).

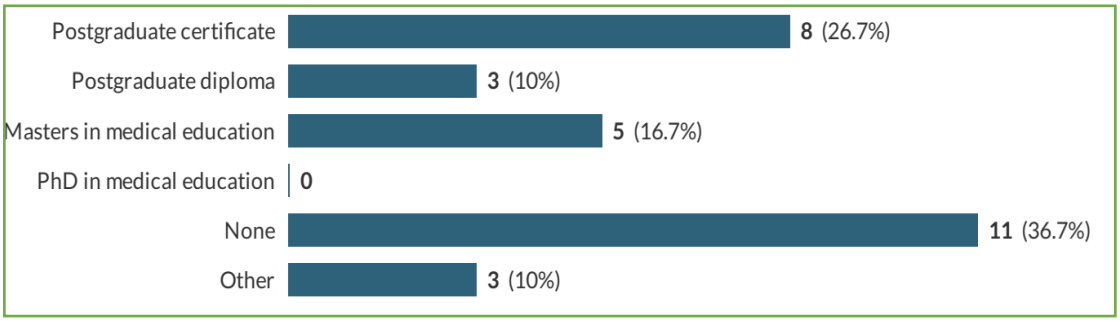

Figure 9: Medical education qualifications attained by undergraduate dermatology teaching leads (Adapted from Sharma et al., 2022)

The use of appraisal, to both support and develop the teaching leads, was not routinely used as part of professional development. In 26 responders, 17 (65%) underwent a formal appraisal for their undergraduate lead role and felt this helped their progression and reflection on educational related activities. A third of the responders (10 out of 28) responders reported not having a yearly appraisal for their role for undergraduate educational activities. Six out of thirty had no allocated time in their job plans towards educational activities for medical students, despite their contribution to teaching.

Dermatology representation in medical schools

Dermatology was a compulsory placement at 26 (89%) medical schools. The length of placement at medical schools varied. Dermatology placement was limited to less than five days in eight of the schools; six schools had one week placement, six schools had two weeks' placement and three schools had four weeks' placement. Only two schools had five weeks placement and one school had no dermatology placement at all (Figure 10) (Sharma et al., 2022).

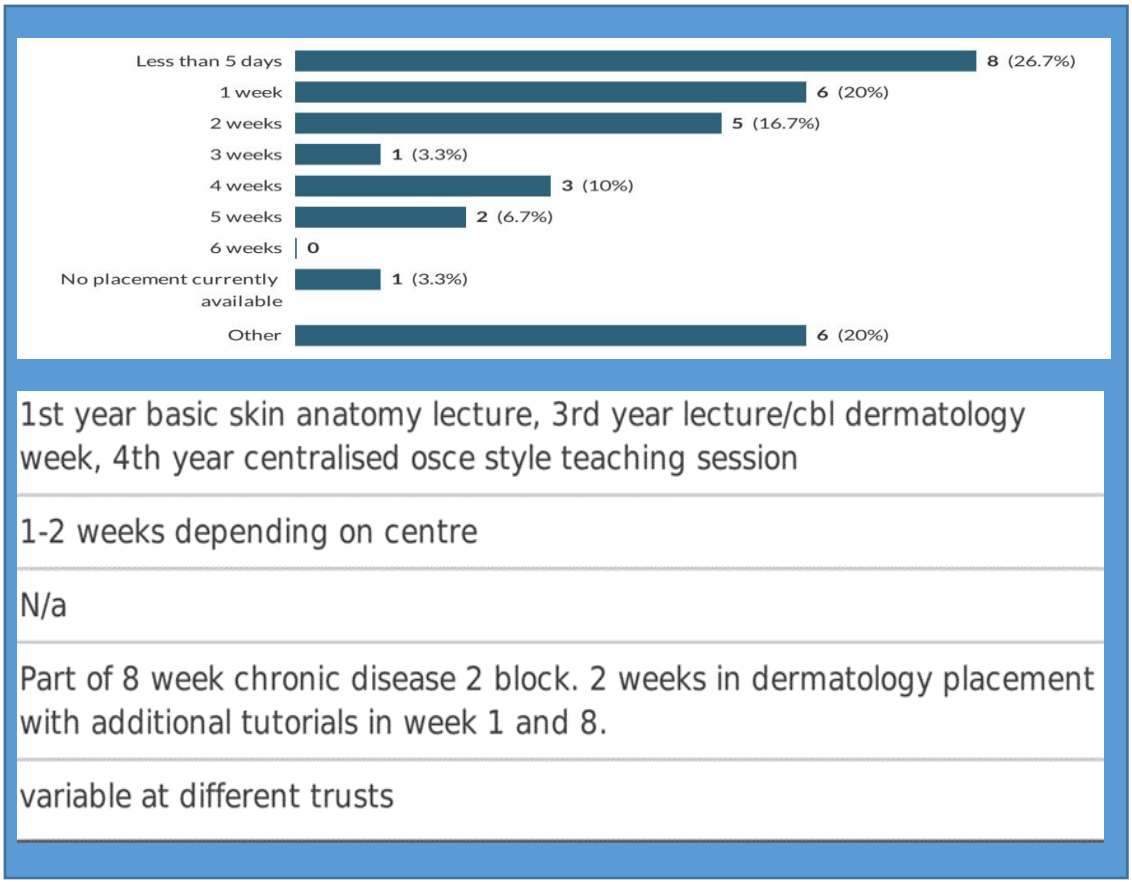

Figure 10: Dermatology representation at medical schools

Dermatology clinical teaching for medical students occurred most frequently in secondary care consultant outpatient clinics (86%), along with specialty trainee clinics (63%) and attending specialty nurse clinics (53%). Teaching opportunities were present during tertiary specialist clinics (33%), at ward rounds and inpatient referrals (30%), General practitioners with a specialist interest in dermatology (GPwSI), specialist dermatology nurses and teaching fellows in dermatology also contributed to undergraduate teaching (16% each) (Sharma et al., 2020). Doctors who were postgraduate dermatology trainees contributed towards the wide level of teaching staff being involved with medical student teaching in their clinical placements (Figure 11).

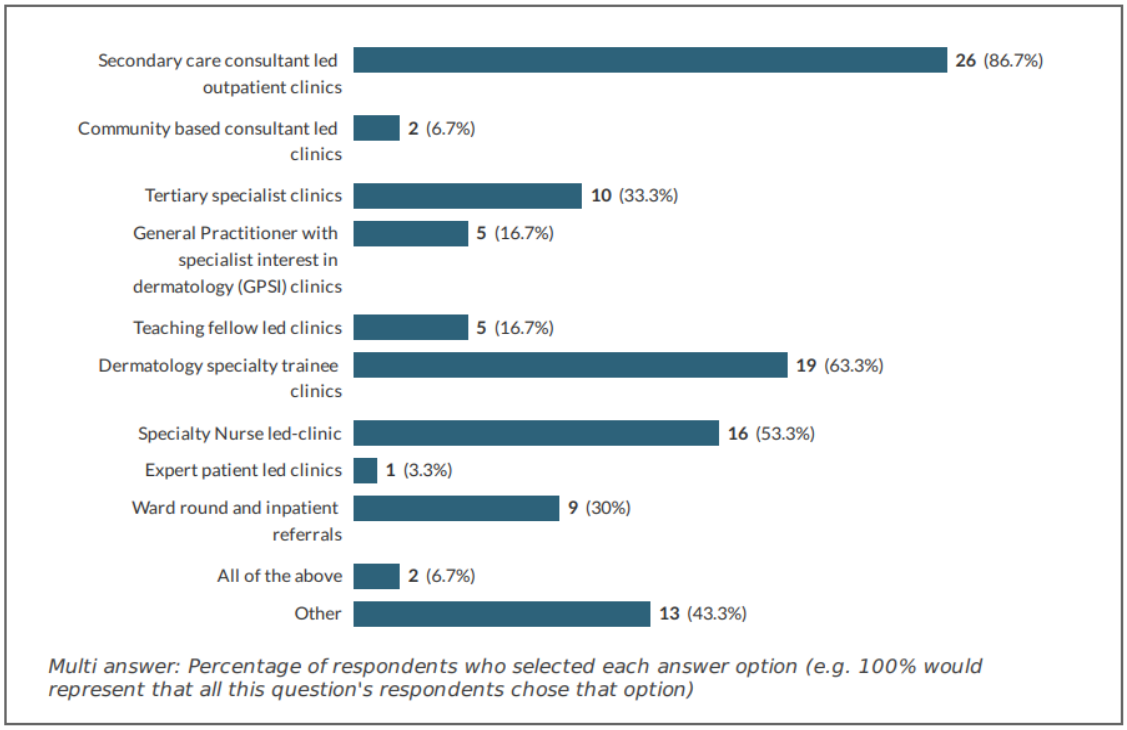

Figure 11: Dermatology clinical placements for student teaching (Adapted Sharma et al., 2022)

Curriculum mapping with national (BAD) recommendations

Twenty-six (86%) of the 30 survey participants were aware of the undergraduate curriculum recommended by the BAD. However, only 13 (43%) were aware if dermatology at their medical school was mapped to the BAD curriculum (Figure 12) (Sharma et al., 2022).

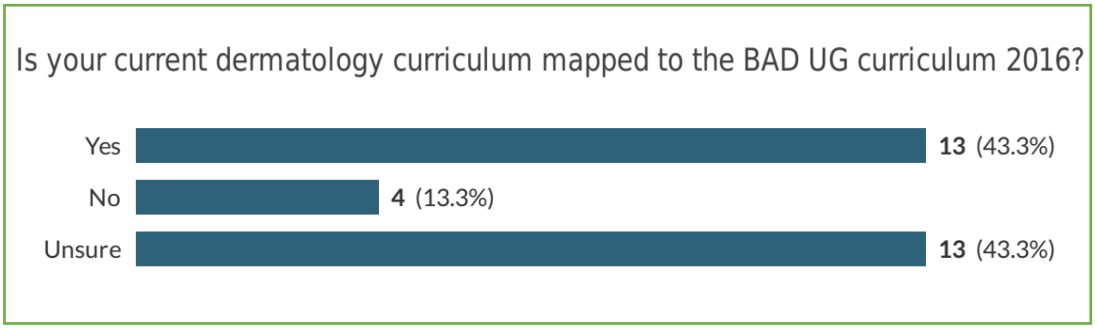

Figure 12: Is your current dermatology curriculum mapped to BAD?

Over half (17) the responders were not confident or only slightly confident regards undertaking a curriculum mapping exercise (Figure 13). Facilitating factors for undergraduate leads to conduct a mapping exercise included medical school support (e.g. IT, administrative) (76%), funding and time (63%), use of mapping tools (60%) and faculty training (50%) (Sharma et al., 2022). Most of the participants (20/30) favoured curriculum mapping to be undertaken at the school level by the curriculum lead and team, with teaching leads providing specialty input (Sharma et al., 2022).

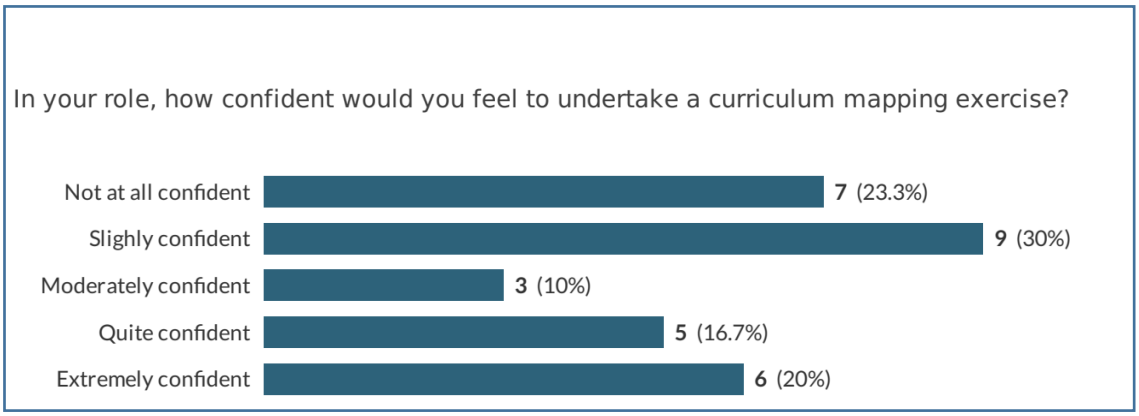

Figure 13: Confidence in undertaking a curriculum mapping exercise

Factors to facilitate curriculum mapping exercise

Respondents were questioned on what would facilitate them undertaking a curriculum mapping exercise at their respective medical schools. They were also provided options of training of the undergraduate faculty in conducting the mapping exercise, use of mapping tools, support from medical school with IT and administrative input, and asked whether this was a task to be undertaken by the medical school team with input from the specialty undergraduate leads. Also, if funding and time would help support mapping of the dermatology curriculum at the individual schools.

In the survey, medical school support was considered important to curriculum mapping, both from an IT and administrative perspective (22/30) as well as role of the medical school curriculum team (18/30). Funding and time to support the activity (18/30), training of faculty on how to conduct curriculum mapping and enabling them to learn with use of mapping tools were other factors that respondents felt would help. Five respondents stated all were equally important factors to help facilitate mapping dermatology within their medical school curriculum (Figure 14).

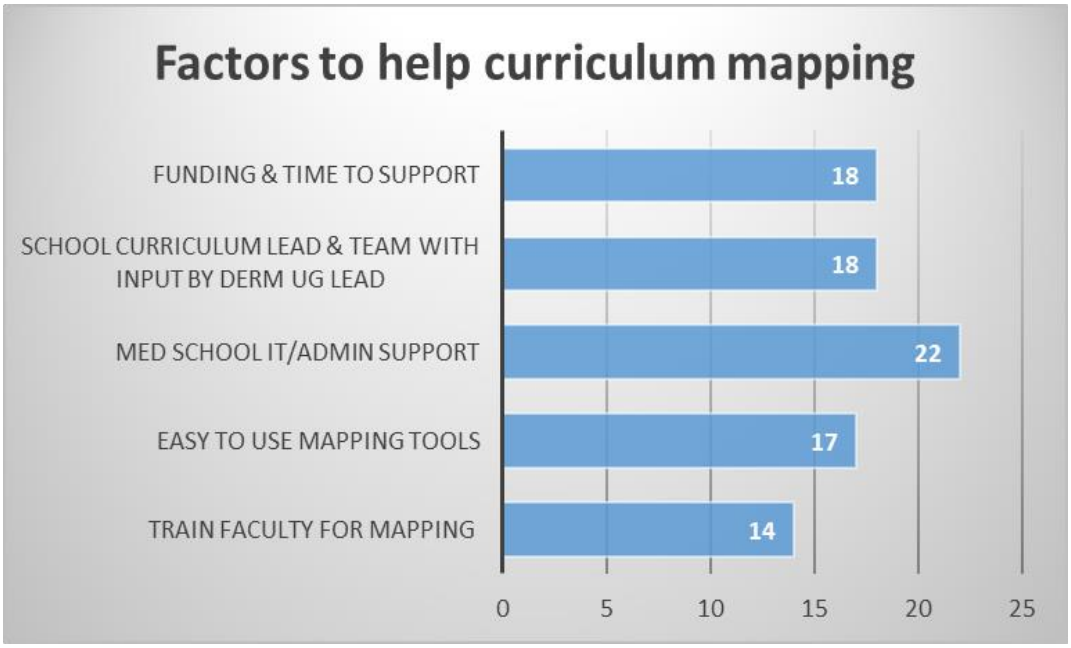

Figure 14: Factors helping teaching leads to perform curriculum mapping

MLA and blueprinting of assessments

With the MLA via the GMC expected to be rolled out in 2024-25 for all UK medical students, participants were asked regarding its role in curriculum implementation. Over half 16/30 (53%) the participants in the survey were unaware of the upcoming MLA (Sharma et al., 2022). As a result, they were unclear how the MLA would impact dermatology teaching and assessments at their respective medical schools (Figure 15) (Sharma et al., 2022).

Figure 15: Are you aware of the Medical Licensing Assessment (MLA) being introduced by the General Medical Council?

Regarding dermatology assessments at their respective medical schools, 15/30 (50%) of the participants were unaware if dermatology assessments were blueprinted on their medical school curricula (Sharma et al., 2022). However, dermatology was being assessed in the school curricula via some form of formative or summative assessments or both. Formative assessments encompassed use of computer based multiple choice questions (MCQs), extended matching questions (EMQs), electronic learning log and interactive online clinical cases. Clinical experience and skills in dermatology were assessed with OSCEs, case-based discussions (CBD), mini clinical examinations (mini- CEX), practical skills like suturing and taking skin swabs, clinical prescribing and use of logbooks. For summative assessments, the majority of the schools 19/30 (63%) used a combination of both MCQs/EMQs

for knowledge-based assessments and OSCEs for skills assessments (Sharma et al., 2022).

Facilitators for implementation of dermatology assessments in year-end medical school exams included funding and time to support these exam activities, use of assessment templates, medical school support (e.g. IT, administrative) and faculty training to write assessments (Sharma et al., 2022). Nineteen out of thirty (63%) responders felt that writing examination questions and clinical assessment preparations should be undertaken by the medical school's assessment team with specialty input from the undergraduate teaching leads. Whilst half of the participants reported that dermatology assessments were being blueprinted to their school curricula, 40% were unsure (Figure 16).

Figure 16: Are dermatology assessments currently blueprinted to your medical school curricula?

Dermatology assessments: formative

Formative assessments were undertaken in 26 of the 30 responders' medical schools. There were no assessments at 2 schools for dermatology and another 2 were unsure if dermatology formed part of assessments at their medical schools. There were only 2 schools which provided all the 7 listed formative assessments in the questionnaire, namely use of MCQs, EMQs,

OSCEs, logbooks, Mini CEX, CBD, practical skills, and clinical prescribing. Assessment methods varied across different medical schools, though all schools which had formative assessments used at least 2 methods to assess students. The most common method of formative assessment was using MCQs and EMQs, which was used in 16/26 medical schools. Logbooks were used in 14 sites, CBDs in 13 schools and clinical OSCEs in 12. Interestingly, clinical prescribing was assessed by only 8 schools (

Figure 17).

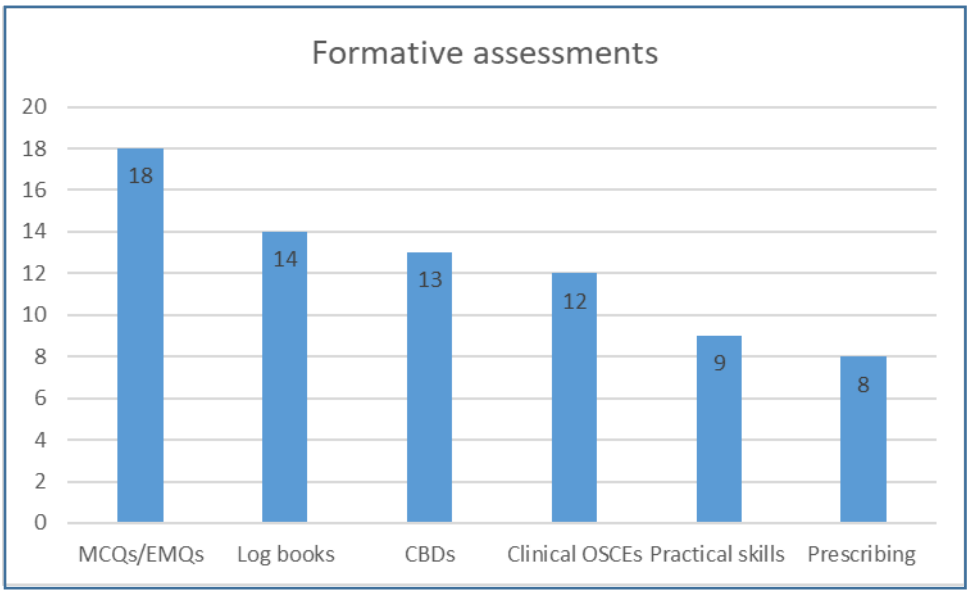

Figure 17: Types of formative assessments for undergraduate dermatology

Online methods of assessments were specifically mentioned by 2 schools, using an interactive online case and an electronic learning log.

Dermatology assessments: summative

Out of 30 responders, 28 had summative assessments for dermatology at their medical school; one had no assessments for dermatology and another was

unsure if there were summative assessments for dermatology. The most common method to assess dermatology was via MCQs and EMQs, where 20 schools used this method. Sixteen schools in addition had clinical assessments in the form of OSCEs. Four schools also examined logbooks alongside MCQs/EMQs and OSCEs. Four schools had only MCQs/EMQs as summative assessments with no clinical examination. Clinical prescribing for dermatology was part of summative assessment in only medical schools (Figure 18).

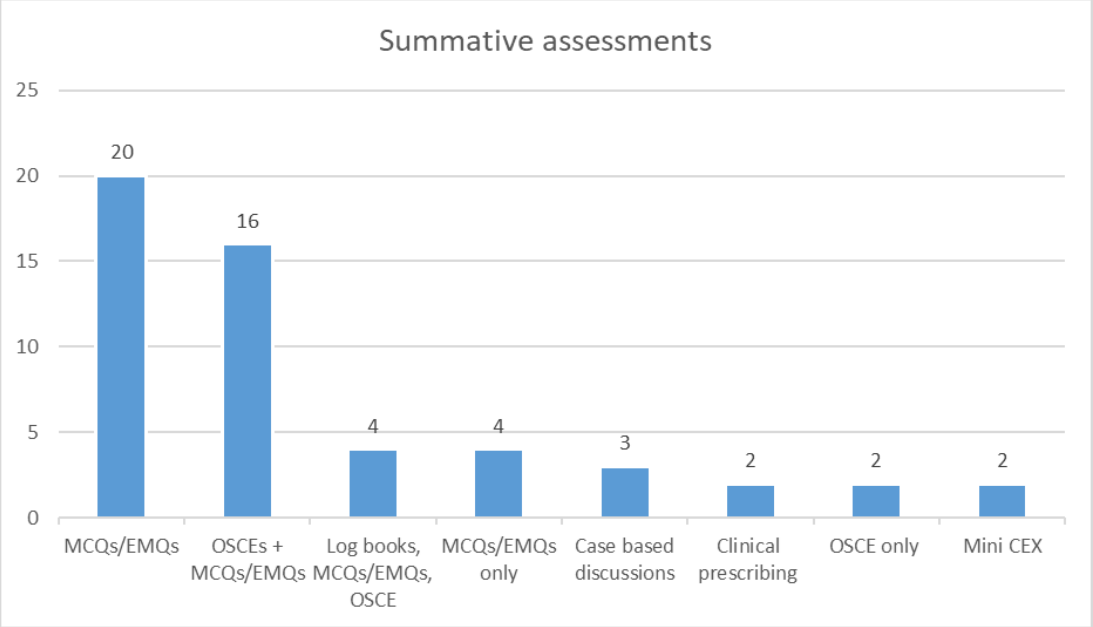

Figure 18: Types of summative assessments for undergraduate dermatology

Factors facilitating dermatology assessments

As with the survey question on curriculum mapping, 19/30 (63%) responders felt assessment activities should be undertaken by the medical school assessment team along with the input from the dermatology specialists (Sharma et al., 2022). Nearly half 14/30 (43%) of the responders felt that

funding and time needed to be allocated to support activities for assessments and easy to use templates would help in the writing and preparing for assessments. Training the faculty and medical school support via IT and administrative help were also important factors determining facilitation of dermatology assessments at respective medical schools (Figure 19).

