Current state and future directions of medical specialties internationally

Joint project by the Australian Medical Council and the Medical Specialties Council of the Royal Dutch Medical Association

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> *[Those responsible for medical education and service delivery have] the obligation to direct their education, research and service activities towards addressing the priority health concerns of the community, region, and/or nation they have a mandate to serve. The priority health concerns are to be identified jointly by governments, healthcare organizations, health professionals and the public.* [WHO 1995 – adapted[13]]

Executive summary

Health landscapes are rapidly changing, and in this changing context, concerns exist about whether the current systems for educating medical professionals and healthcare delivery will meet future healthcare needs.[2-8] Furthermore, increasing discussions are occurring about the relative accountability of governments, education providers, healthcare providers, professionals and the public to predict, lead and adapt to these new health landscapes.[6, 17, 18]

In order to better understand the current priorities, challenges and future directions internationally the Australian Medical Council collaborated in a project with the Medical Specialties Council (CGS) of the Royal Dutch Medical Association to explore international perspectives on the future of the specialty landscape (including the education, training and delivery of specialist care). The following countries were included in this report: Australia; Canada; Germany; Japan; the Netherlands; the United Kingdom; and the United States.

> *'It is no longer sufficient to say that producing competent physicians meets [graduate medical education's] responsibility to the public.'* Macy foundation 2011 [11]

The report presents information that aims to describe the current context, drivers for change, the possibilities for the future and to explore generalism as a future solution to current challenges.

The key findings in each section are presented below:

Section 1		The **current landscapes** of medical specialties: including priorities and challenges

The report provides the context of the current specialty landscapes in each of the seven countries including governance, accreditation, regulation and education and training models. This shows some important differences including the number of organisations involved with varying responsibilities, different approaches to workforce planning, and the relative autonomy of those involved to set a national direction for specialty training and care delivery. In particular the differing systems will influence the need for change, and the appetite and ability of the system to proactively and cohesively respond to the changing healthcare context.

Eleven key challenges and priorities were identified across the international healthcare systems which are considered likely to influence the future specialty landscapes (and healthcare more broadly):

1. Governance	Fragmented systems of governance for care and training with a lack of collaboration and leadership
2. Health of populations	Changes in populations and their health
3. Accountability	Focus on accountability of training and care to meet community needs and changing evaluation measures to include value and outcomes of care and training
4. Sustainability	Significant concerns about the cost and sustainability of health care
5. Technology and information	Rapid advances in technology and the availability of data
6. Medical workforce	Currently not aligned to community need. Imbalances exist in mix, numbers and distribution of workforce. Need for proactive, effective and systematic workforce planning models
7. Access	Disparity of outcomes and inequity of access to care
8. Patients	Changes in roles and expectations of patients
9. Healthcare models	Changes in the way health care is viewed and delivered
10. Medical education and training	Changes including education and assessment methods, flexibility of training and transition points
11. Professional practice and identity	Focus on professionalism, wellbeing and working and learning environments

The relevance of these issues to each country is indicated in the report, however it should be noted that there is variation in the extent and nature of these challenges and priorities in each country.

The responses to these priorities and challenges have the ability to significantly change the way health care is delivered and received. To address these concerns the future medical specialty landscape will need to be accountable, proactive and responsive to community need with stronger, more collaborative governance and with better integrated models of training and care.

Section 2	The **future landscapes** of medical specialties

The doctor of the future will look different and work in a different environment. [1, 19-22] How to predict, lead and be responsive to these changes is a constant challenge for those responsible for workforce planning, healthcare delivery and training.

Future healthcare models are predicted to be based on team-based systems, informed by national data sets, enabled by technology, influenced by different outcome measures, be more focused on prevention and holistic care, and be increasingly delivered in community settings.[3, 19, 20, 22-25]

The report provides some examples of possibilities for the future landscape of medical specialties, as described by interviewed stakeholders and identified in future health workforce studies. Some of the areas of predicted change are provided below:

1. Different training	Training in expanded settings, possibly broader and shorter training with further subspecialisation through modularised units targeted to health needs.
2. Different doctors	Change in mix, type and number of specialists, this might include the return of broader specialties. Doctors will have careers of continuous learning
3. Different care	Care will be team-based, data-informed, technology-transformed, patient-engaged and delivered in expanded settings. Less hospital care and stronger primary/community-based care.
4. Different information and technology	Changes in diagnostics, therapeutics and medical practice due to advances in technology and information, including the use of precision medicine, artificial intelligence and big data
5. Different focus	More holistic views of health and disease, including systems medicine and biopsychosocial models. Shift from a focus on cure to prevention and function.
6. Different accountability	New methods for evaluating the value and outcomes of training and care. Better systems for measuring and tracking outcomes to inform how and what is taught and practised.