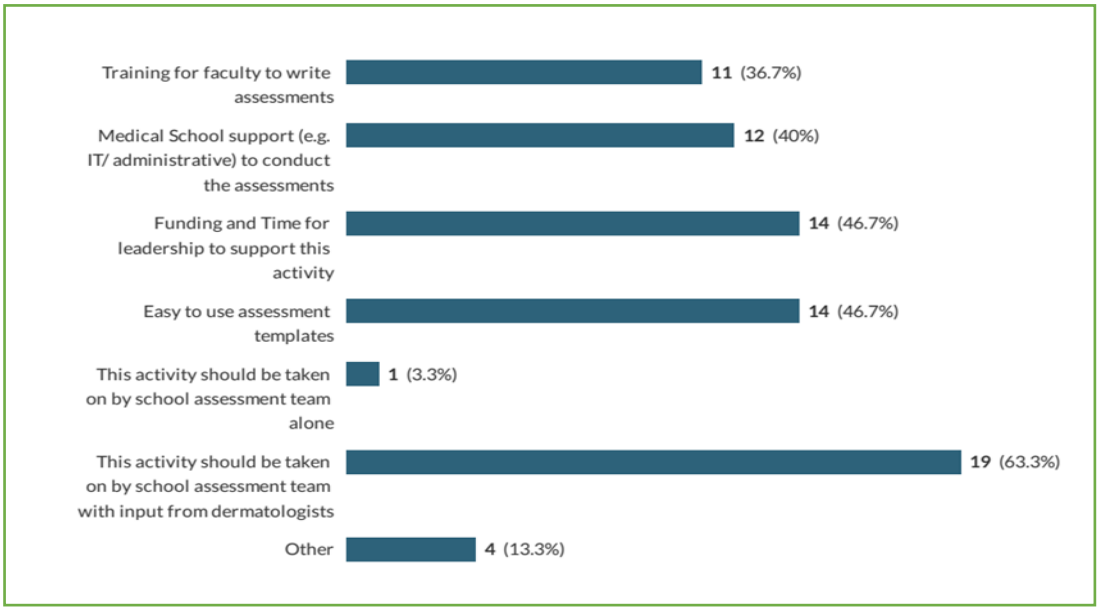

Figure 19: Factors facilitating dermatology assessments (Adapted from Sharma et al., 2022)

Barriers to dermatology curriculum implementation

The two main factors reported as barriers to dermatology curriculum implementation were: the NHS service commitments for dermatologists and dermatology not being a priority for medical schools. Half the respondents (15 out of 30 (50%) felt that NHS clinical work hampered the ability of dermatology teachers in implementing the dermatology curriculum at their medical school. Almost half (48%) respondents also felt that dermatology did not feature highly amongst the medical school programme. This was compounded by challenges in influencing real change at medical school level for the specialty and not finding space in the current school curricula for dermatology teaching and assessments. 25% felt the external influence of GMC on medical schools was not helpful in implementation of dermatology in the school curricula as the Outcomes for Graduates document was deemed to be too generic. Seven schools felt they had no barriers to implementation of the dermatology curriculum at their medical school, while 3 (11%) felt that the curriculum in its current format was not implementable (Figure 20).

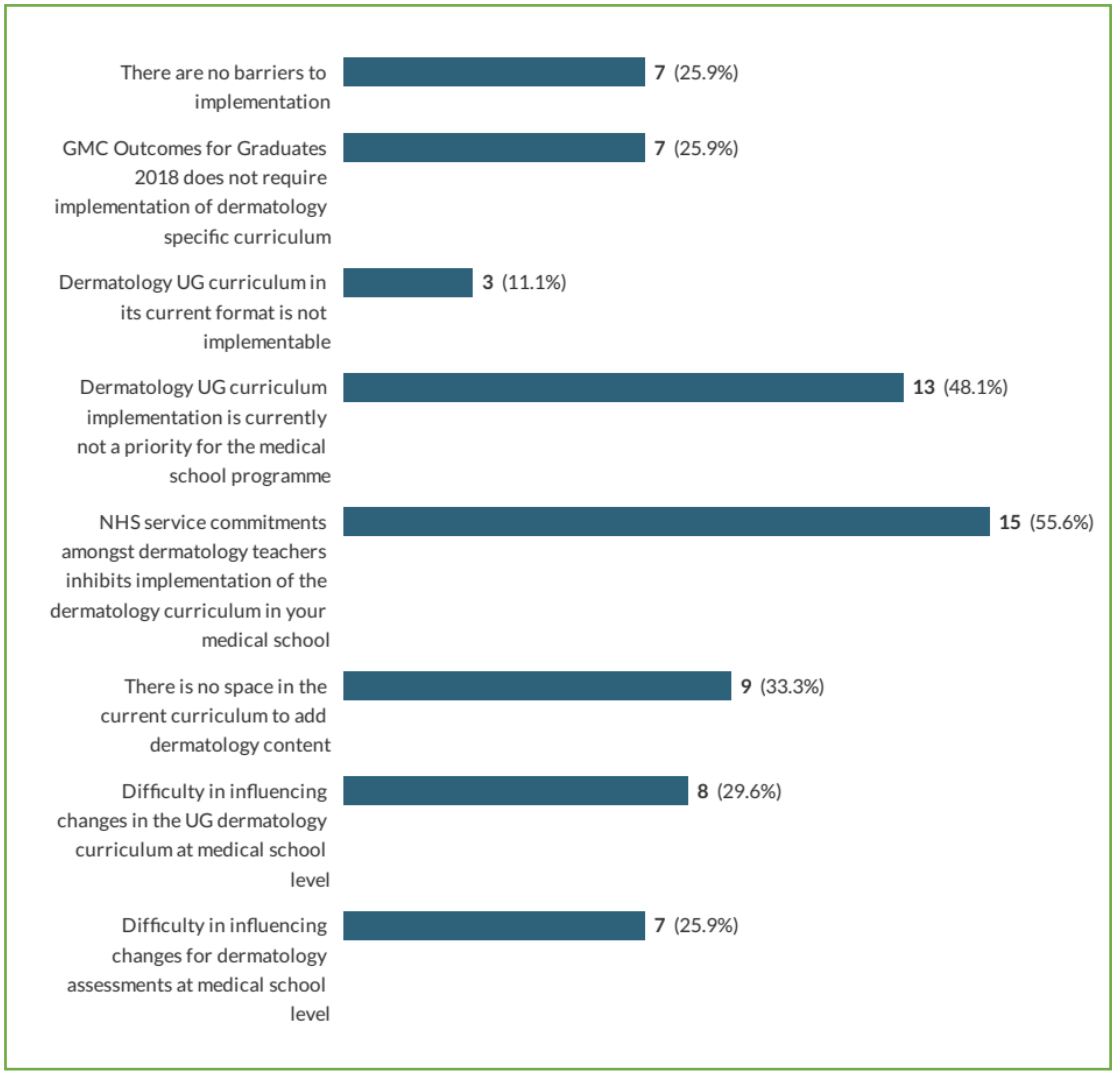

Figure 20: Barriers to dermatology curriculum implementation (Adapted from Sharma et al., 2022)

Facilitators for dermatology curriculum implementation

Dermatology specialty curriculum implementation was perceived to be facilitated by the presence of an undergraduate dermatology teaching lead, and their own commitment and input towards driving dermatology undergraduate education. The availability of dermatology clinical staff and their enthusiasm toward medical student teaching helped in curriculum delivery (Sharma et al, 2022).

Recognition of educational leadership with transparency in funding were considered important to enable curriculum facilitation. Over 85% (23/30) of the survey participants felt the need to have more numbers of dermatology teachers through workforce planning. This could be achieved with interprofessional (IPE) learning via specialist nurse-led teaching and General Practitioners with specialist interest (GPwSI) in Dermatology, as well as including different grades of trainers like teaching fellows and specialty registrars as part of teaching faculty. Student feedback suggesting a lack of dermatology within the curriculum as well as collaboration with dermatology research faculty were other facilitators. Majority (74%) felt that transparency of funding for teaching as well as recognition of leadership role in undergraduate dermatology teaching through structured job planned activities (55%) would also help support the implementation of the specialty in the medical school curriculum (Figure 21) (Sharma et al., 2022).

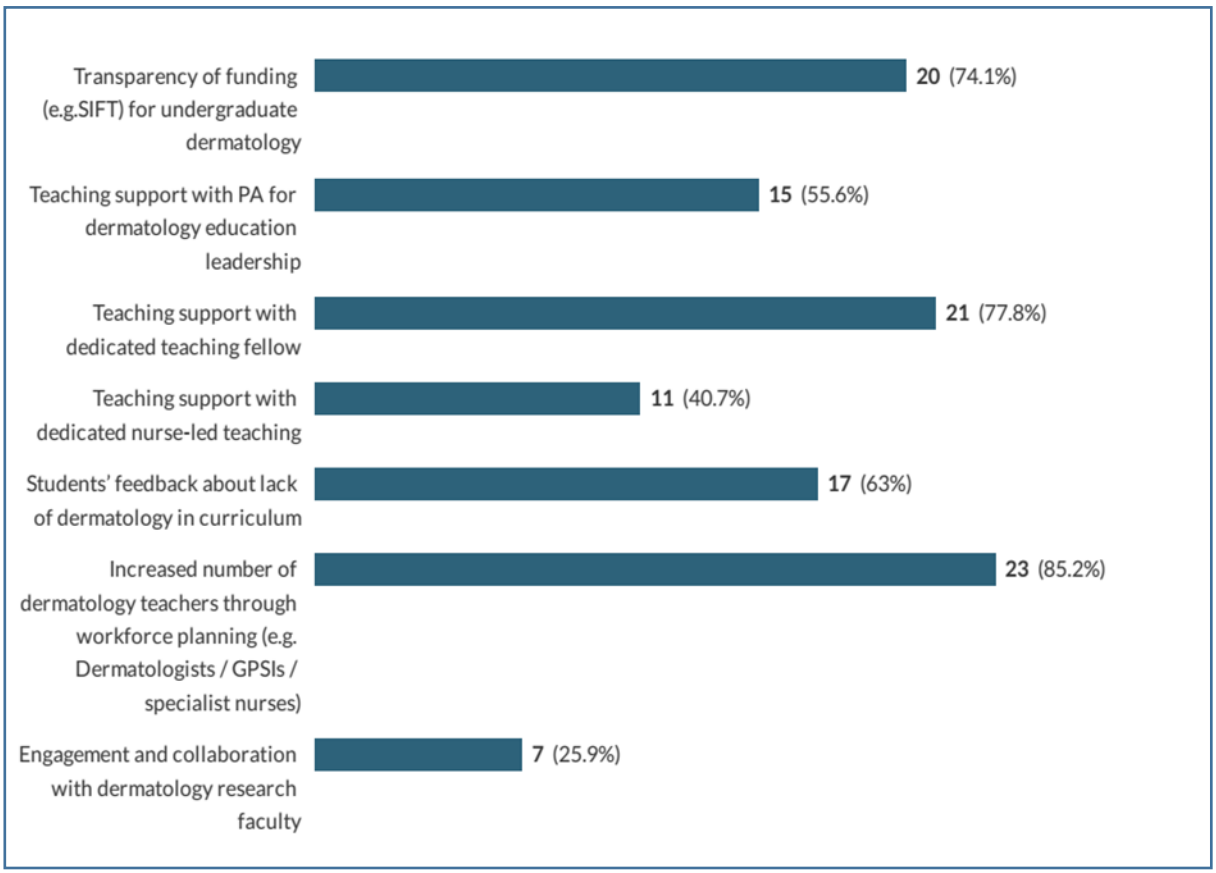

Figure 21: Facilitators to dermatology curriculum implementation

Qualitative analysis and perceived barriers & facilitators in the cross sectional survey

There were a total of 50 responses to the three free text questions pertaining to determinants of dermatology teaching and assessments at the respective medical schools and the perceived facilitators or barriers to specialty curriculum implementation (Sharma et al., 2022). Recurring themes were noted in the comment boxes, indicated by similar comments. An individual respondent could contribute to more than one subtheme if their free-comment covered several issues. These comments with shared similar meaning were amalgamated into subthemes (Sharma et al., 2022). These subthemes were categorised under clinical teachers or staffing; engagement at curriculum/medical school level for dermatology as a specialty; funding/ recognition for teaching and relevance of undergraduate specialty leadership to support curriculum implementation (Sharma et al., 2022). The free text comments provided concurrence to the quantitative data on barriers to specialty curriculum implementation. Half the respondents (15/30) felt that busy NHS service commitments meant there was inadequate time for undergraduate teaching. Thirteen (48%) felt dermatology was not deemed a priority in medical school curricula or that the current school curricula had no space to add dermatology. Undergraduate leads (33%) felt dermatology was being marginalised at medical schools in favour of other subjects. More than a quarter respondents felt it was difficult to be able to influence changes at medical school level for undergraduate dermatology curriculum implementation and assessments (Sharma et al., 2020). The summary of

subthemes are illustrated with quotes in qualitative data table 8, table 9 and table 10.

Table 8: Summary of subthemes for 'in your experience or clinical practice what factors determine whether dermatology is taught and assessed at your school' (Adapted from Sharma et al., 2022)

Themes	**Sub-Themes**	No. of comments	Quotes (examples)
Facilitators/Barriers	Clinical teachers/ staffing	6	Specialty input from enthusiastic teachers Good support and guidance from dermatology consultants It is always taught within our department. We are a small department and make every effort to create a timetable to fulfil curriculum requirements How keen the dermatologists are to engage
	Curriculum/Medical school	6	Up until now dermatology teaching has been good. However the curriculum is under review and we are being marginalised and the amount of dermatology teaching is being drastically reduced Engagement with medical Dean, curriculum planners and assessment teams We are undergoing curriculum review at present, Dermatology will still be taught on the new curriculum but the emphasis will be taken away from secondary care led teaching complimented by primary care, to what looks to be a more primary care driven model, complimented by secondary care. Constructive alignment dermatology is core to our UG medical programme therefore it is mapped and blueprinted within our summative assessments
	Recognition	3	It's certainly not influenced by dermatologists not enough time or assessment, or support for local hospital teaching

	UG Lead	5	Pressure from undergrad lead (regional) This is a new world to me - that I am progressing out of the need to improve UG teaching in dermatology - but this is done as best I can without dedicated time to do this (but job planning due imminently - so this can be formally factored in) Having a Consultant specialist lead with an interest in medical education and commitment towards clinical dermatology being taught and assessed at school Input from Dermatology undergraduate lead and consultant and SAS buy in
		Total:20	

Table 9: Summary of subthemes for 'in your experience or clinical practice what factors would you consider as barriers to implementation of the dermatology curriculum' (Adapted from Sharma et al., 2022)

Sub-Themes	No. of comments	Quotes (examples)
Clinical teachers/ staffing	5	Lack of Dermatologists in local hospitals where students do 'Medicine' attachments (during which Dermatology experience is meant to be gained) Unwillingness to teach Not sure if there are barriers ... just need time to ask the questions and immerse myself in the all the proposed changes - and to make contact with the leads and offer help to develop the programme the offer from district general hospitals
Curriculum/Medical school	5	Dermatology is dealt with reasonably well because we were responsible in curriculum design but enlargement of student numbers and difficulty in concur Pressure on the curriculum The BAD curriculum is rightly ambitious and comprehensive, but it cannot be delivered when the medical school only allows an x day clinical placement. On the other hand, with currently available clinical resources in dermatology in the region, and levels of willingness to take students in clinic, it would be difficult to increase the duration.
UG Lead	2	Less SPA time for teaching UG Lack of time for dermatology educators. My job plan has 0.25 SPA which is for undergraduate and post graduate education support. I am TPD for dermatology trainees as well at my hospital.
Clinical pressures	3	Overbooked clinics Long waiting lists Workload volume
	Total:15	

Table 10 Summary of subthemes for 'in your experience or clinical practice what factors would you consider as facilitators to implementation of the dermatology curriculum' (Adapted from Sharma et al., 2022)

Sub-Themes	No. of comments	Quotes (examples)
Clinical teachers/ staffing	4	-If we had more people with time to teach, we would just need more time with the students -We have a teaching fellow, changes each academic year - for us this is a registrar who helps with course development and delivery, in return the trust funds a PGCE or equivalent. They do the PGCE in their own time and have no actual time allocated to their role but it is still a great help and popular with registrars to date -Staffing issues -Teaching fellow
Curriculum/Medical school	6	-Being on good terms with colleagues at other trusts in the same medical school - Development of awareness around importance of learning Dermatology, as its often considered as not so important specialty, despite of skin being the largest organ of the body - Flexibility in the timetable to facilitate thread of dermatology throughout undergraduate education from clinical skills through to final year - National lesson plans e.g. updated e Lectures, CBD, etc. mapped to realistic set of curriculum requirements - Medical school agreeing to find time in student time table for dermatology - Adequate administrative support
Recognition	3	-Recognition for teaching -The biggest factor is recognition by the NHS of the importance of teaching in delivering current and future care. It is the first role / activity to be dropped by management and colleagues when workforce shortages occur , yet it is the biggest driver for our future workforce to join the dermatology faculty of clinicians

UG Lead	2	-Regular meetings of module leads with the med school dermatology lead as already happens at our medical school. -Increased support and time in my job plan and SIFT funding

From the analysis of the quantitative and qualitative data in the questionnaire survey, the main domains deemed pertinent to specialty specific (dermatology) core curriculum implementation were: (1) awareness of the role of the GMC and the planned MLA for all UK graduates in 2024-25, (2) need for medical education training for specialty teaching educators, (3) lack of recognition and resources for undergraduate leadership (4) development of educational skills to map, blueprint and assess specialty core components and (5) engagement between medical schools and specialties (Sharma et al., 2020).

11 FACILITATORS AND BARRIERS TO IMPLEMENTATION OF SPECIALTY CORE CURRICULA: PERSPECTIVES OF DEANS OF MEDICAL EDUCATION

The cross-sectional questionnaire survey of undergraduate dermatology specialty leads at UK medical schools identified important facilitators and barriers to specialty-specific core curricula. More than half were unaware of the educational directives from the GMC, like the upcoming national MLAs. With only a third of the participants having an additional medical education qualification, the study reflected the need for undergraduate specialty leads to be supported on aspects essential to curriculum implementation, like curriculum mapping and blueprinting of assessments. Allocation of adequate time and funding towards educational activities were considered important for recognition towards their role as medical educators, as most of the undergraduate leads were busy clinicians. There was also the perception of cultural barriers and lack of engagement between the stakeholders, namely the NHS Trusts and medical schools, with the specialty.

The Medical Schools Council (MSC) is the representative body for UK medical schools. The council consists of the heads of UK medical schools and is established to shape the future of medical education in the UK (Medical schools councils, 2018). The mission of the council is to be the authoritative voice of all UK medical schools, with the aim to maintain and build relationships between universities and the NHS (Medical schools councils, 2018). The MSC enables medical schools to work together at the national level

and positively influence the development of medical education across health organisations (Medical schools council, 2018).

It is unclear how medical schools balance the drivers for university education cognizant of the need to produce doctors with the medical competence, in particular specialty-specific curricula needed for the patient population. The purpose of conducting semi- structured interviews for the research study was to gather information from participants who have experiences, attitudes, perceptions and beliefs related to the topic of interest (DeJonckheere and Vaughn, 2019).

11.1 RESEARCH PROTOCOL AND METHODS

Study Design

Rationale for semi-structured interviews of Deans of medical education across UK medical schools: rationale

The need for cohesiveness and meaningful engagement between clinical educators and medical education departments at university or medical school level was apparent in the questionnaire survey study, as elicited in the previous chapter. The undergraduate teaching leads in the survey had reported feeling that their specialty was being marginalised with little ability to impact change at university level (Sharma et al., 2022). In a survey across members of the German medical education board, medical educators faced similar challenges with limited academic recognition, and insufficient institutional and financial support (Huwendiek et al., 2013). The deans of medical education across UK schools were identified as an important group of individuals with

sufficient knowledge and experience for the purposive sampling in this research study (Cresswell and Plano Clark, 2007). Semi-structured interviews as a qualitative research method was considered the most appropriate, as an adjunct to the MMR in this setting. Researchers can use semi-structured interviews to collect new, exploratory data related to a research topic, triangulate other data sources or validate findings through member checking (Lincoln and Guba, 1985). The richness of information gathered through the perspectives of the deans of medical education, would provide an insight and understanding on the factors which help or hinder implementation of a specialty core-curriculum in the UK.

Ethics

Ethics approval was sought and approved from the Research Ethics Committee, UoN (Research Ethics reference no: FMHS363-1021) (Appendix 9). A participant information sheet was prepared outlining the aim of the study, the method of interviews (via MS Teams), the time required and the benefits and risk of participation. All participants were required to give up a small amount of personal time. All questions were optional and participants could choose not to answer any question they considered sensitive. All participants were informed that participation or withdrawal would not affect their role in any way**.** Consent was obtained via electronic consent forms for the semi-structured interviews prior to conducting the online interviews.

Development of the topic guide

Using a constructivist approach from data and knowledge gathered from the research methods as elicited in the previous chapters, interview questions were developed, using open and closed questions. These related to qualifications, leadership, clinical course, and factors relating to stakeholders involved in curriculum implementation. The themes and domains identified provided a framework for the interview topic guide. The interview topic guide was used to outline the planned topics and questions to be addressed, and arranged in a structured format (Appendix 10).

Pilot for the interview questions

The interview questions were drafted, sampled, reviewed, revised and piloted six members involved in undergraduate medical education at UK medical schools. These were four dermatology Consultants and included the BAD undergraduate Teachers' committee lead and two medical education team members responsible for curriculum implementation. The members reviewed the interview questions pertaining to its language, wording and relevance. At this point in the process, questions were modified accordingly due to leading question. Following the initial reviews, the questions comprised of curriculum review, stakeholders for curriculum implementation and the barriers and facilitators which were the central questions that were tested in the pilot work and researcher used probing questions. The aim of the pilot study was to test the appropriateness of the questions and to provide researcher with some

early suggestions on the viability of the research. It facilitated the researcher to obtain experience in conducting in-depth, semi-structured interviews and to build rapport with the informants. It also helped the researcher to learn the skills in interviewing and the flow of conversation.

Participant sampling

Semi-structured interviews were conducted with select UK deans of medical education as a purposive sampling, to understand what facilitates and hinders the implementation of a national recommended core-curriculum, with dermatology as a specific specialty-subject.

Permission was sought and obtained from the Medical Schools' Council (MSC) to contact all the deans of medical education across UK via email, with a short introduction letter explaining the research project briefly and the importance of the participant's role in the research. However, due to the Covid-19 pandemic (2019-2021), there had been a significant workload burden across medical schools and initially, the interview invites were deferred by the MSC. A further invitation was sent as requested at a later date and allowances made regarding timing and duration for the interview schedules. The numbers of interviewees were reduced to 3-5 due to the exceptional and extenuating circumstances.

The participant information sheet (Appendix 11) and the prepared interview topic guide using open-ended questions, was shared with the participants prior to the interview via email. Participants signed a consent form via email

correspondence before commencement of the interviews, after reviewing the interview topic guide and the participant information sheet (Appendix 12).

Interview schedule & Transcription

All interviews were conducted using MS teams via a virtual platform to allow flexibility and feasibility in the context of Covid-19 pandemic and changes to working patterns at universities and medical schools. The interviews were audio recorded via MS teams and written transcripts were analysed based on the recordings. Checks were made to ensure there were no obvious errors made during transcription. The researcher also took notes where possible to highlight any specific aspects during the interview. The transcribed notes were compiled into one report for each participant to generate the most accurate representation of their comments.

At least two of the interview transcripts were reviewed by another researcher with expertise in undergraduate dermatology and medical education, to ensure that the different perspectives were well represented, and the themes and subthemes developed were consistent. Repeat visitation to interview audio files and transcripts helped to check and recheck emerging themes and stay true to the deans' accounts regarding medical school curricula and the associated challenges. Verbatim quotations and descriptions of deans' thoughts and experience on specialty curriculum implementation supported the findings. Due to time constraints and busy schedules, it was not feasible to invite the participants to comment on final themes and concepts generated. Online interviews via Microsoft Teams meeting were arranged to interview UK medical school deans across Scotland, England and Wales.

Data Storage and Data management

Confidentiality was maintained for all participants in the collection, documentation, access and sharing of the data collected via the interviews. The responses were stored as per the data management plan (DMP) of University of Nottingham. All data was password protected and stored on a UoN Microsoft OneDrive facility. NVivo or appropriate software was used for data analysis, which was also password protected.

Analysis

An inductive approach was also used on the ability of the Deans to reflect on their lived experiences, interpretations and perceptions, so as to identify a set of key competencies necessary for effective leadership roles, which would aid medical schools and curriculum development. Identifiers were used within the themes or subthemes acknowledging where quotes or extracts had been taken from or whom they relate to, whilst maintaining the confidentiality of the responder. Interpretive and subjective philosophy was applied, acknowledging the Deans', meanings and interpretations in the conduct of their roles and their ability to develop an in-depth understanding about the competencies for leadership roles at medical schools. Quotes and extracts from the semi-structured interviews were used to demonstrate how the findings and the interpretations had arisen from the data.

The thematic analysis from the semi structured interviews was undertaken using NVivo qualitative data analysis software or equivalent.

Data was analysed and managed, using the Framework Method (Ritchie and Spencer, 1994; Hackett and Strickland, 2018).

11.2 RESULTS OF SEMI-STRUCTURED INTERVIEWS

Participants

A total of four (10%) Deans of medical education responded to the interview request, via the Medical Schools Council. They belonged to four UK medical schools, situated in Wales, Scotland and England, which helped in purposive sampling of gathering views from different UK countries. Two of the schools represented were new medical schools (A, B) and were in early stages of their clinical curricular development, whilst the other two (C, D) were established medical schools.

One of the new schools was set up as a graduate entry programme (GEM) in Scotland, with a problem based learning (PBL) curriculum. This school was being established to cater to the needs of the rural population of Scotland, with provisions of bursaries for those who would like to work in Scotland. Fifty percent of the course was being led or provided by GPs, with the first two years of teaching covered almost entirely by GPs. The third year had longitudinal integrated clerkships and students were based in a GP practice for a whole year. The GPs would have time allocated towards teaching medical students. Secondary care placements followed, with students given a framework to follow and self-directed learning encouraged throughout training. The aim of the school was to create ‘generalist practitioners’ and was based on a case-based series. The other schools followed the traditional UK medical school curricula.

There were four broad themes identified regards implementation of specialty curricula. These were based on 1) curriculum review, 2) role of specialty leads champions, 3) cultural and political influences and 4) student factors.

Theme 1: Curriculum review and factors contributing to undertaking curriculum

Within the broad theme of curriculum review, there were several subthemes regards reasons and challenges to undertake a review, the personnel involved and enabling factors (Table 11).

Table 11: Interview results Theme (1) curriculum review

Theme (1) Curriculum review
Sub theme
Challenges – long, time-consuming, difficult
Reasons to do: Political (e.g. Scottish government), GMC, MLA
People involved: Generalists, specialists ('by chance')
Med Education Qualifications needed – for professional approach

For the new medical schools (A and B), they were in the process of developing and establishing their medical school curriculum. In Scotland, the drive for establishing the medical school came from the Scottish government. The school's core curriculum was developed primarily with the help of GPs, with a GP specific educational needs.

For school C, the last curriculum review had been a decade ago, in 2012, with consideration of an update. For school D, the last review had been in 2012

and implementation of the new curriculum in 2013. All participants reported undertaking a curriculum review to be time consuming, and challenging. This huge task, occurred every (‘8-15 years’, participant C), depending on the institution. Deans felt that there had been a slow change in how curricula were designed, with change in how teaching and learning was delivered. ‘Change is hard’, ‘change is emotionally expensive’, ‘it’s difficult and challenging, but it has to be done’ (Participant C).

At school D, a didactic approach to learning was changed to an active learning approach, and adopting case-based learning. Drop in student satisfaction, a change in leadership and an update and refresh were some of the reasons for review of the curriculum. It was also to keep up with GMC’s Outcomes for Graduates documentation.

Role of GMC and MLA for curriculum implementation

GMC’s Outcomes for Graduates (Outcomes for graduates, 2018) was an important documentation taken into consideration when reviewing a medical school curricula. GMC visits to the medical schools ensured medical schools could demonstrate good quality teaching programmes for medical students.

‘It’s quite generic’ (Participant A).

‘To the GMC in our quality visits, we do address the Outcomes for Graduates’ (Participant C).

‘We did a big review of our learning outcomes to show that we can demonstrate where those are’ (Outcomes for Graduates) (Participant D)

The GMC provided guidance and specification, in particular to the ‘soft skills’. However the Outcome of Graduates’ document was felt to be quite generic, with scope to interpret the guidance in various ways. There would be some clinical skills or procedures which students would need to accomplish to get their primary medical qualification.

The upcoming MLA via the GMC in 2024-25 (Medical licensing assessment – GMC, 2020) was thought to have a significant impact on all medical schools, especially for schools not focussed on end-of-year assessments. The MLA was seen to provide a list of medical conditions for schools and students to learn about, but didn’t expand on how much depth of knowledge was needed. Though medical schools had varied learning outcomes across different schools, there was general agreement that the MLA would help standardise the core curriculum with development of ‘core-practitioners.’ ‘From my point of view, the MLA is a bit of a saviour. If they (students) pass the MLA, then that is the determinant, the sampling framework which the GMC has decided is going to be sufficient’ (Participant B).

‘We will start to see the MLA having a sort of direct ripple effect on curricula’ (Participant C).

There were discussions at traditional schools (C and D), on how best to incorporate clinical teaching in the early years and how best to integrate the curricula to fulfil the MLA requirements.

For the new schools (A and B), the schools had to realign their curricula to the MLA as their curriculum was being developed. MLA content map was also used to alert students to the list of conditions students should focus on, and

several of these aspects could be covered via lecture-based learning or taught based curriculum. School C was considering a strategic curriculum renewal involving the relevant stakeholders to guide the change. At school D, the medical students had already moved to progress testing, with strong clinical based exams, like OSCEs and clinical prescribing exams being included and felt ready and prepared for the changes being brought with the MLA. At school D, MLA was thought to provide the framework to 'essential learning'.

Personnel involved and enabling factors

It was felt that clinicians with no medical educational background were attempting to delve into the complex medical school curricula. They could appear to be arrogant when considering medical education, with a simplistic approach of 'to see one, do one, teach one'. 'There is a bit of arrogance with doctors' (Participant C). 'People have always had a sort of unspoken hierarchy' (Participant C).

Participant C mentioned: 'this business of sort of jobbing clinicians dabbling with complex curricula is in my view not acceptable.'

For school B, a GP led, and GP specific educational approach was employed, with specialty specific clinicians being involved by chance. There appeared to be a perception of attitudinal behaviour towards medical education amongst clinicians, who may have undertaken clinical and research activities. There was also a perception of an unspoken hierarchy amongst clinicians with little depth and understanding regards medical education and curriculum implementation.

To undertake the responsibility of curriculum implementation of a medical school and specialty, it was felt that the task needed to be entrusted to academic and professional teams, and with leads having dual accreditation (clinical and medical education). ‘Leaders having strategic vision and prioritising and triaging things that are really important’ (Participant C).

Participant C mentioned, ‘It’s very important that people with theoretical knowledge are responsible for these sorts of things’. ‘You need people who have dual accreditation.’

All Deans agreed that there needed to be theoretical knowledge in medical education to undertake a curriculum review. One of the Deans held a PhD in medical education.

Theme 2: Specialty lead champions and their role

The skill set, interest and enthusiasm of the specialty leads was an important factor for teaching medical students their specialty subjects. The sub-themes influencing specialty lead engagement are elicited in Table 12

Table 12: Interview Results Theme (2) Specialty lead champion

Theme (2) Specialty lead champions
Sub themes
Availability of experienced clinicians as educator
Need for standardisation with educational degrees and activity
GP led priority for specialty inclusion
Need for recognition in terms of time, remuneration, PAs

The subspecialty areas and their inclusion were dependent on the availability of trained, and experienced faculty locally. There needed to be consistency in the level of teaching delivery, with the background of medical education forming the framework. ‘We insisted that those teachers and course leaders that were making decisions about students had a qualification of some description, that might be a diploma, certificate, it might be an MSc’ (Participant D).

It was felt that the activity, resource and drive of the undergraduate specialty lead influenced students to a large extent, with future career choices being made on the basis of student experience during placements. At school B, despite a systematic and proportional coverage for specialties being undertaken, it was difficult to meet requirements for specialties like ENT surgical specialty, and Ophthalmology. This was due to a lack of experience and time spent by GPs in these specialties.

‘We don’t have a friendly specialist in everything to lean on their team and to write up new questions in that area’ (Participant B).

‘I think it’s genuinely often these specific interests of the people who are building the curriculum…I said where’s the dermatology, and it was because nobody maybe had a specific interest’ (Participant A).

‘Inclusion of specialty areas is dependent on the faculty that are delivering the curriculum’ (Participant D).

At school D, dermatology featured highly in their medical curriculum due to the strengths of having an experienced dermatology teaching and research staff within their faculty.

There was some criticism regarding specialty-driven curricula, with suggestions to prepare rationally constructed curricula and getting specialists to teach that specialty well. ‘There is rarely a recognition from specialties about the other things that need to be taught’ (Participant D).

Education Deans felt the need for standardisation of medical education qualifications and leadership skills amongst academics and clinicians who undertook undergraduate education leadership roles. There was a need for a minimum standard of qualification in medical education. This however, would be dependent on individual Universities, but was felt to be difficult to fill posts due to not having enough qualified individuals. There was scope for development within the roles by undertaking relevant medical educational activities or conferences like International association for medical education (AMEE) or Association for the study of medical education (ASME) and qualifications, with review at annual appraisals.

With huge clinical work pressures, clinicians, particularly GPs were seen to be leaning towards portfolio careers, to allow development in leadership skills in place of very busy clinical sessions. The tired clinical workforce was also perceived to look towards medical education as an alternative, but needed the necessary skill set to perform and deliver the challenges of medical school curriculum implementation.

Theme 3: Cultural and Political influences

Several cultural and political influences played a role in the views of the medical education Deans (Table 13)

Table 13: Interview results Theme (3) Cultural & Political factors

Theme (3) Cultural & Political factors
Sub themes
Local: Hospital Trusts and Medical Education University
Engagement with clinicians
Providers – clinic focused; governance, transparency, funding
Central: Scottish Government
Health Education England

Cultural factors

There was a perception that a shift in the mind-set amongst hospitals and clinicians' was needed where clinical work and patients were considered the only priority, compared to research and education.

The Deans recognised the huge clinical workload and patients' waiting lists, in particular cancer targets, being clinicians themselves. 'The value that is placed on DCC (direct clinical care) versus SPA (supporting professional activities) is much greater' (Participant D).

'There isn't time and capacity from clinical dermatologists to be able to devote time and SPA time has been eroded and people are doing more and more clinical work' (Participant D).

‘The Trusts have to shift their mind-set a bit and not necessarily only prioritise clinical work and patients’ (Participant C).

The Deans observed a shortage in the dermatology workforce as a specialty. This had meant time or capacity for busy clinical dermatologists devoted to teaching and doing supporting professional activities (SPA) had eroded. Other specialities were facing similar challenges and pressures.

To balance the workload and workforce issues, with shortage of doctors, nurses and ancillary staff, the Deans felt it was important to ring-fence and protect time for education. Protecting clinician and nurses’ time for education, proper remuneration, allowing for professional development and rewarding excellence through recognition awards (e.g. Clinical Excellence Awards) were considered helpful ways to improve engagement and drive towards medical education.

Busy clinical workloads also meant difficulty having conversations on matters related to medical education. As clinicians, with overwhelming patient commitments, there appeared to be a tendency to remain in status quo and finding introducing changes difficult. ‘It’s very hard to get people, particularly clinicians, to engage with change, significant change’ (Participant C).

Clinical work was also been looked upon more favourably than research and teaching, when compared to undergraduate teaching.

It was important for support and guidance to help develop educators. Participant C commented ‘being aspirational and role modelling’ (for other clinicians) whilst participant A commented that ‘mentorship and support is incredibly important’ (for educators). Raising the profile of clinicians as

medical educators was considered important to attract more enthusiastic colleagues. In addition, it was felt that health education boards should recognise medical student teaching as a source of income.

Political factors

Apart from the GMC which sets out standards for medical education, in Wales, the Universities alongside clinicians and medical educators had a signed agreement with Health Education Wales, to uphold the development needs and standards of being a medical educator. All clinicians who do teaching were expected to sign this agreement, in collaboration with their NHS Trust, Health Education Wales and the local university.

Political drive from governments, for example the Scottish government led to the creation of the new medical school with aim for ‘generalist practitioners’. This was through a matrix to gather the proportionality to the curriculum, with a generalist or general practitioner specific dominated educational team. The involvement of specialists for curricular development was by chance.

It was felt that the number of clinical academics was falling, with a demand in the clinical workforce. This was leading to reduced opportunities to interact and engage with clinical academics.

There was a perception of ‘Specialty led agendas’ and deferring to national guidance. In addition to the college driven agendas, other national bodies like National Institute for Health and Care Excellence (NICE, 2023) producing guidelines for sub-specialty areas (e.g. chronic fatigue syndrome) or

subspecialty areas with high profile political influences (e.g. eating disorders) tended to lobby heavily to medical schools to influence and implement further additional aspects to the medical school curriculum. These challenges needed to be tackled through the Medical Schools Council to help drive change in specialty specific implementation and via the national specialty body (e.g. BAD).

To help deliver a comprehensive medical curriculum, integration of specialties and skills was considered helpful. For example, in Scotland, the medical school using ‘case-based’ learning had a ‘rash week’, which incorporated within it aspects of the hidden curriculum. This included medical sociology attached to stigma of skin disease and help seeking behaviours. There was however, some reticence with including different specialty curricula, due to the risk of curriculum overload or overflow and difficulties adapting problem based learning courses to include these in the framework. ‘I have no doubt there are cultural barriers and I think culture takes a long time to change, doesn’t it?’ (Participant D). Though focus on clinical and research were considered strengths, it was important to ensure a core curriculum was delivered. The depth of going into specialty knowledge and how much was needed was debatable. ‘What is missing though I think is proper curriculum mapping… where can I evidence this’ (Participant D).

The limitation of specialist availability and in turn educators in rural areas, with scope of experience gathered by students through secondary care was also a consideration. ‘What expertise you’ve got available and what it local’ (Participant D).

Participant B commented that ‘if you have small units, if you haven’t got other people who are more keen do it… it’s kind of hard for someone else to apply for the job’ ‘you have to live with the rough parts.’

This was in conjunction with the advent of new therapies, advancement of genetics and attempting to keep the curriculum updated and relevant. It was considered important for students to be provided the necessary skills to gather information and improve their skill sets on healthcare activities, instead of focussing mainly on knowledge sets.

Integration using telemedicine was considered helpful for rural practices with access to specialist care via remote consultations, and became part of undergraduate medical education training. This was thought to contribute to upskilling of clinicians in general practice, with improved lesion or rash recognition, which in turn could lessen secondary care referrals, as patients could be managed well within primary care settings. One of the Deans (School D) mentioned how comprehensive curricular mapping could help provide evidence on what and how different subject areas were being covered at the school. However, it was perceived that specialties may not entirely grasp the challenge and skill of building an entire medical school curriculum, with difficulties felt by the Deans in perhaps engaging with other specialty group members.

Transparency in Funding and Educational governance

All Deans agreed that there needed to be better accountability and transparency in how funds paid for medical student education were being allocated and spent within Local Hospital Trusts or Local Education Providers.

‘Transparency hasn’t been there’ (Participant C). ‘Funding should be ring fenced and it should be output based’ (Participant D).

‘Can you show me how that money is being spent and that I’m actually getting what I’m paying for’ (Participant C). ‘There’s money in the system to support teaching and there’s systems guiding that, but it’s not very sensitive to quality of teaching that goes on’ (Participant D).

Better and formal engagement between NHS and Universities was required to ensure adequate teaching faculty and quality standard of teaching. Trusts traditionally received funds from medical schools and Universities towards medical education delivery, but were actively involved in the quality of undergraduate education or transparency. ‘Funding enough time for each individual in their job plan, have teaching recognised and protected time to do that’ (Participant A). ‘You’ve just got to give it the respect, in terms of money, time’ (Participant D).

Recognition of medical education alongside clinical and research, by ring fencing the funds was thought to bring more kudos and respect to the role. Developing a portfolio of activity within clinical departments to encompass achievements and share successes in medical education was considered helpful to raise the profile of teaching amongst staff. ‘The stakes are really high’ ‘we are preparing future practitioners to look after citizens’ (Participant C). ‘If people want a future and they want doctors and nurses of the future, people have got to also simultaneously respect and invest in education’ (Participant C).

It was felt that higher authorities like Health Education England needed to play a bigger role to ensure tariffs were appropriately being utilised.

In school D, there was an educational governance lead and annual teaching review meetings were conducted with the NHS of each of the health boards. The team included honorary senior lecturers at the health board level, with curriculum lead and lecturers interacting with each other on a regular basis.

Theme 4: Student factors

Student related factors influenced how and what aspects of the curricula were implemented (Table 14).

Table 14: Interview results Theme (4) Student factors

Theme (4) Student factors
Sub themes
Student feedback
Curriculum overload
Impact of Covid-19 pandemic

Student satisfaction was an important consideration and reason for conducting a curriculum review at medical schools. ‘A recognition that student satisfaction had dropped’ (Participant D). ‘Sometimes it’s the medical students who realise they are missing stuff, so they create special interest groups or clubs’ (Participant A)

Student feedback was considered a powerful voice with regards to quality of teaching, availability of appropriate staff and their overall student experience. Resources needed to follow students. With vast expansion and advances in

medicine, it was felt medical school curricula did not have the capacity to teach everything. Emphasis was laid on students graduating as safe junior or foundation doctors, with further knowledge and skills supplemented during their postgraduate training. There were concerns regards curriculum being filled with various specialties and the risk of students feeling overburdened. ‘We have to make sure we give the students what they need to survive for foundation years, without overwhelming them’ (Participant A).

‘We are all challenged by the curriculum overflow syndrome’ (Participant B).’There is a risk of learner burnout’ (Participant B). ‘You can take the horse to the water, you can’t make it drink it’ (Participant B).

‘If you come along and say here’s the dermatology curriculum, I would have to say, we don’t have the mechanism to put in place multiple specialty driven curricula. Just can’t, can’t do it in our framework’ (Participant B).

With medical schools’ intake for students becoming larger, and with an increasingly full curriculum, Deans were concerned students would find engaging in the educational experience difficult, leading to early burn out amongst learners. ‘We couldn’t teach everything anyway, because there was no capacity within a curriculum to teach all that you need to’ (Participant D).

Similarly having a large group of students with short clinical rotations, could mean difficulty having a more personal approach to teaching and learning between educators and students. For example, it would be difficult to ascertain if students were paying attention during lecture sessions, if teaching was delivered to large groups.

Students are also known to be selective and strategic in their learning and revision which was largely based on assessments (Wormed et al., 2009). ‘So if we say yes, we’ll have everything. Let’s bung it in. Of course how can you argue that doctors should know all about eating disorders? But it’s just not achievable’ (Participant B).

In this regards MLA was likely to influence the outcomes for student success and schools were looking to prepare students accordingly. There was emphasis on students becoming more responsible for their learning and seeking more knowledge through self-directed learning.

Impact of Covid-19 Pandemic

The Covid-19 pandemic was felt to have impacted clinical and teaching activities widely. The disruption to normal clinical work had led to even larger NHS backlogs. Patient waiting lists had risen to disproportionate levels and clinical work would likely take over other priorities like medical education. The Covid-19 pandemic also had changed the ways of working in the NHS and beyond. Patients were being offered remote consultations with telephone clinics or video consultations via MS Teams. The Covid-19 pandemic also brought in opportunities to look at different ways of teaching and learning. Telemedicine and online teaching were new avenues to consider and integrate with medical school curricula (Sandhu and de Wolf, 2020). The students could use tele dermatology images to recognise skin disease, including use of photos from diverse ethnic skin backgrounds. It was felt that there would be a significant impact on how schools did teaching and learning for their medical students. There was uncertainty on how long the changes to curriculum

delivery during the pandemic would remain and this was likely to be guided by national and international evidence based developments. Thus specialty curricular implementation would need to adapt and adopt new ways of teaching and learning. With the disruption to teaching and clinical activities due to Covid-19, Deans reported that medical schools had not conducted the usual site visits to ensure Trusts and Hospitals were in alignment with regards curriculum delivery and review of funding for education.

12 DISCUSSION: SUMMARY OF MAIN FINDINGS AND COMPARISON WITH EXISTING LITERATURE

12.1 SUMMARY OF MAIN FINDINGS AND COMPARISON WITH EXISTING LITERATURE FOR SCOPING REVIEW STUDY

The scoping review of literature highlighted the current status of specialty specific core curricula for medical graduates in the UK. This was the first study to provide an extensive overview of the curricula developed by specialties and their advise on the knowledge and skills expected of all UK medical graduates, in alignment with the GMC (Sharma et al., 2019). The study provided an insight to the factors that led to the development of specialty specific core curricula for the UK and what measures could be undertaken for undergraduate curricular development and implementation. The undergraduate curricular guidance from European, national and regional bodies, reflect the need for UK medical schools to coordinate and remodel their curricula to recommended standards (Sharma et al., 2019).

The scoping review of literature highlighted that the specialty specific core curricula were developed through consensus of national and international experts advising on standards of core knowledge and skills to be attained by medical graduates and aligning these to GMC's Outcomes for Graduates. The intention of the developed core curricula were to provide guidance to medical schools and allow flexibility on their implementation.

The GMC's 'outcome for graduates' describes the requirements of a doctor as a scholar, scientist, practitioner and professional, all applicable to different specialties in the medical curriculum (Outcomes for Graduates, 2018). Despite

GMC recommendations of a ‘core curriculum’ for medical students’ education, several medical educational establishments have found it challenging to outline what is meant by core, what should be included within its core and its relevance in larger context of students graduating as junior doctors (Wylie and Thompson,2007; McIntosh et al.,1997, Sharma et al., 2019).

Though medical schools’ curricula correspond to the generic outcomes set out by the GMC, explicit representation of specialties and mapping of the disease burden in society against curricula has been challenging (Public Health Educators in Medical Schools, 2014; Wylie and Thomson 2007; McIntosh et al., 1997; Royal College of Physicians, 2017, Sharma et al., 2019).

Medical schools find responding constantly to changes in clinical practice challenging, keeping a contextual curriculum and assuring that students are not overburdened by content. This has meant that clinical exposure as a method of learning is often absent and the blueprint for assessment is often overlooked (Wilkinson, 1991, Sharma et al., 2019).

The core curricular development in the review was noted to have been in response to safety and quality, including burden of disease, social aspects shaping society, health illness and healthcare. They reflected the need for quality assurance in medical education covering both generic professional and specialty specific areas.

As Voss et al., (2008) noted, ‘Improving patient safety and quality in health care is one of medicine’s most pressing challenges. Residency training programmes have a unique opportunity to meet this challenge by training physicians in the science and methods of patient safety and quality

improvement'. The specialty specific curricula could help develop minimum standards on core-knowledge deemed essential and could help provide quality assurance across UK medical schools (Sharma et al., 2019).

Thus, medical educators in curricular development could examine the evidence for the need to change or update medical curricula, and through reflection on content and process, apply Mezirow's concept of transformative learning (Mezirow, 1990, Sharma et al., 2019).

Additionally, the introduction of UK- wide MLA in 2024 (Medical Licensing Assessment -*GMC*, 2020), with the outline of the content map may influence what medical schools are likely to teach or provide learning opportunities to keep their curricular content pertinent and comprehensive.

In the scoping review, it was observed that there were specialty recommended curricula covering conditions and diseases which overlapped between specialties. Alignment of the curricula to combine specialties adopting the interprofessional educational (IPE) approach could help reduce subject matter overload and keep learning and teaching contextual (Sharma et al., 2019). IPE as an educational method has been helpful in increasing knowledge in undergraduates, changing attitudes and behaviour, integrating curricula and providing a sustainable model that could accommodate a large number of students (Ponzer et al., 2004; Anderson and Lennox, 2009). Allied specialties like non-surgical oncology and palliative care curricula could be studied together as a multidisciplinary approach, which would help students understand all aspects of cancer, including managing patients with cancer and

end- of-life care (Paes and Wee, 2008; The Royal College of Radiologists, 2014, Sharma et al., 2019).

The scoping review revealed that subjects related to foundation and professionalism topics recommended their curricular elements be integrated both horizontally and vertically throughout the school course (Jackson 2001; Ross and Maxwell, 2012; Smith et al., 2016; Core curriculum for sociology in undergraduate medical education, 2016). These subjects, functional and applicable to all clinical specialties, could be available within the generic outcomes for the specialties and form the scaffolding through the entire medical course (Sharma et al., 2019).

In 2016, the UK government announced strategies to invest, develop and increase the general practice workforce, to cater to the demands of an ageing population with complex needs and burden of chronic diseases (General Practice Forward View*,* 2016). There have recently been proposals to have a spiral curriculum for medical students from an undergraduate to a postgraduate curriculum in general practice, highlighting the ways in which curricula have developed in relation to health care service and societal needs (Jones and Oswald, 2001).

The Scottish Deans' Medical Curriculum Group (SDMCG) helped coordinate the development, delivery and evaluation of Scotland's undergraduate curricula. The aim of the group had been to ensure that graduates from all medical schools in Scotland were of an equivalent standard. The review of their curriculum was informed by frameworks on specialist subjects like acute & emergency medicine, dermatology, neurology, palliative care,

pharmacology and sexual health (Scottish Deans' Medical Curriculum Group, 2008, Sharma et al., 2019).

The above approaches to curricular development would bring further challenges for medical school Deans, with time within the school course and the availability of resources being limited. Use of technological advances could aid in providing adaptability and autonomy in how these curricula could be delivered and implemented, if followed (Sharma et al., 2019).

12.2 SUMMARY OF MAIN FINDINGS FOR CURRICULUM MAPPING STUDY

To align and revise medical school curricula to recommended specialty specific core curricula standards, conducting a curriculum mapping exercise would help determine the proportion of ILOs being met. A mapping study would help appraise aspects like teaching and assessment methods, clinical placements, teaching staff, identify gaps and redundancies as well as attempt linking learning outcomes across to other specialties. The curriculum mapping study performed at the UoN medical school, taking dermatology specialty as an example, demonstrated an excellent alignment of the local ILOs to the national BAD and GMC's Outcomes for Graduates, 2018 (Sharma et al., 2019). The study helped to show how the curricular syllabus and learning opportunities could be organised to support its delivery within a compulsory dermatology clinical placement for students in their medical school course over a two week period.

Membership and participation at the meetings held for BAD Undergraduate workstream and curriculum related meetings at medical school level provided an insight on how the specialty was perceived nationally and at medical school levels.

To align and revise medical school curricula to recommended specialty specific core curricula standards, conducting a curriculum mapping exercise would help determine the proportion of intended learning outcomes being met. A mapping study would help appraise aspects like teaching and assessment methods, clinical placements, teaching staff, identify gaps and redundancies as well as attempt linking learning outcomes across to other specialties.

The mapping exercise enabled modification of current learning outcomes. For example, the inclusion of skin diseases in children could be taught in the adult age group as well for an existing outcome. Another example of how the ILO at UoN could be modified to national standards is demonstrated in Figure 22

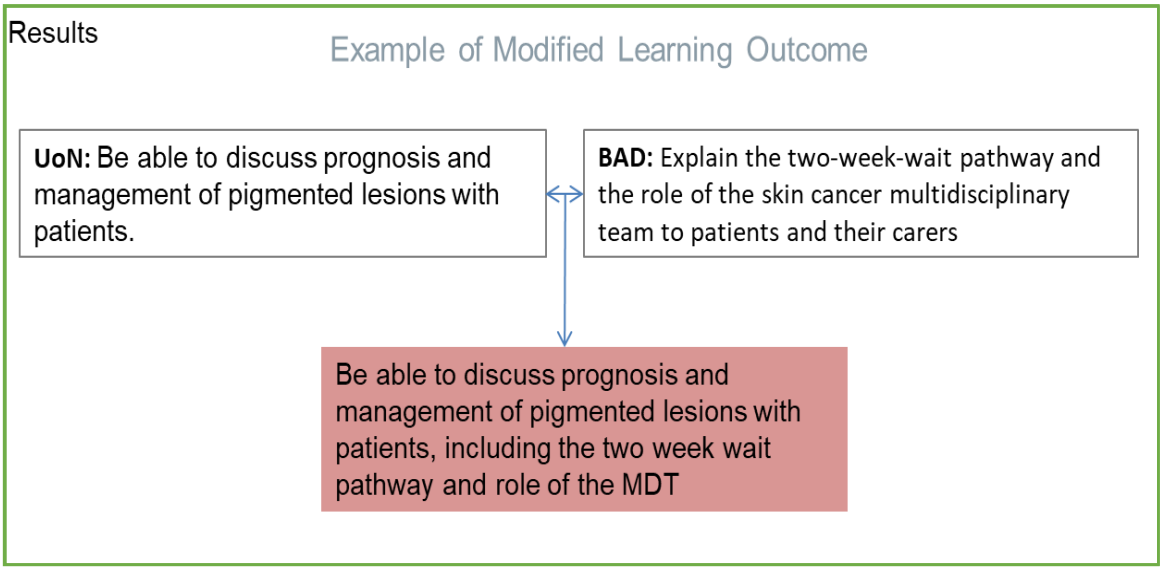

Figure 22:Modified Intended Learning Outcome after mapping exercise

The curriculum mapping study demonstrated how dermatology was being taught and assessed at Nottingham Medical School. The process of curriculum mapping helped provide details on the teaching methods being used and consider if these were appropriately matched to the learning needs as well as the expertise of the faculty involved in delivery of dermatology teaching (Sharma et al., 2020).

The study helped identify gaps in learning outcomes at the local level and also remove redundant material. There were BAD ILOs that were being taught but not declared in the current UoN dermatology curriculum. The mapping

exercise helped in creating specific new learning outcomes. An example of such a new outcome is demonstrated in Figure 23.

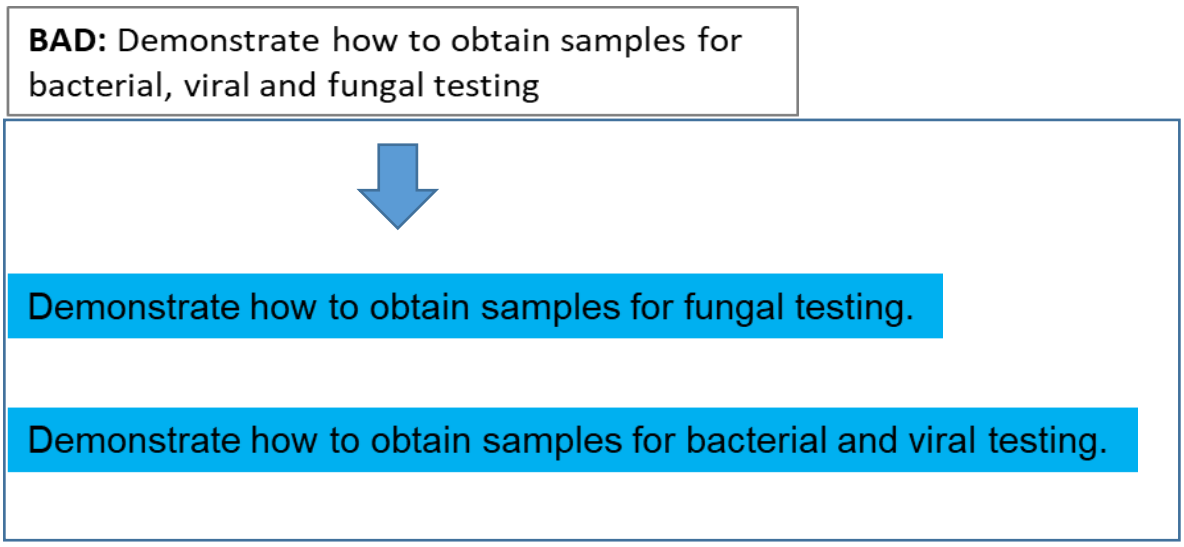

Figure 23: New learning outcome

Curriculum mapping helped in signposting the teaching opportunities in dermatology outpatient clinics by allowing a wide range of patient interaction and experiential learning with student attendance at skin cancer clinics, general clinics, volunteer or expert patient clinics, and specialty nurse clinics (Sharma et al., 2020). Nurse-led teaching on phototherapy, dressings and wound care also helped signify the role of inter-professional teaching within undergraduate medical education, specifically for dermatology (Sharma et al., 2020). Curriculum mapping could also be used as an opportunity to identify where relevant learning can take place outside of dermatology departments when building an integrated curriculum. The map could be used to 'diagramming the interrelationships among objectives from different domains of learning' (Wager, 1976). The specialties involved could include paediatrics, general practice, cancer care or oncology, rheumatology and pharmacology or prescribing and therapeutics.

Students achieved experiential learning and gained the necessary clinical skills through direct observation and formative assessments with feedback based on patients observed by dermatology Consultants, specialty trainees and teaching fellows (Sharma et al., 2020). Student feedback was found to be constantly exceptional regards content delivery with 132/134 (98.4%) of students in the academic year (2018-19) agreeing that the dermatology placements helped them achieve their course objectives (Sharma et al., 2020). The mapping exercise also provided transparency amongst all stakeholders to demonstrate how the curriculum was being implemented.

Trends in education, learning and assessment have changed in medical schools. GMC's Outcomes for Graduates 2018 recommends that medical schools provide an education that enables graduates to achieve the necessary knowledge and skills (Outcomes for Graduates, 2018). Dermatology skills deemed essential must be both taught and assessed in comparative performance-based tests such as OSCEs rather than rely completely on knowledge based assessments (Tormey, 2015).

The inclusion of dermatology in summative assessments has the potential to drive learning these essential skills in undergraduate clinical placements (Cilliers et al., 2012). The curriculum mapping exercise demonstrated how the ILOs in dermatology were being assessed at the UoN with the use of summative MCQs and EMQs as well as end of year OSCEs with a dermatology station. This mapping and blueprinting would allow for review of assessments and enable covering aspects of the curriculum not previously assessed.

‘Doing’ sets the benchmark standard in the Miller’s triangle of professional competency framework (Cilliers et al., 2012). Within the pyramid framework of competence, learners first know a subject, then apply knowledge, demonstrate a skill, and finally perform in clinical practice. The end product of the curriculum mapping process enables us to take any ILO and demonstrate alignment with national curricula. One can demonstrate how each element of the curriculum contributes to the development of competence in the learners, i.e. the teaching methods, learning opportunities, or assessment, contributes to competence at each level, with the ever-necessary resources such as learning locations and staff. Using the framework of the Miller’s pyramid on assessing skills and competencies, an example of how competence in a dermatology learning outcome on an adaptation of the pyramid is demonstrated in Figure 24 (Sharma et al., 2020).

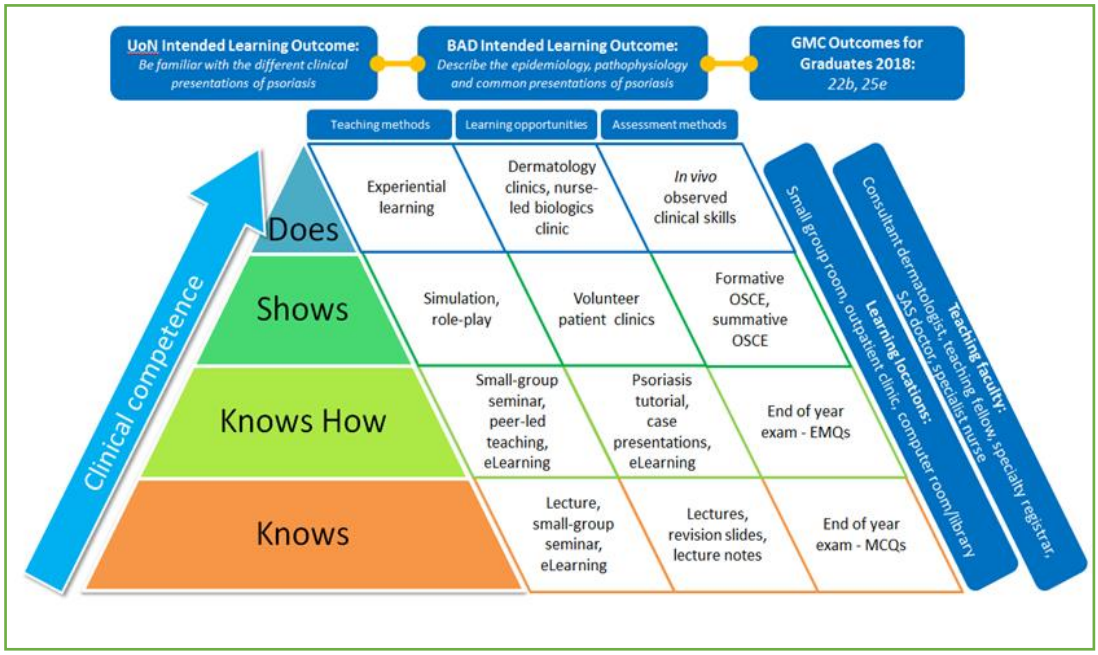

Figure 24: Adaptation of Miller's Pyramid of competency for a dermatology ILO

With the publication of GMC's Outcomes for graduates' document and the anticipated MLA, it was important to consider how these may translate to specialty-specific curricula. The MLA document specifically provides a content map and domains which could be covered at assessments. For medical schools to ensure their students are adequately prepared, medical schools and their respective curriculum programme directors and/or specialty undergraduate leads would need to map out the content specified in both the documents set out by the GMC.

12.3 SUMMARY OF MAIN FINDINGS FOR CROSS-SECTIONAL SURVEY STUDY AND COMPARISON WITH CURRENT LITERATURE

A constructivist approach was used to assimilate, analyse and interpret the evidence gathered from multiple sources to develop the domains of the questionnaire survey for specialty curriculum implementation.

The multiple approaches to extract salient information for curriculum implementation allowed for meaningful interpretations and provided relevant guidance on the construction of the questionnaire survey.

The cross-sectional survey investigated the facilitators and barriers to a specialty specific (dermatology) curriculum implementation across UK medical schools from the perspective of undergraduate teaching leads (Sharma et al., 2022). The use of an online questionnaire study with the help of the BAD administration team was promoted to reach the target participants (dermatology teaching leads). The response rate for the survey was a very reasonable 71%, given that the mean response rate for web-based surveys reported in a meta-analysis of 49 studies has previously been found to be only 39.6% (Cook et al., 2016) the cross- sectional questionnaire study generated a good response rate. The adoption of a mixed methodology approach in the study with the use of anonymous free text responses allowed for participants to provide a contextual understanding on the issues at their individual medical schools regards what helped or hindered curriculum implementation (Sharma et al., 2022). The sampling was in a reasonably homogenous sample (undergraduate specialty teaching leads) and performed well, providing a

good basis for generalising the concepts and the relationships between them (Tesch, 1990).

The online cross-sectional questionnaire study identified important facilitators and barriers to specialty core curriculum implementation at UK medical schools. There were knowledge gaps amongst specialty undergraduate leads with respect to mapping and blueprinting of core undergraduate curricula and the proposed implementation of the MLA in 2024-25. Lack of standardised training in medical education, time and resources undermined the role of specialty teaching leads as medical educators (Sharma et al., 2022).

Several domains were found to be pertinent to implementation of a specialty core-curriculum at medical schools. These included the need for standardisation of training and skills in medical education for undergraduate teaching leads, especially with regards to curriculum mapping, blueprinting and assessments (Sharma et al., 2022). There was a perceived lack of recognition of the undergraduate specialty lead role and a need for better engagement with the medical schools. Adequate funding, time and educational resources for undertaking the teaching lead role for curriculum delivery were other factors to influence specialty specific implementation. The role of GMC and the planned MLA for all UK medical graduates was important for undergraduate leads to be aware of, to enable alignment of specialty core curricula with the regulatory body's recommendations (Sharma et al., 2022).

Adequate time within job plans was needed across NHS Trusts to support undergraduate specialty teaching delivered by a multi-professional and multi-specialty workforce. Medical schools could provide more formalised oversight

and governance to the undergraduate specialty leads to ensure they were aware and met undergraduate training requirements at the national level. Medical school engagement with specialties with mutual support could aid the forthcoming educational reforms.

The national curriculum implementation for postgraduate medical specialty training was noted to have similar challenges as found in this study for undergraduate core curriculum implementation. The European Society for Radiotherapy and Oncology (ESTRO) developed a ‘Minimum Curriculum for the Theoretical Education in Radiation Oncology in Europe for radiation oncologists and radiotherapists (ESTRO, 2019). An international survey to review its implementation, revealed that within the 90% (Giuliani et al., 2020). National Societies which completed the survey, the commonest contextual barriers to implementation was a lack of support from the government (57%), a lack of internal organisational support (35%), a 'poor fit' between the ESTRO Core Curriculum and the broader political and economic context (35%) (Giuliani et al., 2020). Perceived implementation barriers included not having enough teaching faculty (44%), poor coordination between the government and training institutions (48%), and a lack of an influential person leading the implementation (44%) (Giuliani et al., 2020).Two barriers related to curriculum change were a lack of funding and lack of assessment tools (Giuliani et al., 2020).

Role of undergraduate specialty teaching leads

The online cross-sectional survey highlighted the role reliance of the undergraduate teaching lead as the ‘specialty champion’ to guide and facilitate

the specialty curriculum implementation. The presence of a specialty teaching lead, with their commitment and input towards dermatology undergraduate curriculum implementation was considered an important determinant for teaching and assessment of dermatology at the medical school level. Undergraduate leads were seen to have dual roles of being clinicians as well as performing undergraduate teaching activities (Sharma et al., 2022).

Consultant dermatologists acting also as teaching leads, provided vital clinical skills teaching within outpatient and inpatient settings with the help of patients presenting with acute or chronic skin diseases or skin cancers, an essential aspect for student competencies (Sharma et al., 2022). Teaching leads in the survey felt restricted with time and resources to focus towards undergraduate education. Formalising and standardising the undergraduate lead role would help prioritise dedicated time in job plans for its delivery and allow student teaching and assessments to be more structured (Sharma et al., 2022). A survey of the practice and experience of clinical educators in UK secondary care similarly reported having limited time for preparation and delivery and that teaching activities were often completed in their own time (Norman and Dogra, 2014). The dedicated time for professional development and teaching activities would enable undergraduate leads to be involved in the medical school curriculum planning activities, and help to understand why and how specialty curricula could fit at their respective medical schools (Sharma et al., 2022).

Implications for clinicians as educators in medical schools

The questionnaire survey observed that a third of the teaching leads had no teaching qualification, suggesting a lack of formal training in medical education. This need for formal training in aspects of curriculum development and implementation was apparent where responders reported a lack of confidence and awareness on conducting mapping exercises, blueprinting and assessments for the specialty (Sharma et al., 2022).

Guiding principles with pre-requisite knowledge and skills in medical education amongst undergraduate leads would help facilitate delivery of the core-curriculum with the use of appropriate teaching and assessments methods (Sharma et al., 2022). Most of the training received for educational roles for clinicians relates to postgraduate teaching, delivered by the individual hospital Trusts and the Deanery, with some training by external sources like the Royal Colleges and Speciality Associations (Norman and Dogra, 2014).

Post graduate qualification in medical education as a foundation towards educational leadership roles could support clinicians to be more effective in their role as educators in medical schools. The standards and framework for qualifications necessary to undertake undergraduate medical education roles could be proposed by Universities and Deans in medical education for clinicians performing a dual role as teaching leads (Sharma et al., 2022). The GMC advises medical schools to ensure appointing undergraduate teaching roles based on competence, aptitude and role modelling, rather than experience or clinical teaching alone (General Medical Council, 2011).

Without clinicians and undergraduate leads having a role at the medical school or University level, they may be unaware of the evolving changes and be peripheral in discussions relevant to curriculum planning or assessments (Sharma et al., 2022). Dermatological conditions have been included quite prominently in the MLA content map set out by the GMC, and thus UK medical schools would need to align their curricula accordingly (General Medical Council, 2019). Keeping the MLA into consideration, the BAD have also recently updated and aligned its national recommendations on the undergraduate curriculum (Singh, et al., 2021). The undergraduate teaching leads, also acting as clinicians could guide medical school curriculum directors or school Deans on what clinical teaching activities, placements and personnel would be best placed to deliver the curricular content and assess the intended learning outcomes (Sharma et al., 2022).

Implications for clinicians as educators in the NHS

Undergraduate leads in clinical specialties often undertake the role of a medical educator in conjunction to their busy clinical activities and schedules. This questionnaire survey reported a lack of time due to competing NHS service clinical commitments as a barrier towards undergraduate teaching (Sharma et al., 2022). The GMC also advocates that teachers and trainers have dedicated time in their job plans to deliver their educational responsibilities and undertake their own training and development (What's the teaching excellence framework? 2021). Discussions during yearly Consultant appraisals and University educational governance meetings with the NHS Trusts, local hospitals could provide opportunities to support and align the role

of clinicians as undergraduate educators (Sharma et al., 2022). A national survey amongst anaesthetic College Tutors in the UK revealed similar inadequacies with regard to training in medical education, and considered appraisal and assessment courses the most valuable in helping professional development in their role (Rashid et al., 2008).

The BAD campaigns for improved and more dermatology training at undergraduate level, especially since almost a quarter of patients seen in GP are for skin related conditions, and only few (20%) GP training schemes teach dermatology (Levell et al., 2013). The BAD recommends reductions in patient numbers in clinics for consultants supervising and training other doctors and medical students (Levell et al., 2013). This could vary (typically one patient slot/individual) but may mean (up to 30%) further reduction in patient numbers to support teaching in clinical practice (Levell et al., 2013). NHS service commitments could be enhanced by improving workforce planning and involving specialty trainees and nurses, teaching fellows, GPwSI in dermatology and other inter-professional educators to support undergraduate dermatology teaching (Sharma et al., 2022).

Bridging the gap between undergraduate specialty educators and medical schools

Medical schools and educators' employers have clear guidance from the GMC to ensure undergraduate teachers have dedicated time in their job plans to undertake the educational responsibilities and their training and development be reflected through appraisals (General Medical Council, 2011). The questionnaire survey reflected a need for undergraduate specialty leads to

be supported on aspects essential to curriculum implementation. Medical education related training activities like curriculum mapping and assessment writing could be held by the medical schools and supported by specialty societies through conferences, workshops or seminars (Sharma et al., 2022). The Teaching Excellence Framework (TEF) introduced for higher education and adopted by most Universities measures excellence in three areas: teaching quality, learning environment, and the educational and professional outcomes achieved by students (What's the teaching excellence framework? 2021).

Availability of adequate resources for teaching is increasingly important in the current environment of financial challenges. Allocation of funding, traditionally, is perceived to be biased towards research or delivery of direct patient care (The Academy of Medical Sciences, 2010; Postgraduate Medical Education and Training Board, 2008; Schiekirka-Schwake, S. et al., 2017). While research and patient care are crucial, it is also important to raise the status of teaching and training. Mutual engagement between the stakeholders would enable curriculum planners to adopt innovative teaching methods (e.g. use of teledermatology in clinical placements) as well as ensure assessment standards for specialty specific content across medical schools (Sharma et al, 2022).

12.4 SUMMARY OF MAIN FINDINGS FOR SEMI-STRUCTURED INTERVIEWS AND COMPARISON OF EXISTING LITERATURE

Key characteristics of conducting semi-structured interviews were fulfilled, including taking into consideration the ethical issues as well as the logistical planning (DeJonckheere and Vaughn, 2019). Several approaches as recommended for qualitative research were adopted to ensure the rigour of the study findings, (Noble and Smith, 2015). The data was reviewed to qualify the standards of 'trustworthiness' (Lincoln and Guba, 1985; Shenton 2004). For data gathering, to ensure robustness and credibility, the sampling of interviewees must be justified (Young et al., 2017). The selection of Medical School Deans of Education who had a wide range of experience, knowledge and oversight on undergraduate curricula at their respective schools, provided a rich sample of their views, attitudes and insight for answers to the questions on specialty specific curriculum implementation.

Credibility was given to the findings being accurately and fairly representative of the data by engaging another researcher with expertise to review the accuracy of the data and ensuring the themes generated were consistent. The findings could be applied to other specialty specific curriculum implementations regarding potential barriers and facilitators, suggesting generalisability (DeJonckheere and Vaughn, 2019). To offset the bias and subjectivity that may develop with a single researcher, another research team member with an expertise in undergraduate dermatology and medical education was requested to help provide internal validity to the themes, and categories developed from the thematic analyses. The use of audio recorded

interviews and the generated transcripts enabled repeat revisiting of the data to check emerging themes and remain true to participants' accounts.

Impact of Covid-19 pandemic on the research study and beyond

In the UK, the first cases of the Covid-19 virus were identified in January 2020. By the time the outbreak was declared a pandemic by the WHO on 11 March, 2020, concerns about potential strain on the UK healthcare system led to proposals that final year medical students could graduate early and enter the workforce as qualified doctors (General Medical Council, 2021). With the workload burden across medical schools to rapidly adopt and change how curricula were being delivered, and invites for the semi-structured interviews with the Deans of medical education for UK was initially deferred by the Medical Schools Council. A further invitation was sent as suggested, at a later date and allowances made regarding timing and duration for the interview schedules. Only four Deans (10%) of medical education participated in the research study, due to the exceptional and extenuating circumstances.

The Covid-19 pandemic impacted all aspects of healthcare, in particular access and delivery of services. The education sector, from primary schools to medical schools were also severely affected. With initial months of closed schools and Universities and routine health appointments, new ways of teaching as well as seeing and treating patients were developed. However, with almost 18 months of advent of lockdown and limited access for patients to be seen for chronic, non-life threatening diseases the huge backlog and waiting lists for patients to be seen felt overwhelming. Priority fell onto busy

clinicians to overload their already full clinics to see these complex, anxious patients, instead of undergraduate teaching. Furthermore, there were fears NHS England may consider deprioritising teaching and training, particularly for undergraduates for clinical staff due to skin cancer waiting lists and emergency work. The RCP consultant census for the current dermatology workforce showed 81% were doing some remote work, and 21% felt at risk of burnout with 48% doing excess hours to their agreed job plan (Royal College of Physicians, 2021). The Covid-19 pandemic changed the ways of working in the NHS and beyond, with adaptation of social distancing and limiting face to face consultations (Responding to new challenges and opportunities (2019). Patients are still being be offered remote consultations with telephone clinics or video consultations via MS Teams. With the national drive towards telemedicine, dermatology may in future feature more prominently and favourably in the medical curricula, being a very visual specialty and patients and clinicians able to communicate via teledermatology services. Thus specialty curricular implementation would need to adapt and adopt new ways of teaching and learning.

There was triangulation of data whereby some of the perspectives gathered from interviews of the Deans of the medical schools echoed findings relayed by undergraduate teaching leads in the cross-sectional survey (Sharma et al., 2020). Deans of medical education had a challenging task of balancing the need to keep their medical school curricula up to date, whilst ensuring medical students did not feel overburdened or overwhelmed by increasingly complex and diverse ways of teaching and learning the art of medicine.

Medical school Deans' perspective on Medical Curriculum review

Suggesting Medical schools undergo a review of their entire curriculum was a huge challenge and undertaking. The process required substantial resources, thought and engagement from all stakeholders. There had been several drivers to curriculum review or development of the new curriculum. In this study, the two new medical schools had to develop a new curriculum, largely based and guided by the principles of Outcomes for Graduates of the General Medical Council (Outcomes for Graduates, 2018). It could not be ascertained if this task was more or less challenging than revising an established curriculum, as in the other two schools.

All four school Deans were very aware and responsive to the upcoming MLA set out by the GMC in 2024-25. They were keen for their students to be prepared and had taken measures to align their curriculum to the MLA content map. One school had let the students take on a more self-directed learning approach for students by sharing the MLA content map and allowing their own initiative to gain knowledge on the various topics. However, it was felt that since the MLA content map simply provided names or topics that students may be assessed on (e.g. Rash, Burns), the depth of knowledge and how detailed students needed to supplement their learning was difficult to assimilate. Schools would then have to rely on the national bodies (like the RCS, BAD etc.) who could provide guidance on the minimum standards for all UK graduates regards knowledge and skills for specialty subjects and depth of knowledge expected. Other reasons for curriculum review or refresh could

include increasing numbers of medical student intake at medical schools and standardising the student experience across different local providers. The introduction of different and new forms of learning (e.g. simulator models or activities) or assessment (e.g. use of formative assessments in early stages of school course or introduction of clinical summative assessments to align with MLA), were further drivers for medical school curriculum reviews. The need for greater accountability and efficiency of undergraduate education featured high on the priority for curriculum development.

Specialty factors and NHS workforce challenges

All NHS Consultants, specialists and associate specialists work according to their job plans, which is a professional and contractual agreement undertaken between themselves and their employers, the NHS Trusts (Consultant job planning: A best practice guide- NHS England, 2017). Job plans are usually reviewed on an annual basis and set out in terms of direct clinical patient care or programmed activities (PAs), as well as supporting professional activities (SPAs) and includes being involved in undergraduate and post graduate teaching (Consultant job planning: A best practice guide - NHS England, 2017). The Trusts may consider more SPA time if Consultants or specialists have national or local role of being the teaching lead for their specialty. The roles of medical educators with representative PAs and SPAs allocated in Consultant job plans for medical education were important to be honoured and ring fenced. Review at annual appraisal meetings were considered a constructive way towards professional development of clinicians with roles and responsibilities in the medical education with SMART (specific, measurable,

achievable, realistic and timed) objectives being laid out. Translating the NHS Trust's objectives into meaningful, measurable objectives in job plans would allow Consultants to identify changes required to support growth and recognition of their service and ensure it remains attractive to commissioners (Consultant job planning: A best practice guide - NHS England 2017).

National bodies like the Academy of Medical Educators (What is the Academy?, 2015) could ensure that clinical directors who were involved in doing appraisals valued medical education in job plans and looked to improve and develop clinicians in their role as medical educators.

Regular meetings with senior hospital Trust management teams, quality and educational governance teams from the medical school, alongside the Trust finance teams could improve transparency. However, this involved a huge undertaking and commitment from all parties to engage.

Though dermatology is a popular choice as a postgraduate specialty, there has been a severe workforce shortage due to a long-term restriction on the number of new dermatology training posts (Levell, 2021). More data is needed for planning a multi-professional workforce with specialist nurses, specialty doctors, GPs with extended roles, physician associates and pharmacists working within dermatology. The RCP consultant census has revealed that the current dermatology workforce had 959 consultants with 61% female, of which 90% felt valued as professionals (Royal College of Physicians, 2021).

Getting It Right First Time (GIRFT, 2023) has released new guidance on pathways to support service improvement and the development of multidisciplinary services. An important document on this topic is Referral

optimisation for people with skin conditions which was released in September 2022 (Referral optimisation for people with skin conditions, 2022). This initiative could enable primary care and secondary care services to be better integrated with education, support and guidance for GPs to assess and manage skin patients within the community (Referral optimisation for people with skin conditions, 2022). In Scotland, there appeared to be development of the curriculum with an intention of having medical graduates with an interest in community practice. A range of knowledge, skills and attitudes could be acquired as effectively in the community with primary care providers, offering effective integrated teaching and experience, as in hospital settings (Murray et al., 1999) (McCrorie et al., 1994).

Political & Cultural factors: Government and Local

The government initiative to create more generalists was one of the factors contributing to the development of new medical schools, for example, in Scotland. Similarly other rural areas in need for medical services for the local population are being helped by centres of medical education. Lincoln medical school was recently established in 2018, under the auspices of UoN, with the aim to improve recruitment and retention of doctors to serve the Lincolnshire community (Lincoln Medical School). Having medical students train in these areas could help understand and provide insight on the burden of disease in these areas. The establishment of new centres for medical student training, could eventually help develop secondary and tertiary care services in these areas and incentivise trainees to progress and consider settling there. The drive for generalists could also influence the emphasis towards certain

specialties within medical curricula. For example, almost 25% of GP consultations had been for patients seeking help in diagnosis and management of skin conditions (Schofield, 2011), whilst specialties like Ophthalmology or ENT which were considered ‘niche’, with patients often seeing ancillary services like audiology or opticians.

The all party parliamentary group on skin (APPGS) provides an unbiased means of responding to threats to dermatology services and acts as a forum for partners or stakeholders in skin care to engage with politicians (The All Party Parliamentary Group on Skin, 2019. Importantly, the APGGS seeks to advise, and make recommendations to the Government, on improving the management and treatment of skin related conditions (The All Party Parliamentary Group on Skin, 2019*)*. Thus, national bodies like Getting it Right First Time (GIRFT) and APGGS could provide evidence-based advice and guidance on priorities related to the skin on a national government level. The BAD, through its educational arm the British College of Dermatology (British College of Dermatology, undated*)* could advise on undergraduate and postgraduate dermatology education, and include general practitioners and allied health professionals. The BAD Education Board’s Undergraduate Work stream is already undertaking ways to help communicate and share best practice amongst dermatology teaching leads across the UK, provide electronic educational resources and contribute to the question bank of the Medical Schools Council Assessment Alliance (MSC Assessment allowance, 2018; Cohen et al., 2021).

Specialty champions for curriculum implementation

At the local or medical school level, there appeared to be a need to support undergraduate specialty leads to drive the specialty specific curriculum. Traditionally and as revealed by the questionnaire survey, teaching leads for undergraduate specialties took the task of teaching, planning, assessments and other aspects of undergraduate specialty curriculum delivery with limited or no medical education experience or qualification. There was often no recognition in their job plans, with little time dedicated to the undergraduate teaching activities. In the interviews with Deans of Medical Education, the Deans agreed that undergraduate education leads should have a *minimum* standard of qualification in medical education for them to undertake these roles and responsibilities effectively. Current medical educators could be developed by rewarding excellence and providing opportunities for their professional development and gaining additional postgraduate teaching qualifications like Medical education diploma or equivalent. From the school and medical education Deans' perspective, specialty or subject and their leads could aspire for proper representation in the school curriculum. For this purpose a team-based approach that matches the values and contextual need of the organisation was advisable, with iterative consultations, for example via curriculum planning meetings and strategy meetings (Gale and Grant, 1997).

Job plans and PA time for the teaching leads needs to reflect on the teaching activities and commitments being undertaken. The education leads could also have opportunities to review and discuss their specialty teaching programme

progression, challenges, and student feedback during yearly appraisals with the clinical Sub- Deans. In addition, the Educational Governance teams from the University could ensure funding for undergraduate teaching is ring-fenced for staff development and student placements. Clarity and transparency of funding allocation needed to be reviewed during yearly finance or budget meetings with the Local Education Providers (LEPs), or Hospital Trusts.

Student factors

Increased number of students per academic year, along with student feedback also influenced changes or review of the curriculum. For example, the UoN is one of the largest UK medical schools. To ensure equity and standardisation of teaching and learning to cater to almost yearly 500 student intake, a curriculum refresh was undertaken in 2020 (University of Nottingham, 2022).

The Deans in the study were concerned regards overwhelming students with ‘curriculum overload’, which in turn would risk lack of student engagement and high student burn out. They also felt that there was physically not enough space to fit all aspects of medicine into the curriculum, without lengthening the curriculum itself. This was particularly important, in the context of Covid-19 pandemic and associated mental health issues faced by staff and students alike (O’Byrne et al., 2021). Well-being strategies for students needed to be embedded within the span of their school course, to help cope with the work and study in order to graduate from medical school. This would involve providing the necessary skills set to gather knowledge, introduce mentoring with near peers, apprenticeships (General Medical Council, 2021) and allowing adequate and frequent breaks within the school course.

This study provided a unique insight on the perspectives of UK Deans of Medical Education on specialty curriculum implementation. The results of the study indicated several factors that determine curriculum review and changes. These included political (local and central agencies, like the GMC, MLA, UK government and Health education boards) and cultural influences, availability and enthusiasm of specialty champions as well as student satisfaction. Immense NHS workloads, paucity of adequate clinical staff for teaching, and impact of Covid-19 pandemic were other challenges that influenced curriculum implementation. Transparency in funding to NHS towards undergraduate medical teaching and educational governance were considered paramount in ensuring monies followed and reflected the students' experience. Strategies for undergraduate leads to improve specialty core curricular implementation included formal training in medical education, appropriate recognition in job plans and review of professional development in yearly appraisals.

Use of semi-structured interviews with Deans of Medical Education at UK medical schools was an appropriate tool to gather information and insight to curriculum implementation at the medical school or University level.

13 STRENGTHS AND LIMITATIONS OF THE RESEARCH STUDY

13.1 MIXED METHODS RESEARCH METHODOLOGY

Mixed-methods research (MMR) methods allows for a more flexible evaluation design option, with the possibility of amalgamating evidence in different ways, as guided by the purposes of an investigation or the research question. The strengths and limitations of using mixed-methods approach emerge from advantages and limitations of quantitative or qualitative approaches. The triangulation of data sources in effect, countered threats to trustworthiness, such as reactivity, researcher bias, and respondent bias (Bowen, 2009). For the researcher, broader skill sets were needed to understand and perform tests or studies spanning both quantitative and qualitative research methods (Molina-Azorin, 2016). Extending and sharpening research methods skills can enable increased rigour in conceptual thinking, and help apply new ways of answering questions or creating more contextual abilities to address the research questions (Edwards, 2008).

13.2 SCOPING REVIEW: STRENGTHS AND LIMITATIONS

A thorough search for all articles relevant to the study was conducted. However, as with limitations observed when conducting scoping reviews, articles or studies pertinent to the review question may have been inadvertently omitted (Arksey and O'Malley, 2005, Sharma et al., 2019). The level of evidence for the quality of the developed specialty specific core

curricula could not be graded as done with systematic reviews. Nevertheless, it was determined that expert consensus and use of Delphi study were the ways that most curricula were developed, which implied that efforts were made to establish ‘best practice’ regards recommended core curricular learning outcomes for students studying those specialties. The curricular elements for individual specialties were versatile, making comparisons difficult (Sharma et al., 2019).

The review however, was able to establish common themes and factors responsible for development of the current specialty specific curricula for UK medical undergraduates. In addition, the study helped identify gaps in specialty specific curricula as well as observed the heterogeneity of the curricular designs between specialties (Sharma et al., 2019).

13.3 CURRICULUM MAPPING EXERCISE: STRENGTHS AND LIMITATIONS

Whilst conducting the curriculum mapping study for specialty curricula it was observed that the task required an in-depth knowledge on the medical school course dermatology content, and how it compared to the national BAD undergraduate curriculum recommendations. The mapping involved ensuring alignment with the GMC Outcomes for graduates’ and review of how dermatology was being taught and assessed at the medical school. As the undergraduate lead for dermatology, background knowledge of the specialty subject and its importance within medical school curricula helped to identify teaching locations, methods and faculty as well as gaps within ILOs. Several challenges also became apparent which dermatology undergraduate leads in other medical schools could also face if tasked to map their dermatology

curricula to national BAD and GMC outcomes. Prior to conducting the mapping exercise, no mapping tools or formal training was available to help conduct the curriculum mapping, and the exercise relied on reading medical educational literature and discussions with the school curriculum lead and curriculum team members at the medical school. The mapping exercise also required significant time and commitment working with the medical school curriculum team as well as expert knowledge of the specialty subject to successfully display the key elements of the dermatology curriculum.

Curriculum mapping exercise of a single-specialty specific curriculum involved a significant undertaking with time limitations and restricted resources. Involvement of dermatology teaching leads at respective medical schools would help schools review their current dermatology practice, and support ways to implement the national undergraduate curriculum (Sharma et al, 2019). Being familiar with the curriculum taught at the school would enable successful implementation with an integrated approach (Harden, 2001). The mapping of the curriculum would also involve training and support for undertaking this exercise.

13.4 CROSS-SECTIONAL QUESTIONNAIRE SURVEY: STRENGTHS AND LIMITATIONS

The use of several methods to prepare the questionnaire survey (e.g. review of literature, curriculum mapping exercise, document analyses, expert opinion) meant the questions were pertinent to the research study on barriers and facilitators to specialty specific implementation. Studies drawn from documentation analyses can be constrained by what is available and its quality

but provide the lack of reactivity (Bowen, 2009). The documents analysed in the study did not have the potentially distorting qualitative researcher's presence in the field in terms of behaviours, attitudes, and feelings. The document analysis served as a complementary data collection procedure in support of triangulation and theory building (Bowen, 2009). Curriculum committee minutes alluded to GMC Outcomes for Graduates and MLA being important to influence curricula at the medical school. Though specialty-specific guidance was recommended by several specialties, as observed in the scoping review (Sharma, M et al., 2019), medical schools may ignore these and use the GMC as their only benchmark to include the generic aspects within their individual school curricula. Thus medical schools may also use GMC requirements as a barrier to exclude specialty-specific core skills and knowledge not explicitly stated in the Outcomes for Graduates or considered mandatory in order for their students to graduate. The document analysis thus acted as an adjunct with other research methods as a means of triangulation—'the combination of methodologies in the study of the same phenomenon' (Denzin, 1970, p. 291).

For the expert opinion, a couple of experts (e.g. BAD undergraduate committee lead) may have had some subjective opinions on challenges of dermatology curriculum implementation across UK medical schools. However, they were not directly involved in the envisaged implementation of innovations. The involvement of external experts who were undergraduate leads of specialty curricula *not* related to dermatology helped to provide objectivity and consensus to the generalisability for the survey questionnaire development.

The cross-sectional survey served a specific target audience (dermatology undergraduate leads or equivalent) with relevant questions applicable to the participants and generated a very good response rate (70%). The sampling of undergraduate leads responsible for the specialty curriculum implementation provided appropriate representation for meaningful contribution to the data (Sharma et al., 2022).

With the responses to the questionnaire being anonymous, opinions shared via free text responses provided rich perspectives among the participant group. Since the participants were undergraduate educators at their respective schools, the ‘natural’ setting allowed for perceptions of institutional culture and practices, reasons for success or failures for curriculum implementation at their respective schools. However, the free text responses using the online questionnaire had a variable response rate. Further, the anonymous responses meant the geographical spread of medical schools was unknown and may have biased the findings (Sharma et al., 2022).

The response rate to the questions and free text option was anticipated to be variable amongst responders as the questionnaires are voluntary. There was also a limit to the extent of detail and diversity that maybe expressed via an online questionnaire. The mixed methods approach helped to understand the potential barriers and facilitators for a specialty (dermatology) core-curriculum implementation across UK medical schools.

13.5 SEMI- STRUCTURED INTERVIEWS: STRENGTHS AND LIMITATIONS

The use of qualitative methods of conducting semi-structured interviews allowed a unique insight into the thoughts and perceptions of Deans of Medical Schools on decisions regarding medical curriculum implementation. The sampling and recruitment was done through medical schools council, UK, allowing for all Deans to participate. Formal ethics approval was gained for the study. Other ethical aspects taken into considerations included level of personal intrusion, the sensitivity of questions and all questions being optional, vulnerability of participants groups and the storage of confidential data.

Due to the Covid-19 pandemic (2019-2021), there had been significant workload burden across medical schools and initially the interviews invites were deferred by the Medical Schools Council. A further invitation was sent as requested at a later date and allowances made regarding timing and duration for the interview schedules. The numbers of interviewees were reduced to 3-5 due to the exceptional and extenuating circumstances.

The impact of Covid-19 Pandemic and the subsequent disruption to student teaching, followed by challenges to deliver teaching to medical students in different and safe ways, meant only four (10%) of the Deans of medical education of the agreed to participate in the interviews. The results and conclusion may not be entirely representative of all UK medical school Deans. Although not aiming to be a representative sample of all UK medical schools, the medical school Deans involved in this study varied in location

(England, Scotland and Wales) and followed traditional, conventional curricula as well as new medical school courses and curricula.

The use of virtual MS Teams semi-structured interviews gave flexibility to both the participants, allowing them to participate at a time and location convenient to them, as well as a topic guide for both parties to refer to.

It was important to acknowledge the background of the researcher, being an Undergraduate lead for a specialty at a school of medicine in UK. The author's qualification was disclosed and it is possible that the prompting questions may have resulted in interviewees making assumptions about the interviewer's knowledge and influenced the way they presented their attitudes towards specialty specific curriculum. However, the challenge of specialty curriculum implementation appeared to be universal amongst all interviewees, and at no point did the interviewer feel that participants were holding back information or their own perspectives on the topic. Therefore it is possible, but unlikely that the influence of the interviewer could have caused the participants to significantly alter the way they presented their attitudes towards specialty curriculum implementation.

Due to the nature of the selection and recruitment methods used in the interview studies there was the potential for self-selection of participants. The participants may have been particularly interested in the topic of curriculum implementation (e.g. new medical schools), and could skew the results and not represent the attitudes of school Deans for whom curriculum implementation may not be a particular topic of interest. The aim of the study was to collect and analyse a wide range of opinions to suggest explanations

for how and why decisions around specialty curriculum implementation were made.

Though medical school Deans had the responsibility for delivery of school curricula, this study highlighted the complex relationships involved with other stakeholders (e.g. GMC, UK Government, Health Education Boards, medical, surgical and allied specialties).

14 STRATEGIES FOR SPECIALTY CORE-CURRICULUM IMPLEMENTATION: IMPLICATIONS FOR FUTURE PRACTICE AND RESEARCH

This research study helped to understand from different perspectives on what may help specialty core-curriculum implementation across medical schools. Some of the strategies are discussed as follows:

14.1 CURRICULUM DESIGN, MAPPING AND INTEGRATION

A curriculum design should be able to be communicated with ease to both students and the faculty, and allow for effortless review, evaluation and revision once it has been implemented into practice (Prideaux, 2003). In this research study, the curriculum mapping focussed on four key areas: intended learning outcomes (ILO) as per BAD 2016 document and the GMC's Outcomes for graduates 2018; learning opportunities; core content; and assessment methods. Each dermatology specific ILO was also mapped to the teaching methods used, location of teaching delivery, and teaching faculty involved. Of the 70 ILOs for dermatology in the medical school curriculum, 55 (79%) were mapped to the BAD curriculum, 14 (20%) required modifications to align them with the BAD learning outcomes, 2 were not specified in the current curriculum and 1 objective was identified as redundant. The core dermatology content in the medical school curriculum was aligned to all domains of the BAD curriculum. Medical teaching faculty included consultant dermatologists, specialty doctors, dermatology trainees and a dermatology teaching fellow. Specialist nurses contributed to teaching 20/70 (29%) of ILOs.

68/70 (97%) of the ILOs were assessed in the form of either formative and/or summative assessments. This exercise was proven to be a valuable tool in the successful implementation of national undergraduate curricula. The curriculum mapping exercise for undergraduate dermatology strengthened the alignment of the ILOs to the BAD and GMC's Outcomes for graduates. This helped to make explicit how dermatology was being taught and assessed as well as identified gaps and redundancies. It recognised the role of inter-professional teaching and multidisciplinary approach to patient care.

Opportunities could be taken to integrate specialty curriculum ILOs with other specialties at the medical schools. For example, students could benefit from incorporating specific dermatology modules within their General practice placements. This could involve early recognition and prompt referral by a general practitioner to a two-week wait specialist clinic. Interpretation and action on pathological or radiological findings (e.g. interpretation of results for skin cancer and suspected metastasis) could help with clinical reasoning skills. Similar modules could be included whilst students were in surgery placements (e.g. learning about wide local excisions or lymph node examination) or oncology or palliative care rotations which could focus on communication skills with patients and carers and systemic treatment modalities. Thus, for understanding the multidisciplinary approach to skin cancer, integration with histopathology ILOs, radiology ILOs, oncological therapeutic options for skin cancers, use of teledermatology for skin cancer referral pathways between primary and secondary care, importance of specialist cancer nurses and interprofessional learning, could all provide a holistic approach to patient journey and this multi-faceted approach to student learning could be

highlighted on a curriculum map. Specialties and sub-specialties could be taught and delivered to nationally recommended guidelines and standards, avoid duplication of course content and allow formative and summative assessments to assess clinical reasoning.

The use of dynamic sophisticated computer aided mapping tools would allow visualisation across specialty- specific curricula. Important themes could be covered longitudinally, for example the MLA content map (General Medical Council, 2019) and allow for breakdown of silo teaching and learning. The overview would enable ease of navigation and integration of multiple learning outcomes, avoid duplication between specialties and blueprint assessment methods, thus becoming a valuable tool for curriculum reviews (Imperial College London, Sofia: Interactive curriculum mapping 2018).

14.2 ADOPTION OF COMPETENCY BASED CURRICULUM MODELLING

The anticipated introduction of national assessments (MLA) for all medical undergraduates, by UK's regulatory body the General Medical Council, combined with a hard-pressed national health service further stretched post Covid-19 pandemic, limited resources with shortage of clinicians and teaching faculty, and political imperatives towards creating a 'generalist' workforce, makes the competency based model (Hager and Gonczi, 1996) of curriculum design appealing. However, with the advent of competency-based curricula, there is a risk and tendency to 'teach-to-the-test' along with a more instrumental, less creative, approach to learning on the part of the students. (Sharpe, 2010).

A competency based assessment provides the advantage of public accountability of medicine and the standards are made transparent. With variable or reduced clinical exposure as a result of Covid-19 pandemic or the reduced hours of work under the European Working Time Directive (a problem which is likely to increase as hours of work decrease in forthcoming years), it also maximises use of training opportunities as trainee and trainer know what they need to learn (Leung, 2002).

However, by reducing each clinical skill into a list of subcomponents, the connections between these tasks may not be made and the system may not adequately assess the global or meta competencies which a doctor needs (Leung, 2002). This may be seen with the recent GMC guidance for the Medical Licensing Assessment Content map, which simply provides a list of conditions or diseases (General Medical Council, 2019).

The student intake in UK medical schools continues to rise to cater to the demands of the community heath. With the increased number of students per year, methods of teaching and learning would need to be adapted to cover the core elements of the curricula. The expansion of clinical placement capacity for increased students is likely to challenge the overstretched NHS further, to deliver appropriate and adequate clinical experience needed to underpin the expansion in medical training (Smith and Sime, 2001). Furthermore, inadequate clinical academic staff to ensure high quality medical educational development for the medical students can pose a risk to their overall success (Smith and Sime, 2001). There is also criticism that adoption of competency based assessment can be viewed as politically motivated allowing the

government to define important competencies and allocate resources based on the outcomes of performance (Leung, 2002). The system could also be considered rigid and impersonal and for some individuals this could be demotivating (Carr, 2004).

With the impact of the Covid-19 pandemic leading to a need for social distancing with limited face to face teaching, medical schools have already started to use virtual platforms like webinars or delivering lectures via MS teams. Though these platforms may provide supplementary methods of teaching and learning, they cannot replace the necessary clinical reviewing and examining patients face to face to develop the core skills needed for safe practice (Cohen et al., 2021). Thus a blended learning approach, incorporating teledermatology and experiential clinical direct patient care could help provide a balance to gain confidence and competence amongst medical students in dealing with skin-related conditions.

14.3 Development of Undergraduate 'Specialty Champions'

For the purpose of specialty-specific core curriculum implementation, appointing and developing undergraduate specialty champions would help curriculum designers and medical education Deans defer this responsibility to the undergraduate leads.

From the cross-sectional survey, undergraduate leads expressed the need for time, training and skills to undertake the medical educational leadership roles with confidence.

Medical schools and educators' employers have clear guidance from the GMC to ensure undergraduate teachers have dedicated time in their job plans to undertake the educational responsibilities and their training and development be reflected through yearly appraisals (General Medical Council,2015). The yearly consultant appraisals culminate into the process of revalidation by the General Medical Council every five years, which sets out the requirements that all licensed doctors must meet in order to continue practice (General Medical Council, 2020). Within the revalidation process, the GMC instructs that the supporting information must cover any work done including non-clinical roles such as educational, research, academic, managerial or leadership roles (General Medical Council, 2020). The yearly appraisals could be made more robust to reflect the supporting professional activities (SPA) undertaken within the job plans to continue in the educational leadership role, with oversight from the University or medical school. Supporting documents could then be used to demonstrate the role as an undergraduate educational lead and reflected during the five year cycle of revalidation.

To improve the knowledge gaps and skills as lead educators 'specialty champions' could be encouraged to undertake formal training or qualification in medical education, appropriate time ring-fenced in job plans and remuneration provided towards their professional development for a role in medical education.

For specialty core-curriculum core-content to remain relevant, recent and contextual, the newer developments could be updated at the national body level (e.g. BAD). Undergraduate leads as part of their professional

development in medical education would be expected to attend national conferences and courses to cascade and share other knowledge, skills and new developments in education (e.g. teledermatology in undergraduate teaching) at their respective medical schools. With guidance, undergraduate specialty leads at medical schools could develop and use curriculum mapping and other educational tools for their specialty to strengthen the alignment of the ILOs to the national (e.g. BAD) and GMC's Outcomes for graduates. Undergraduate leads could then provide a unique contextual insight into adopting strategies for curriculum implementation at their medical school level. Undergraduate leads could enable horizontal and vertical integration of specialty content, aligned with other specialties to provide a meaningful approach to student learning.

14.4 POLITICAL INFLUENCE (NATIONAL AND LOCAL) AND AGENDAS FOR CHANGE TO IMPROVE STANDARDS OF MEDICAL GRADUATES AND EDUCATORS

This research study demonstrated that national and local political agendas played a vital role in medical school curricula, its development as well as its implementation. On a national level, the 'Getting it Right First Time' (GIRFT 2023) would be a vital body with specialist input to guide evidence-based solutions towards improvement in workforce planning, access to dermatology services as well as training requirements. These training opportunities could be strengthened on the needs of society and the burden of disease.

For example, Section 13A of the National Health Service Act 2006 (mandate) is amended in accordance with subsection NHS England mandate: cancer

outcome targets and states that ‘NHS England must include objectives relating to outcomes for cancer patients, and those objectives are to be treated by NHS England as having priority over any other objectives relating specifically to cancer’ (Health and care act, 2022). The importance of teaching, learning and assessing cancer patients (including skin cancer) could be prioritised in medical school curricula to reflect the national government initiatives.

14.5 INNOVATIONS AND ADAPTATIONS IN THE CONTEXT OF COVID-19 PANDEMIC

In the context of Covid-19 pandemic, changes were rapidly brought in for teaching and learning have included telemedicine (Ahmed, S., Sanghvi, K. and Yeo, D. 2020). The pandemic led to reduced opportunities for students to interact directly with patients as a result of using telemedicine and remote consulting. Innovative online teaching methods like gamification, delivery of small- and large-group teaching via webinars, and use of social media for educational activities, although potentially beneficial, could not provide the necessary clinical practice required to harness core skills (Cohen et al., 2021).

In addition the national increase in medical student numbers and the implementation of social distancing measures in hospitals limited face to face student -patient interactions resultant reduced clinical teaching opportunities and the necessary experiential learning (Cohen et al., 2021). A blended learning approach to curriculum implementation may provide solutions to the newer ways of teaching, learning and assessing, which are expected to stay for the foreseeable future. This would mean combining the benefits of technology with high-quality and focussed clinical encounters, for example

with hybrid clinics a combination of face-to-face (FTF) and remote consultations (Cohen et al., 2021).

15 CONCLUSIONS

This research study aimed to identify and explore the potential facilitators and barriers to specialty curriculum implementation across UK medical schools, using dermatology as an example.

A mixed methods research methodology was adopted with a sequential explanatory design process which guided the decision on the next research method and data analysis as trends became evident in the study. The use of mixed methods approach as the methodological framework helped to provide congruence and corroboration from different data sources. The data collection was extensive, drawing on multiple sources of information gathered such as conducting a scoping review of literature on the current status of specialty core-curricula for UK medical schools, a curriculum mapping study for dermatology at a medical school, a cross-sectional survey for undergraduate leads, document analysis, experiential learning and expert opinions from conducting semi-structured interviews with the Deans of medical education.

This combination of research methods provided a means of triangulation - 'the combination of methodologies in the study of the same phenomenon' (Denzin, 1970, p. 291). The researcher was expected to draw upon multiple (at least two) sources of evidence; that is, to seek convergence and corroboration through the use of different data sources and methods (Yin, 1994). Thus the triangulation helped reduce the impact of potential biases that could exist by being a single investigator, or performing a single study, using single source

or being artifactual (Patton, 1990), By triangulating data, attempts were made to provide ‘a confluence of evidence that breeds credibility’ (Eisner, 1991, p. 110).

The scoping review of literature provided a comprehensive overview of the curricula developed by specialties, in alignment with GMC outcomes. Drivers for development of these included fear for patient safety, burden of disease, medical schools not including it in their curricula and graduates feeling ill prepared to practice confidently and safely (Sharma et al., 2018).

Curriculum mapping proved to be a vital tool to standardize local dermatology ILOs to national recommendations and provided transparency to stakeholders for implementation of the dermatology curriculum (Sharma et al, 2020). Undergraduate specialty leads within medical schools were considered to be in a unique position to provide content expertise, skills and assessment methods needed for students to achieve minimum standards. Curriculum mapping could help with visualisation of a specialty and its relationships between other clinical or foundational subjects (Harden, 2001). Undergraduate leads could provide contextual insight into adopting strategies for curriculum implementation at their medical schools (Grant, 2019). Horizontal and vertical integration of curricula (e.g. anatomy, histopathology, and clinical placements general practice, plastic surgery, oncology or dermatology could fulfil domains related to skin cancer on MLA content map) (Sharma et al., 2020). Developments in specialty based educational interventions (e.g. teledermatology) could strengthen the alignment of the ILOs to the national curricula (Singh et al., 2021), keeping the curriculum up

to date and relevant. Aspects within hidden curricula like medical ethics, communication skills and professionalism (e.g. breaking bad news for cancer diagnosis) could also be mapped and assessed. The course could then be evaluated on the impact of learning core knowledge and skills through expertise driven specific outcomes. Use of advanced curriculum mapping tools (*Sofia: Interactive curriculum mapping,* 2018) could ensure teaching and learning resources were standardised, especially with the expansion of medical student intake across UK medical schools (Medical Schools Council, 2021).

The cross-sectional survey revealed the skill set, and enthusiasm of the 'specialty champions' as an important facilitator for curriculum implementation. However, there were knowledge gaps amongst undergraduate leads with respect to mapping and blueprinting of core-curricula and the GMC's proposed implementation of the Medical Licensing Assessment (MLA). Facilitators included training on use of mapping tools, assessment planning and writing. These training activities could be undertaken via the BAD College of education, or respective Royal Colleges or at medical schools as educational interventional programmes to develop and mentor undergraduate teaching leads. Perceived barriers to curriculum implementation included NHS clinical workloads, dermatology not deemed a priority in school curricula, and difficulty influencing changes at medical school level (Sharma et al, 2022).

The data drawn from the cross-sectional survey with undergraduate leads helped to contextualise data collected during interviews with the Deans of medical education at the UK medical schools. Cultural attitudes between

specialties, NHS Trusts, and Universities, and student feedback determined how well curriculum integration took place. The cultural, environmental and curriculum related barriers have also been noted in the literature (Rousseau et al., 2018). Prioritising expert clinical teachers with recognition of their time and effort, and teaching delivered in a protected environment with real patients with relevant clinical findings would be helpful (Rousseau et al., 2018).

Paucity of adequate clinical staff for teaching, and impact of Covid-19 pandemic were other challenges that influenced curriculum implementation. National and local political driven health agendas influenced teaching, learning and assessments. With the introduction of MLA for all UK medical undergraduates, a competency based model (Hager and Gonczi, 1996) of curriculum design seems to be appealing.

A competency based assessment provides the advantage of public accountability of medicine and the standards are made transparent. With variable or reduced clinical exposure as a result of Covid-19 pandemic or the reduced hours of work under the European Working Time Directive (a problem which is likely to increase as hours of work decrease in forthcoming years), it also maximises use of training opportunities as trainee and trainer know what they need to learn (Leung, 2002).

Future research plans on curriculum implementation need be contextual, and dynamic to the changing landscape of disease burden, resources and clinical practices (e.g. remote consultations) (Cohen at al., 2021). Medical school curricula should remain fit for purpose, contextual (Grant, 2019), and be driven

by evidence base, to enable medical graduates to practise safe and ethical medicine with confidence, for their patients and carers.

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Zafiriu, B. and Yesudian, P.D., (2010) Does undergraduate dermatology education affect junior doctors' diagnostic and therapeutic skills? *British Journal of Dermatology* 163, pp. 36-37.

APPENDICES

Appendix 1 Example search strategy for scoping review

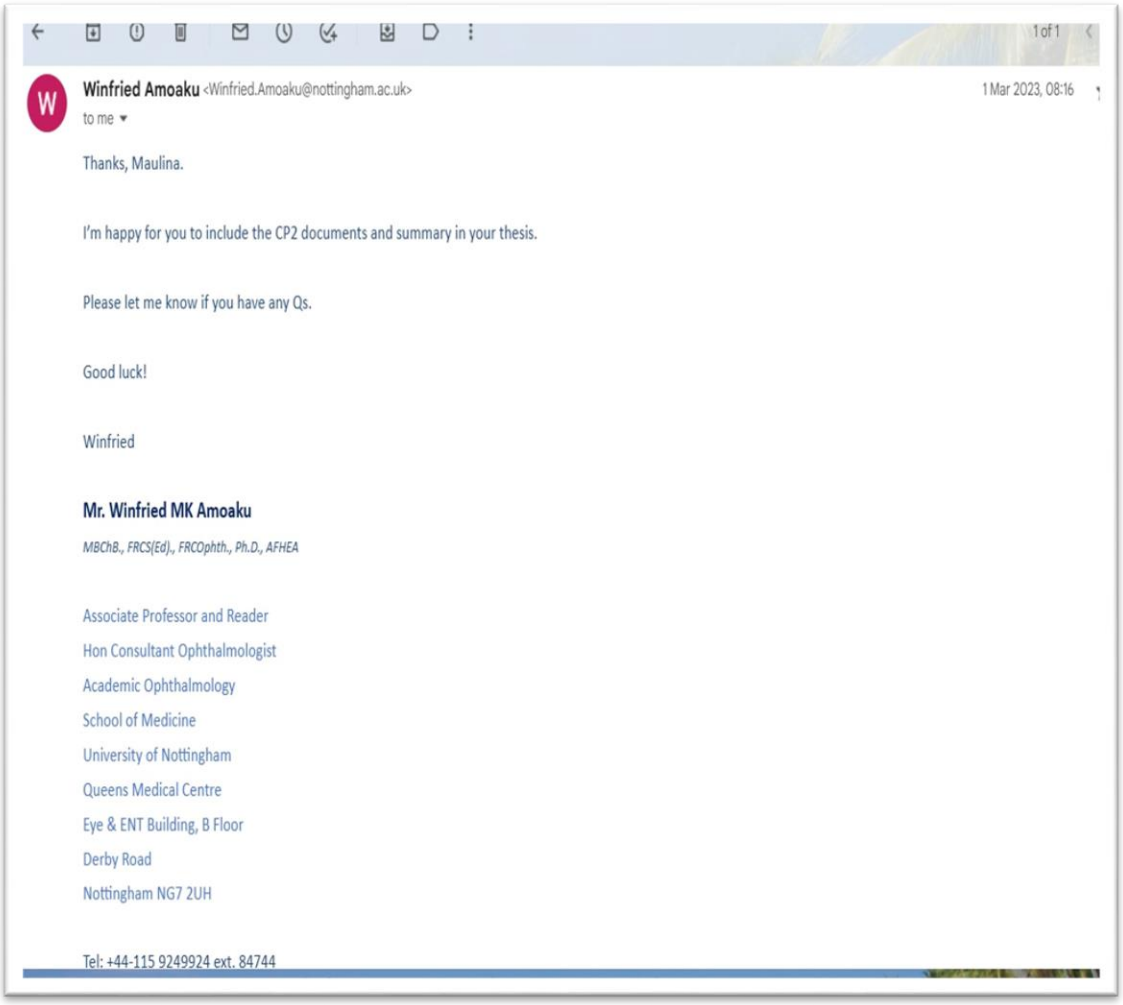
NICE Healthcare Databases Advanced Search MEDLINE 1946 to present (Provided by Proquest).

Strategy 606888

#	Database	Search term	Results
1	Medline	‘EDUCATION, MEDICAL, UNDERGRADUATE’/	22398
2	Medline	(‘medical education’).ti,ab	36006
3	Medline	(undergraduate).ti,ab	29224
4	Medline	(‘medical student’).ti,ab	6528
5	Medline	‘STUDENTS, MEDICAL’/	30311
6	Medline	(2 AND 3)	3401
7	Medline	(1 OR 4 OR 5 OR 6)	48667
8	Medline	CURRICULUM/	70249
9	Medline	(curricul*).ti,ab	48931
10	Medline	(8 OR 9)	93842
11	Medline	(core OR influenc* OR design* OR develop* OR deliver* OR enabl* OR barrier* OR process* OR factor*).ti,ab	9645339
12	Medline	‘REFERENCE STANDARDS’/	40365
13	Medline	(standard*).ti,ab	1110534
14	Medline	(12 OR 13)	1133896
15	Medline	(11 OR 14)	10194258

16	Medline	DERMATOLOGY/	17224
17	Medline	(dermatology).ti,ab	23551
18	Medline	(16 OR 17)	33537
19	Medline	exp ‘UNITED KINGDOM’/	350174
20	Medline	(UK OR ‘United Kingdom’ OR ‘Great Britain’ OR GB OR England OR Wales OR ‘Northern Ireland’ OR Scotland).ti,ab	205051
21	Medline	(19 OR 20)	459845
22	Medline	(7 AND 10 AND 15)	8130
23	Medline	22 [DT 1994-2019]	7323
24	Medline	(7 AND 10 AND 15 AND 18)	57
25	Medline	24 [DT 1994-2019]	52
26	Medline	(7 AND 10 AND 15 AND 21)	788
27	Medline	26 [DT 1994-2019]	718
28	Medline	(7 AND 10 AND 15 AND 18 AND 21)	8
29	Medline	28 [DT 1994-2019]	8

Appendix 2: Consent agreement for use of UG committee meeting minutes for document analysis



1 of 1

Winfried Amoaku <Winfried.Amoaku@nottingham.ac.uk> 1 Mar 2023, 08:16

to me

Thanks, Maulina.

I'm happy for you to include the CP2 documents and summary in your thesis.

Please let me know if you have any Qs.

Good luck!

Winfried

Mr. Winfried MK Amoaku

MBChB., FRCS(Ed)., FRCOphth., Ph.D., AFHEA

Associate Professor and Reader
Hon Consultant Ophthalmologist
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Appendix 3: UoN UG Lead Committee meeting minutes

Minutes of Committee Meetings of Clinical phase 2 UoN UG leads (including dermatology) and themes emerging for curriculum barriers/facilitators:

i. GMC and MLA

- Meeting date: 18/07/2018

A number of external factors are driving the changes, including the GMC's new Outcomes for Graduates document (still to be released), and the introduction of the Medical Licensing Assessment (MLA). The current CP3 assessments will not prepare the students appropriately to pass the MLA and are too limited in their scope. To ensure the students are adequately prepared, the school needs to adjust their assessments to align with the MLA.

The School will be looking at the learning objectives across all attachments and seeing where they duplicate so this could be an opportunity to work with Child Health, Medicine, Surgery etc. There will be certain things each attachment considers as core to their curriculum, and the school hopes to set a curriculum derived from current attachments and adjusted to fit the new (GMC) Outcomes for Graduates document.

ii. Curriculum mapping & blueprinting

- Meeting date: 06/06/2018

Blueprinting would be across the curriculum and then broken down.

- Meeting date: 18/07/2018

In LA's experience, each attachment has excellent teaching but all are in isolation. The attachments are clear on what they are delivering individually, but no one is clear on what is being delivered within the other attachments, so to improve student learning, integration will be key. A similar problem at Imperial College has led to them changing their curriculum and introducing bespoke software ('Sophia') to help students and tutors navigate through the curriculum to help learning. The Medical Schools' Council has now adopted this software and wants to disseminate it across all medical schools.

iii. Assessments

- Meeting date: 21/08/2019

Discussed exam results including OSCE station results for dermatology, ophthalmology and ENT

- Meeting date: 03/04/2019

The group had previously requested stats on the performance of last year's students in the DOE questions within the new knowledge exams. YA has explained that the DOE questions are embedded within the larger CP2 exam paper, and so they are unable to produce these stats for the group as requested.

WA and MD were disappointed these stats could not be produced so their group did not have a way to confirm how the DOE questions have been performing in the exams.

- Meeting date: 26/09/2018

If the university says they need less mandatory summative assessments, then MD wants mandatory formative assessments instead. If the university does not want a formal record of an assessment then this is okay but an assessment is needed.

- Meeting date: 06/06/2018

The Assessments team has started thinking about the OSCE's for the academic year 18/19 and asks attachment leads that if they have any ideas for stations to send them to YA. It was noted that the assessments team are working on building a bank of questions and stations.

YA confirmed that the mock OSCEs went well and received positive feedback and will be rolled out again for the academic year 18/19.

- Meeting date: 07/06/2017

SB enquired as to which documents would be needed to discuss exam performance. WA advised that members will require a copy of the pass rates, fails and if there are any retraining students. MS requested that the information be broken down by speciality.

Feedback for the Dermatology OSCE station was good.

- Meeting date: 18/10/2017

SB reminded AMG members to email her should they need an Associate Account to access Rogo to provide exam question input. AMG members with associate accounts are also reminded to make sure they renew their accounts as they expire after a limited time.

- Meeting date 29/03/2017

MS mentioned that questions for Paediatric Dermatology needed reviewing and that the standard of questions should be reaching a higher level and that she was happy to offer to create questions for this section in the future.

MS reported that she had asked Lincoln and Derby colleagues for assistance with preparing OSCE and Single Best Answer questions (SBAs).

JE suggested to AMG members that a DOE Question Writing Bootcamp could be arranged if desired; this had been arranged for both HCOLL and Psychiatry attachments.

- Meeting date: 11/01/2017

AD explained that previously because DOE has had exams in the online format and not a physical format we have asked external examiners to visit the course and meet students. But this year we have OSCE exams that need to be observed. AD explained that all the CP2 examiners will be asked to visit on one day to review the new CP2 OSCE by asking for their availability and scheduling them accordingly over the six days of OSCEs. WA explained that previously DOE external examiners would oversee the whole course not just the exam and they will still need access to the whole course. Not all the externals will have to attend at the same time.

Assessments team to confirm exactly which dates the exams will be and then to invite external examiners.

iv. Specialty leadership and expertise

- Meeting date: 21/08/2019

Concern expressed regards lack of expertise teaching within general practice for the specialty teaching. There needed to be skills taught properly by specialists in order for the learning to be embedded correctly.

- Meeting date: 03/04/2019

A teaching fellow for every subject at every site would benefit

the teaching at the different sites.

SDM said King's Mill find that having a lower number of consultants at the smaller sites makes covering all the teaching difficult when someone is off sick or away.

- Meeting date: 26/09/2018

MS said there are only three MACCS in Dermatology, so they cannot afford to drop any as they all cover something basic which students need to know. WA said there are five in ophthalmology, and they are all basic skills.

- Meeting date: 18/07/2018

VM explained that when anyone in their department is on annual leave they make sure that the trainees cover for their teaching during that period. But VM explained that they are a very small department (with five consultants, only three are involved in teaching).

- Meeting date: 18/10/2017

NJ also reported that students based at Lincoln felt that there were a good number of clinics but insufficient teaching compared to other sites, and that a lot of teaching was dependent upon consultant availability and willingness. WA informed NJ that if

students strongly feel consultants are not teaching enough they should report this to their site attachment lead in the first instance. Reference to the AMG should be made if not actioned at the site.

- Meeting date: 07/06/2017

DOE leads confirmed that all learning resources and practice OSCE papers were OK to rollover for 17/18.

Feedback for the Dermatology OSCE station was good.

- Meeting date: 11/01/2017

WA stated that the core of the AMG should be the clinical leads and that the AMG should occur with a minimum of three clinical leads in attendance. MD agreed it should be clinical leads but sometimes attendance is very low. The group agreed that the AMG should have at least three clinical leads in order to have a meeting.

QMC – LE explained that another ophthalmology consultant has not wanted students in their clinic. He is the second ophthalmologist in six months to decline having students in their clinic.

- Meeting date: 29/03/2017

LE mentioned that NUH Ophthalmology students had experienced confusion concerning Fundoscopy sign-offs. NUH students reported that in Derby, a Fundoscopy examination where the patient had signs of pathology in both eyes counted as 2 Fundoscopy entriesies, whereas at NUH it was counted as only one. WA confirmed that it should only count as one Fundoscopy entry. MD suggested there should be clear guidelines in the logbook as to the definitions of sessions/clinics/examinations.

MD and MS affirmed that their respective lectures on Moodle had been updated

Derby – RY explained that interviews for a new Teaching Fellow for ENT are ongoing.

v. Cultural/Political

Funding

- Meeting date: 21/08/2019

One UG Lead remarked it took him 10 years to identify appropriate SIFT money. Another UG lead agreed that nearby Trust was 10 years ahead with respect to knowing how SIFT money was allocated and how it helped them deliver high quality, consultant –delivered education to their students.

- Meeting date: 03/04/2019

Regarding funding for teaching at King's Mill, MD told SDM that transparency over SIFT funding has transformed his teaching, and allowed him to make a much

clearer case for funding into his department recently. SDM agreed and said that knowing how much they get for each student would probably help convince some

people to get more involved. MD advised that SDM find out exactly how much her team should be receiving per student, and can then use this when making a case for teaching resources etc.

Similarly, students had expressed disappointment that there had not been any ENT SSMs this year, and MD explained that these had to be paused while MD negotiated funding for the teaching with management.

- Meeting date: 18/10/2017

WA reminded all sites that they are responsible for the equipment

purchased for students at each site. If they were concerned about uniformity in teaching delivery across sites. Site Leads would need to discuss with colleagues in Nottingham to decide on a unifying plan, subject to funding

- Meeting date: 11/01/2017

From a Trust perspective, the (student) feedback goes towards revalidation letters for the consultants and helps them to evidence they are achieving everything the Sift funding is for.

Appendix 4: Expert opinion discussions

Expert opinions of UG leads with a specialty specific national curriculum

Discussion with UG leads of other specialties which also have a national recommended specialty specific core-curriculum (e.g. Palliative Care, ENT, Paediatrics). Understand the perspectives amongst specialty-specific leads at a medical school (UoN), on what factors contribute to implementation of a standardized core-curriculum. The email summary of discussion with Palliative Care Consultant undergraduate lead on factors influencing curriculum implementation is elicited below:

Memo/ Email summary of meeting with palliative care lead (UoN):

'Broadly I am thinking of categorising these points into:

a) Leadership

b) Funding

c) The specialty curriculum itself (local or national)

c) School related issues

d) External influences

e) Prioritisation/ communication/ coordination/ etc.

From my understanding, the following were the points we touched upon:

1. Specialty Champion- led by Consultant of the specialty instead of non-specialty Lead impacts on delivery of teaching, assessments

2. National/local specialty Curriculum itself maybe too big to deliver within the allocated time - to consider how to distill out the ' essential, important and nice to know' bits

3. Rise in student numbers being taught - impacts on how teaching maybe delivered (more central, but difficult to provide similar clinical experience)

4. Non- standardisation of curriculum delivery between sites within a medical school

5. Lack of transparency and clarity on how SIFT funding works and how it is being utilised within departments to support teaching

6. Need for admin support

7. Need for IT support - e.g. making podcasts/ moodle lectures

8. Lack of communication between disciplines -e.g. nursing, oncology, pharmacy, school, teaching fellows

9. External influences: GMC, MLA, Political drive for prioritisation of some specialties over others

10. Difficulty engaging with medical school and committees

12. Apparent lack of commitment to specialty at higher levels of school

13. Role of nurse educators to support teaching

14. Need for quality assurance across sites/ where teaching delivered to ensure high teaching for specialty specific standards in knowledge and skills

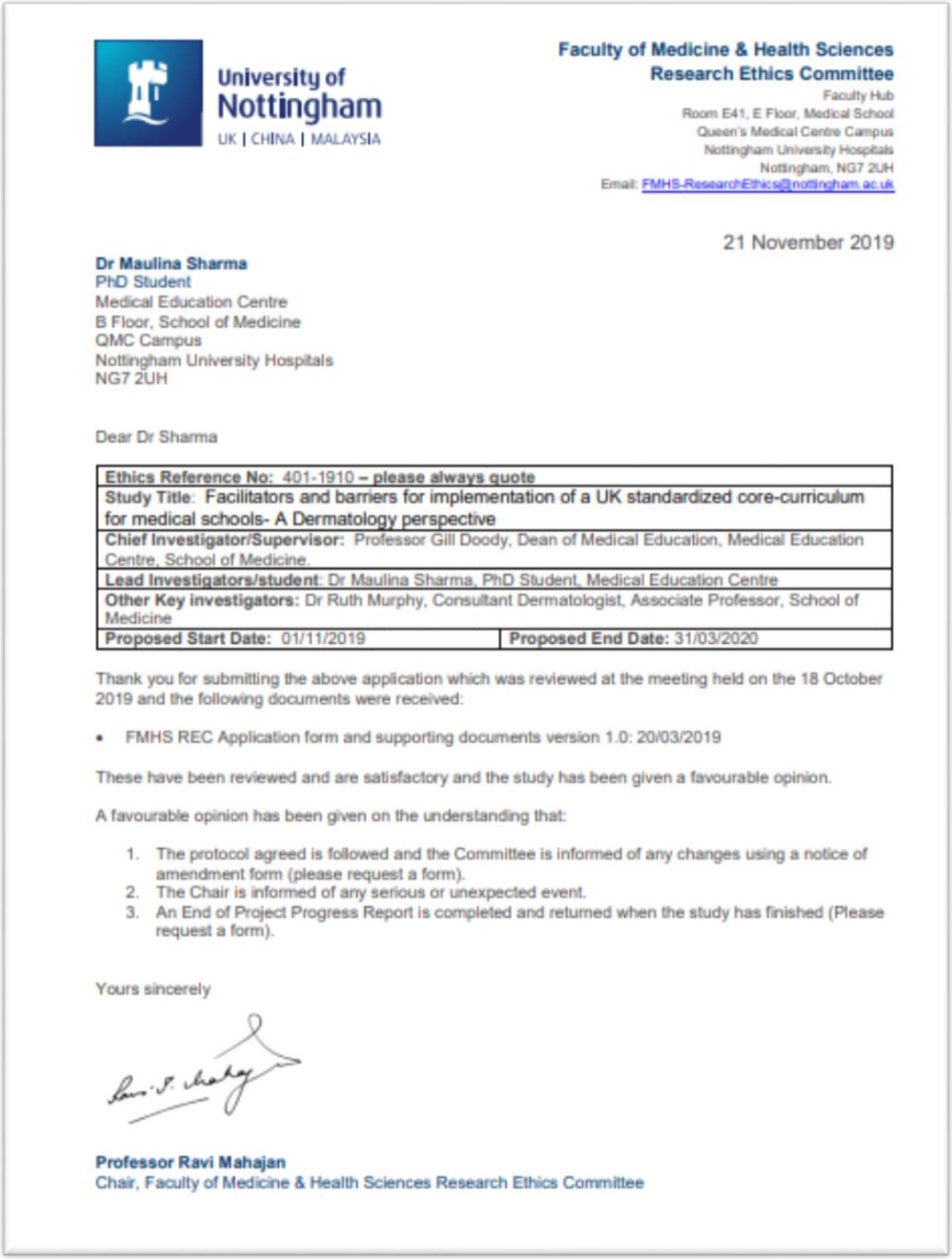
15. Need for specialty specific curriculum mapping and blueprinting to assessments to ensure alignment.

Design of the questionnaire:

Email correspondence with palliative care lead (08/05/2019) 'Some of the basic information in the first part of the questionnaire should be on the SIF website for each medical school (I fill in a form each year or so); the issues helping/hindering will have been explored probably in a more basic way.

Of interest, it was only because the SIFT sent a questionnaire to the medical school asking who their lead for palliative care was they found me! So a questionnaire alone can be helpful.'

Appendix 5: Research ethics application approved for questionnaire survey



University of Nottingham
UK | CHINA | MALAYSIA

Faculty of Medicine & Health Sciences
Research Ethics Committee
Faculty Hub
Room E41, E Floor, Medical School
Queen's Medical Centre Campus
Nottingham University Hospitals
Nottingham, NG7 2UH
Email: FMHS-ResearchEthics@nottingham.ac.uk

21 November 2019

Dr Maulina Sharma
PhD Student
Medical Education Centre
B Floor, School of Medicine
QMC Campus
Nottingham University Hospitals
NG7 2UH

Dear Dr Sharma

Ethics Reference No: 401-1910 – **please always quote**	
Study Title: Facilitators and barriers for implementation of a UK standardized core-curriculum for medical schools- A Dermatology perspective	
Chief Investigator/Supervisor: Professor Gill Doody, Dean of Medical Education, Medical Education Centre, School of Medicine.	
Lead Investigators/student: Dr Maulina Sharma, PhD Student, Medical Education Centre	
Other Key investigators: Dr Ruth Murphy, Consultant Dermatologist, Associate Professor, School of Medicine	
Proposed Start Date: 01/11/2019	**Proposed End Date:** 31/03/2020

Thank you for submitting the above application which was reviewed at the meeting held on the 18 October 2019 and the following documents were received:

- FMHS REC Application form and supporting documents version 1.0: 20/03/2019

These have been reviewed and are satisfactory and the study has been given a favourable opinion.

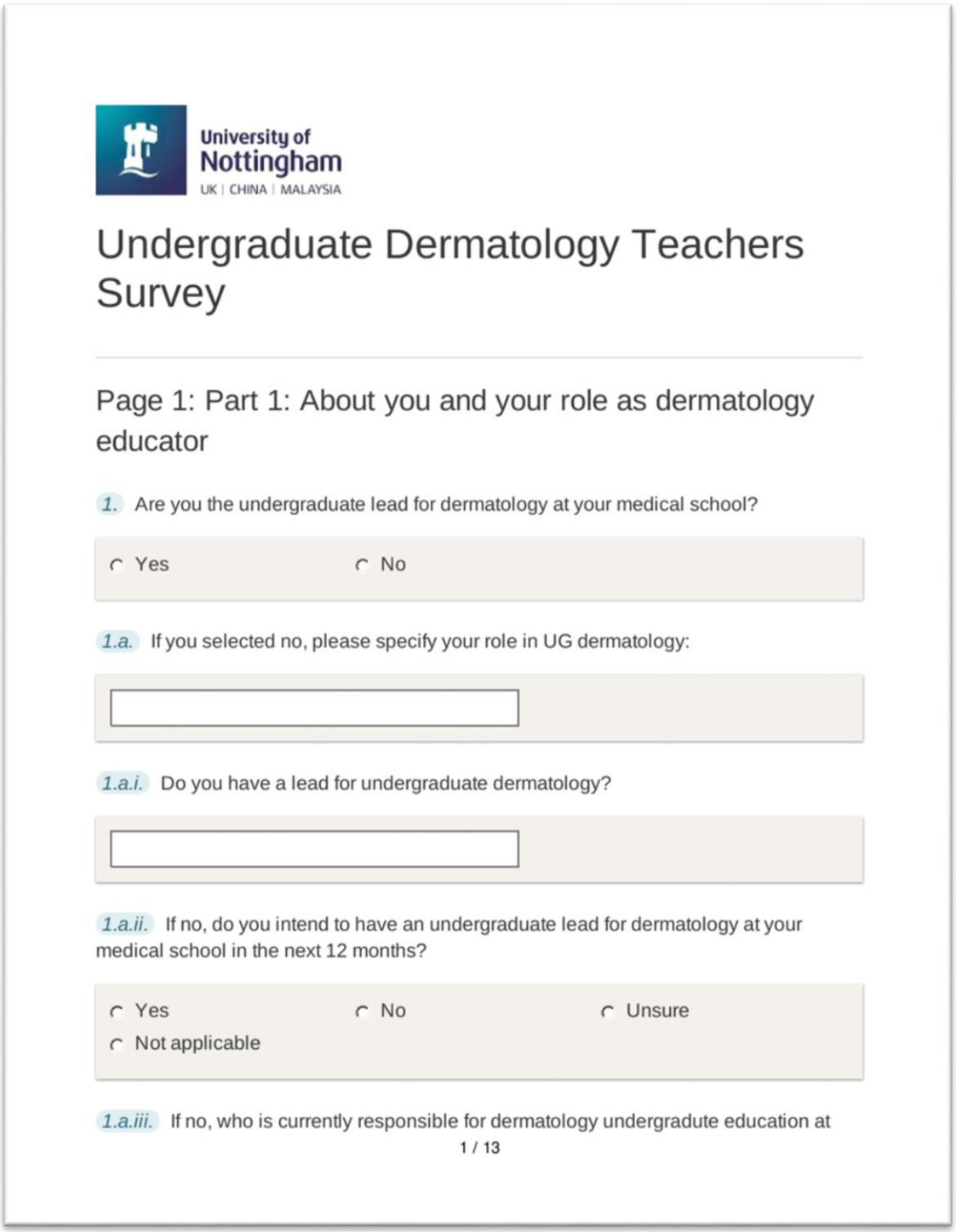
A favourable opinion has been given on the understanding that:

1. The protocol agreed is followed and the Committee is informed of any changes using a notice of amendment form (please request a form).
2. The Chair is informed of any serious or unexpected event.
3. An End of Project Progress Report is completed and returned when the study has finished (Please request a form).

Yours sincerely

Professor Ravi Mahajan
Chair, Faculty of Medicine & Health Sciences Research Ethics Committee

Appendix 6: Sample copy of UG Dermatology Teachers Questionnaire Survey



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Undergraduate Dermatology Teachers Survey

Page 1: Part 1: About you and your role as dermatology educator

1. Are you the undergraduate lead for dermatology at your medical school?

- Yes
- No

1.a. If you selected no, please specify your role in UG dermatology:

1.a.i. Do you have a lead for undergraduate dermatology?

1.a.ii. If no, do you intend to have an undergraduate lead for dermatology at your medical school in the next 12 months?

- Yes
- No
- Unsure
- Not applicable

1.a.iii. If no, who is currently responsible for dermatology undergradute education at

1 / 13

your medical school?

- Programme Director
- Curriculum Director
- Year Lead
- Module Lead
- Don't know
- Other
- Not applicable

2. At what level is your role as undergraduate lead for dermatology?

- University level
- Trust level
- Department level
- Other
- Other

2.a. If you selected Other, please specify:

3. Do you have teaching qualifications in addition to your primary medical qualifications?

- Postgraduate certificate
- Postgraduate diploma
- Masters in medical education
- PhD in medical education
- None
- Other

3.a. If you selected Other, please specify:

4. How much of your job plan is dedicated towards undergraduate education activities?

(In sessions or Professional Activities PAs)

Please enter a number.

5. Do you undergo yearly appraisal for your role in undergraduate educational activities?

- Yes
- No

5.a. If yes, how do you think it helps support your role?

Page 2: Dermatology placement at your medical school

6. Is dermatology a compulsory placement at your medical school?

- ○ Yes
- ○ No

7. How long is dermatology placement at your medical school

- ☐ Less than 5 days
- ☐ 1 week
- ☐ 2 weeks
- ☐ 3 weeks
- ☐ 4 weeks
- ☐ 5 weeks
- ☐ 6 weeks
- ☐ No placement currently available
- ☐ Other

7.a. If you selected Other, please specify:

8. In what setting is dermatology taught at your medical school (tick all that apply)?

- ☐ Secondary care consultant led outpatient clinics
- ☐ Community based consultant led clinics
- ☐ Tertiary specialist clinics
- ☐ General Practitioner with specialist interest in dermatology (GPSI) clinics
- ☐ Teaching fellow led clinics
- ☐ Dermatology specialty trainee clinics
- ☐ Specialty Nurse led-clinic
- ☐ Expert patient led clinics
- ☐ Ward round and inpatient referrals
- ☐ All of the above

☐ Other

8.a. If you selected Other, please specify:

Page 3: General Medical Council (GMC) and curriculum mapping

9. UK Medical schools are required to comply with General Medical Council (GMC) Outcomes' for Graduates 2018 document. How do GMC's Outcomes for Graduates 2018 facilitate dermatology UG education at your school?

10. Are you aware of the British Association of Dermatologists' (BAD) Undergradate (UG) Curriculum 2016?

- ○ Yes
- ○ No

11. Is your current dermatology curriculum mapped to the BAD UG curriculum 2016?

- ○ Yes
- ○ No
- ○ Unsure

12. In your role, how confident would you feel to undertake a curriculum mapping exercise?

Please select no more than 1 answer(s).

- ☐ Not at all confident
- ☐ Slighly confident
- ☐ Moderately confident
- ☐ Quite confident
- ☐ Extremely confident

13. What factors would help conduct the mapping exercise? (tick all that apply)

- ☐ Training faculty in how to conduct mapping exercise
- ☐ Easy to use mapping tools
- ☐ Medical school support (e.g. IT/ administrative)
- ☐ This activity should be taken on by Medical School curriculum lead & team with input by yourself
- ☐ Funding and Time to support mapping exercise
- ☐ Other

13.a. If you selected Other, please specify:

Page 4: Dermatology UG assessment at your medical school

14. Are dermatology assessments currently blueprinted to your medical school curricula?

- ○ Yes
- ○ No
- ○ Unsure

15. How is dermatology assessed at your medical school?

- ☐ Objective structured clinical examination (OSCE) at final exams
- ☐ Multiple choice questions (MCQs)/ extended matching questions (EMQs) at final exams
- ☐ Both summative OSCEs and MCQs/EMQ
- ☐ Not assessed
- ☐ Other

15.a. If you selected Other, please specify:

_____

16. What formative assessment methods are used to assess UG dermatology at your medical school? (tick all that apply)

- ☐ Log books
- ☐ MCQs/EMQs
- ☐ Clinical OSCEs
- ☐ Case based discussions
- ☐ Mini CEX

- [ ] Practical skills
- [ ] Clinical prescribing
- [ ] All of the above
- [ ] None of the above
- [ ] Other

16.a. If you selected Other, please specify:

17. What summative assessment methods are used to assess dermatology at your medical school? (tick all that apply)

- [ ] Log books
- [ ] MCQs/EMQs
- [ ] Clinical OSCEs
- [ ] Case based discussions
- [ ] Mini CEX
- [ ] Practical skills
- [ ] Clinical prescribing
- [ ] All of the above
- [ ] None
- [ ] Other

17.a. If you selected Other, please specify:

18. What factors would help you implement or improve dermatology assessment at your medical school?(tick all that apply)

- ☐ Training for faculty to write assessments
- ☐ Medical School support (e.g. IT/ administrative) to conduct the assessments
- ☐ Funding and Time for leadership to support this activity
- ☐ Easy to use assessment templates
- ☐ This activity should be taken on by school assessment team alone
- ☐ This activity should be taken on by school assessment team with input from dermatologists
- ☐ Other

18.a. If you selected Other, please specify:

Page 5: About other influencers

19. Are you aware of the Medical Licencing Assessement (MLA) being introduced by the General Medical Council in 2023?

- ○ Yes
- ○ No

19.a. If yes, in your opinion, the introduction of MLA 2023 will influence dermatology teaching at your medical school?

- ○ Strongly agree
- ○ Agree
- ○ Can't decide
- ○ Disagree
- ○ Strongly disagree

20. In your opinion, what determines if dermatology is taught and assessed at your school?

21. In your opinion, what are the barriers to the implementation of the BAD dermatology curriculum 2016 at your medical school? (tick all that apply)

- ☐ There are no barriers to implementation
- ☐ GMC Outcomes for Graduates 2018 does not require implementation of dermatology specific curriculum
- ☐ Dermatology UG curriculum in its current format is not implementable
- ☐ Dermatology UG curriculum implementation is currently not a priority for the medical school programme
- ☐ NHS service commitments amongst dermatology teachers inhibits implementation of the dermatology curriculum in your medical school

- ☐ There is no space in the current curriculum to add dermatology content
- ☐ Difficulty in influencing changes in the UG dermatology curriculum at medical school level
- ☐ Difficulty in influencing changes for dermatology assessments at medical school level

21.a. Apart from the above statements, in your own experience or clinical practice, what other factors would you consider as barriers to dermatology curriculum implementation?

22. In your opinion, which of the following factors would help dermatology curriculum implementation at your medical school?

- ☐ Transparency of funding (e.g.SIFT) for undergraduate dermatology
- ☐ Teaching support with PA for dermatology education leadership
- ☐ Teaching support with dedicated teaching fellow
- ☐ Teaching support with dedicated nurse-led teaching
- ☐ Students' feedback about lack of dermatology in curriculum
- ☐ Increased number of dermatology teachers through workforce planning (e.g. Dermatologists / GPSIs / specialist nurses)
- ☐ Engagement and collaboration with dermatology research faculty

22.a. Apart from the above statements, in your own experience or clinical practice, what other factors would you consider as facilitators to dermatology curriculum implementation?

Appendix 7: Formal request letter for admin support from BAD for questionnaire survey

To

Dr Tamara Griffiths

Director of Medical Education

Tamara.Griffiths@manchester.ac.uk

&

Dr Mini Singh

Chair Undergraduate Dermatology Work stream

Minal.Singh@manchester.ac.uk

British Association of Dermatologists

Willan House, 4 Fitzroy Square Date: 04/10/2019

London W1T 5HQ

Re: Request for BAD administrative support to conduct an online questionnaire survey for undergraduate (UG) dermatology leads or equivalent across UK medical schools

PhD Research Topic: Facilitators and barriers for implementation of a UK standardized core-curriculum for medical schools- A Dermatology perspective

Dear Dr Griffiths and Dr Singh,

We would be grateful if you would kindly consider providing administrative support for an online questionnaire survey for teaching leads of undergraduate dermatology across UK medical schools.

The aim of our online questionnaire survey study is to identify the possible barriers and facilitators to implementation of a core-curriculum using dermatology as a specialty across UK medical schools.

Despite national recommendations and standards, specialties like dermatology have expressed concerns about lack of adequate representation, consistency and implementation across UK medical school curricula.[1] This has been evidenced by the Dermatology Council of England 2016 audit report with specific recommendations for medical schools to review their dermatology training and improve curriculum implementation.[2,3]

Identifying the barriers and facilitators in the implementation of the national BAD undergraduate curriculum across UK medical schools would help to address or promote these respectively. The knowledge gained through this study could be shared and be valuable for the BAD, the dermatology workforce, and relevant stakeholders in UG medical education in understanding how dermatology UG curriculum implementation could be improved. The data gathered could be used to

influence policy decisions in the UK at the government, regulator and medical school level to follow a standardized recommended curriculum. Adequate and consistent dermatology representation across medical schools would help medical graduates achieve minimum equitable knowledge, skills and competencies with the ultimate aim of improving care and safety for patients suffering with skin disease.

We would be grateful if you would kindly consider supporting this research as part of my PhD in Medical Education at the University of Nottingham, exploring the facilitators and barriers to a standardized core-curriculum implementation for UK medical schools, with a dermatology perspective. The BAD has granted an Education Bursary Award in 2018 to support this research.

The administrative support will involve:

-The questionnaire survey (using by Bristol online questionnaire supported by University of Nottingham) to be sent to UG leads or equivalent in dermatology across all UK medical schools by the BAD administrative team via email.

-Where no UG lead for dermatology identified, questionnaire to be sent to relevant equivalent relevant person /medical deans via email

-The survey to remain open for completion for 6 weeks with a reminder email for completion to be sent at week 4 and week 5 before end date of survey.

-The survey would be circulated via the BAD as per the recent BAD Policy for questionnaire surveys.

-The anonymised results to be sent to the lead researcher, Dr Maulina Sharma (msxms16@nottingham.ac.uk)

References:

1. Sharma M, Murphy R, Doody GA.Do we need a core curriculum for medical students? A scoping review. BMJ Open 2019; 9:e027369. doi: 10.1136/bmjopen-2018-027369
2. Yaakub A, Cohen SN, Singh M, Goulding JMR. Dermatological content of UK undergraduate curricula: where are we now? [abstr] Br J Dermatol 2015; 173, S1:194–197
3. http://www.appgs.co.uk/wp-content/uploads/2017/10/DCE_FOI_2017_Briefing-1.pdf [accessed 02/10/2019]

Please find attached

1. Ethics application form to University of Nottingham. (Survey to begin once ethics approved)
2. Participant information and consent
3. Questionnaire survey in PDF format

Many thanks

Kind regards

Dr Maulina Sharma

BAD member and Consultant Dermatologist

Lead Researcher-PhD student

Medical Education Department

University of Nottingham

msxms16@nottingham.ac.uk

Professor Gill Doody

Chief Investigator

Dean of Medical Education

University of Nottingham

Gillian.doody@nottingham.ac.uk

CC: Louisa Coulthurst

Education Board Administrator

Email: louisa@bad.org.uk

CC: Dr Ruth Murphy (Co-supervisor)

President, BAD

Email: ruth.murphy1@aol.com

Appendix 8: Participant information sheet and Consent form for questionnaire survey

Medical Education Unit, University of Nottingham School of Medicine

Title: Facilitators and barriers for implementation of a UK standardized core-curriculum for medical schools- A Dermatology perspective

[Insert name of REC] Research Ethics Ref: 401- 1910

Thank you for your interest in taking part in this questionnaire survey.

This study is led by Dr Maulina Sharma, Consultant Dermatologist & PhD student in Medical Education at University of Nottingham, with support of the British Association of Dermatologists (BAD).)

Please read through this information before agreeing to participate by ticking the 'yes' box below.

You have been invited to participate as you are identified as the teaching lead for undergraduate dermatology or having an equivalent role at your medical school. Your participation will help us to understand as to what factors may influence implementation of undergraduate dermatology curriculum across UK medical schools The information gathered will your help may enable the BAD, the dermatology workforce, undergraduate teachers and trainers and relevant stakeholders in medical education to address the barriers and facilitate curriculum implementation.

The questionnaire has 4 parts. The first is about you and your role as dermatology undergraduate lead, the second about dermatology placement at your medical school, the third about dermatology assessments and the fourth about influencers which may impact curriculum implementation.

Your participation in the study is entirely voluntary. By consenting completing the questionnaire you are providing consent for your information to be used within the study. If you change your mind about taking part in the study, you are free to withdraw at any time.

The questionnaire will take you about 10 minutes to complete. Please try to answer all the questions. There is free- text boxes for you to add further comments. If you do not wish to answer a question, please leave it blank.

We would also like to invite you to participate in further research generated from this questionnaire. If you are happy to be contacted in the future, please tick box below to confirm.

The information you provide will be strictly confidential.

Your personal data will be stored in accordance with the General Data Protection Regulation (GDPR) and Data Protection Act 2018. This research has been reviewed by the University of Nottingham Research Ethics Committee to protect your interests.

The University of Nottingham and British Association of Dermatologists is the data controller for the purposes of the Data Protection. We believe there are no known risks associated with this research study; however, however, as with any online related activity the risk of a breach is always possible. We will do everything possible to ensure your answers in this study will remain anonymous.

The results of the study may be published in scientific journals and presented at scientific conferences. The data will be reported anonymously, with any identifying information removed.

If you have any questions about this project, you may contact the Lead Researcher Dr Maulina Sharma on email msxms16@nottingham.ac.uk or if you have any concerns about any aspect of this study please contact the Research Supervisor: Prof Gill Doody/ Dr Ruth Murphy.

If you remain unhappy and wish to complain formally, you should then contact the FMHS Research Ethics Committee Administrator, c/o The University of Nottingham, Faculty PVC Office, B Floor, Medical School, Queen's Medical Centre Campus, Nottingham University Hospitals, Nottingham, NG7 2UH. E-mail: FMHS-ResearchEthics@nottingham.ac.uk

This study has been reviewed and given a favourable opinion by the University of Nottingham, Faculty of Medicine & Health Sciences Research Ethics Committee (insert FMHS REC ref no here].

I have read and understood the above information and consent form, I confirm that I am 18 years old or older and by clicking the NEXT button to begin the online questionnaire, I indicate my willingness to voluntarily take part in the study.

NEXT – I consent to take part EXIT - I do not give consent

Facilitators and barriers for implementation of a UK standardized core-curriculum for medical schools- A Dermatology perspective

Dr Maulina Sharma, Dr Ruth Murphy, Professor Gill Doody,

Medical Education Unit, University of Nottingham School of Medicine

Ethics ref no. 401- 1910

Thank you for participating!

Please, tick each box to continue:

- ○ I confirm that I have read and understood the information on the previous page
- ○ I understand that my participation is voluntary and I can end the study at any time and withdraw my data by clicking the EXIT button.
- ○ I understand that my answers will be anonymous.
- ○ I understand the overall anonymized data from this study may be used in the future for research (with research ethics approval) and teaching purposes.

- ○ I confirm that I am happy for researchers at University of Nottingham to contact me for additional research studies on undergraduate medical education.

NEXT – to be taken to the survey.

Appendix 9: Research ethics application approval for dean interviews approval letter

University of Nottingham
UK | CHINA | MALAYSIA

Faculty of Medicine & Health Sciences
Research Ethics Committee
Faculty Hub
Room E41, E Floor, Medical School
Queen's Medical Centre Campus
Nottingham University Hospitals
Nottingham, NG7 2UH
Email: FMHS-ResearchEthics@nottingham.ac.uk

19 November 2021

Dr Maulina Sharma
PhD Student
Medical Education Centre
School of Medicine
Medical School, B Floor
QMC Campus
Nottingham University Hospitals
NG7 2uH

Dear Dr Sharma

Ethics Reference No: FMHS 363-1021 **– please always quote**	
Study Title: Facilitators and barriers for implementation of a UK standardized core-curriculum for medical schools- A Dermatology perspective	
Chief Investigator/Supervisors: Gill Doody, Professor of Medical Education, Medical Education Centre, School of Medicine, **Ruth Murphy** Honorary Clinical Professor in Dermatology , University of Sheffield, Sheffield Teaching Hospitals & Associate Professor and School of Medicine, University of Nottingham	
Lead Investigators/student: Maulina Sharma, PhD Student, School of Medicine	
Proposed Start Date: 01/11/2021	**Proposed End Date:** 30/04/2022

Thank you for submitting the above application, which was considered, at the meeting on 15 October 2021 and the following documents were received:

- FMHS REC Application form and supporting documents version 1.0: 06.10.2021
- Data Management Plan dated 26.10.2021

These have been reviewed and are satisfactory and the study is given a favourable ethics opinion.

A favourable ethics opinion is given on the understanding that:

1. The protocol agreed is followed and the Committee is informed of any changes using a notice of amendment form (please request a form).
2. The Chair is informed of any serious or unexpected event.
3. An End of Project Progress Report is completed and returned when the study has finished (Please request a form).

Yours sincerely

pp

Dr John Williams, Associate Professor in Anaesthesia and Pain Medicine
Chair, Faculty of Medicine & Health Sciences Research Ethics Committee

Appendix 10: Topic guide for the interviews

At the time of requesting participation for the semi-structured interviews, via the Medical Schools Council, the UK Deans of Medical Education were provided a topic guide as a framework for the interview questions. The topic guide was divided into 5 parts, as follows:

Part 1: Historical/ background

a) What triggers a curriculum review at your medical school?
b) When did your medical school last undergo a curriculum review?
c) What are the factors which determine the curriculum content and time spent within each specialty?

Part 2: Role of General Medical Council (GMC) and Medical Licensing Assessment

(MLA) in curriculum implementation

a) How do the GMC's Outcomes for Graduates[1] influence specialty curriculum implementation at your medical school?
b) How will the introduction of the Medical Licensing Assessment (MLA) [2, 3] for all UK graduates in 2024-25 alter the specialty curriculum at your medical school?

Part 3: Undergraduate (UG) Leads skills development

The GMC advises medical schools to appoint undergraduate (UG) teaching roles based on competence, aptitude and role modelling, rather than experience or clinical teaching alone [1,4]

a) How does your school ensure UG leads meet the standards recommended by GMC? Are there any challenges to achieving these standards?
b) How can specialty leads improve their skills development to map, blueprint and assess specialty core-components?

Part 4: Engagement between medical school and specialties

Our recent questionnaire study[5] showed that dermatology UG leads wanted better engagement with their medical school for specialty curriculum delivery

a) How could medical schools improve engagement with specialties for effective curriculum delivery?
b) What maybe the barriers to this?

Part 5: Funding and recognition of UG leadership

Allocation of funding, traditionally, is perceived to be biased towards research or delivery of direct patient care

How can we address the perceived lack of recognition and transparency towards resources for leadership skills in undergraduate education?

Appendix 11: Participant information sheet for semi-structured interviews

Study Title: Facilitators and barriers for implementation of a UK standardized core-curriculum for UK medical schools- A Dermatology perspective

PARTICIPANT INFORMATION SHEET

Research Ethics Reference: FMHS 363-1021

We would like to invite you to take part in a research study. Before you decide, it is important for you to understand why the research is being done and what it will involve. Please take time to read this carefully and ask us anything that is not clear.

What is the purpose of the research?

This research study is part of a wider project to gain deeper understanding into what maybe the barriers and facilitators to implementation of specialty core-curriculum (using dermatology as an example) at medical schools in the UK. This particular study aims to understand your views and experiences as a Dean of a Medical School as to what factors determine implementation of a specialty-specific core- curriculum.

Why have I been invited to take part?

You have been invited because you are one of the UK Medical School Deans. We are interested to hear your views and experiences because you are involved in the planning of undergraduate education

Do I have to take part?

No. It is up to you to decide if you want to take part in this research. If you agree to participate, we will email you a consent form to complete and return electronically. However, you would still be free to change your mind at any time, without giving a reason.

What will happen to me if I take part?

You will be invited to an online interview using Microsoft Teams at a convenient time in your busy schedule.

The interviewer will outline the study procedure and check if you are happy to be recorded and have any questions before starting the recording.

The discussion will be about your own experiences of teaching and education and development of medical school curricula, in particular specialty specific curriculum implementation. This should take approximately 30 minutes.

What is an interview and what is grounded theory research?

This is a qualitative research technique which aims to build understanding of your experience through a one to one discussion. The study uses a type of research called grounded theory research. Grounded theory methodology emphasises inductive analysis. It develops new theories or hypotheses from many observations. The emphasis of a grounded theory study may evolve as it becomes apparent to the researchers what is important to the study participants. This is a way of understanding how wider factors affect interventions to bring about an outcome. In this case we are interested in understanding from your experience, any factors you consider relevant that help or hinder implementation of a specialty core- curriculum.

Are there any risks in taking part?

There are no foreseen risks of taking part.

Are there any benefits in taking part?

There will be no direct benefit to you from taking part in this research but your contribution may help plan future educational strategies to develop clinical reasoning ability in medical students.

Will my time/travel costs be reimbursed?

As this is interview will be conducted online, no travel costs will need to be reimbursed.

What happens to the data provided?

The interview will be audio recorded and later transcribed for further analysis by the researcher. The **research data** will be stored confidentially using NVivo and Excel software. To help ensure your privacy, you will be assigned a volunteer study identification number (for example P01 for participant number 1), and it will be used instead of your name. We will save all the recordings and research data using that volunteer study identification number so that none of the data will have your real name or other individual identifiers associated with them. Your name and any information about you will not be disclosed outside the study centre.

Personal / sensitive data

Personal contact details will be kept for 1 month after the interview and deleted thereafter.

The research team above will have access to research data.

We would like your permission to use fully anonymised direct quotes in research publications.

All research data and records will be stored for a minimum of 7 years after publication or public release of the work of the research. We would like your permission to use anonymised data in future studies, and to share our research data (e.g. in online databases) with other researchers in other Universities and organisations both inside and outside the European Union. This would be used for research in medical education. Sharing research data is important to allow peer scrutiny, re-use (and therefore avoiding duplication of research) and to understand the bigger picture in particular areas of research.

What will happen if I don't want to carry on with the study?

Even after you have signed the consent form, you are free to withdraw from the study at any time without giving any reason. Any personal data will be destroyed.

Who will know that I am taking part in this research?

Your research and personal data will be used for the purposes of the research only. Research is a task that we perform in the public interest. Responsible members of the University of Nottingham may be given access to data for monitoring and/or audit of the study to ensure it is being carried out correctly.

You can find out more about how we use your information and to read our privacy notice at:

https://www.nottingham.ac.uk/utilities/privacy.aspx/

What will happen to the results of the research?

The research may be published in a medical education journal or dermatology education journal.

The research will be written up as a thesis. On successful submission of the thesis, it will be deposited both in print and online in the University archives, to facilitate its use in future research.

The research will be written up as dissertation for the degree of PhD and also aimed to disseminate and share the results with all medical schools as well as the British Association of Dermatologists (BAD).

Who has reviewed this study?

This study has been reviewed and given favourable opinion by the Faculty of Medicine and Health Sciences Research Ethics Committee (Reference number: FMHS 363-1021)

Who is organising and funding the research?

The lead researcher is part funded by British Association of Dermatologists

What if there is a problem?

If you have a concern about any aspect of this project, please speak to the researcher (Dr Maulina Sharma) who will do their best to answer your query. The researcher should acknowledge your concern within 5 working days and give you an indication

of how he/she intends to deal with it. If you remain unhappy and wish to complain formally, you can do this by contacting the FMHS Research Ethics Committee Administrator, Faculty Hub - Medicine & Health Sciences, E14, E Floor, Medical School, Queen's Medical Centre Campus, Nottingham University Hospitals, Nottingham, NG7 2UH.

E-mail: FMHS-ResearchEthics@nottingham.ac.uk.

Contact Details

If you would like to discuss the research with someone beforehand (or if you have questions afterwards), please contact:

Dr Maulina Sharma
Medical Education Centre
Medical School
Queens Medical Centre
Nottingham University Hospitals

Tel: 07903048258

Email: msxms16@nottingham.ac.uk

Appendix 12: Consent form for semi-structured interviews

Barriers and facilitators to specialty core-curriculum implementation in school curricula. Medical Education: consent form (interview)

Participant Consent Form Title of Study: Barriers and facilitators to specialty specific curriculum implementation

REC ref: Name of Researchers: Lead researcher: Maulina Sharma PhD Student, msxms16@nottingham.ac.uk

Supervisor: Professor Gillian Doody, Dean of Medical Education, 0115 823 0025, gillian.doody@nottingham.ac.uk Medical Education Centre, School of Medicine, University of Nottingham, Queen's Medical Centre, Nottingham, NG7 2UH

Required

1. I confirm that I have read and understand the information sheet for the above study and have had the opportunity to ask questions.

◉ Agreed

2. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason.

◉ Agreed

3. I understand that relevant sections of my data collected in the study may be looked at by the research group and by other responsible individuals for monitoring and audit purposes. I give permission for these individuals to

have access to these records and to collect, store, analyze and publish information obtained from my participation in this study. I understand that my personal details will be kept confidential.

- Agreed

4. I understand that the interview will be video-audio recorded through Microsoft Teams and audio recorded using a digital device, the recording may be professionally transcribed, and that anonymous direct quotes from the interview may be used in the study reports.

- Agreed

5. I understand that information about me recorded during the study will be made anonymous before it is stored. It will be uploaded into a secure database on a computer kept in University Secure OneDrive. Data will be kept for 7 years after the study has ended and then destroyed.

- Agreed

6. I agree that my anonymous research data will be stored and used to support other research in the future, and shared with other researchers including those working outside the University.

- Agreed

7. I agree to take part in the above study.

- Agreed

8. Name

9. Date

10. Signature