7. Different patients	Patients with more autonomy and different expectations with an increased role and responsibility for care.

Some specific examples of change being considered or implemented in each of the countries are briefly explored in this section. It is noted that most of these concepts are relevant across all of the countries explored, however individual responses to these challenges will be context dependent.

Overall, the system is rapidly changing, whatever the specialty landscape looks like in the future it will need to be more proactive, flexible and adaptive to change. It is not necessarily possible to fully predict or understand how the medical landscape will change but there is 'a need for collaboration and some shared vision between, community, education providers, medical profession, health service delivery, population health experts, government.' [2]

Section 3		Generalism – part of the **solution to future challenges?**

The report explores generalism as part of the solution to some of the current and predicted challenges in health care. It considers current discourses about generalism across the seven countries, including definitions, drivers, barriers and possible mechanisms of influence.

Some of the challenges experienced that are relevant to generalism include changing population health requirements, a lack of alignment of healthcare provision to community need, issues with access to care, concerns about the sustainability of the system, a lack of coordination, a loss of a holistic focus and increasing fragmentation of care.[10, 16, 26, 27]

Generalism is a broad and context-specific topic, particularly given the differences in the current specialty landscapes (in numbers, mix and distribution), different training pathways and governance structures. As such, it is important to define the problems more specifically before considering context-specific solutions. This includes distinguishing between challenges that might be solved by generalist doctors (including general practitioners) and/or health system challenges that might need generalist principles (including broad skills, patient-centred care and coordination). [10, 16]

The following **areas of need** were commonly discussed across the countries:

Medical generalists	More general practitioners and strengthened primary and community-based care
	More broadly skilled practitioners to enable better coverage of services and distribution of care
Generalist principles	Models of care better suited to rural and remote communities
	Broader skill mixes to manage complex and undifferentiated patients
	Better integration of care within and between services
	Care that is focused on the whole patient in their context

	Care focused on prevention and function rather than cure
	Coordination of care within a complex and fragmented system

In addition to understanding the concept of generalism, it is important to consider why the workforce is specialising and to acknowledge that for many reasons, this has been necessary and has improved health outcomes [16]. It is also not helpful to consider generalism and specialisation as two separate and opposing forces but to recognise they are both essential and interdependent elements of the healthcare system that exist on a spectrum, and that discussions about the future should focus on the balance and cohesion between them.

However, in the face of changing healthcare environments a number of stakeholder discussions and health reports predict that the continued increasing specialisation of the workforce will be unsustainable [5, 10, 25, 28]. It is also apparent that different models will be required to manage a changing health context into the future and the issues in the health workforce will not necessarily be solved without valuing generalist principles and/or medical generalists. [5, 29]

One of the aims of this report was to determine if the discussion about generalism and specialisation is relevant in each country and the outcomes of this. The information gathered suggests yes, the discussions are relevant and increasingly so. However, generalism is also a topic that has been considered for many years and a number of countries have made a number of changes, in a number of ways, over a number of years. Such changes are difficult to quantify. As noted in the report, the United Kingdom and Canada have done some specific work in this area recently.

Beyond the current and predicted challenges, discussions about generalism appear to be related to issues of access and responsiveness of health systems. Burdens of disease and health system pressures change over time. While the next predicted phase of disease is from acute to chronic, this might change again, and a highly subspecialist workforce with little to no cohesive links between their training and practice overall is not sustainable in this changing context. So the issue is also about creating a more cohesive and responsive medical workforce to solve problems of access and responsiveness.

Access	Broader capability and skill mixes to manage complex, undifferentiated presentations in hospital and community settings
Responsiveness	Models for training practitioners and delivering care need to be far more flexible and responsive to predict and adapt to changing healthcare needs. For example a broader approach to training with modularized upskilling in line with patient need or better cohesion between specialties including transfer between pathways and relevant upskilling

Overall, the information indicates that to address current priorities and challenges with respect to the accountability, responsiveness and sustainability of medicine, the future medical specialty landscape will need to be more proactive to community need, with more collaborative governance, better integration of training and care delivery and a stronger focus on patients. [7]

Better collaboration is needed now more than ever to ensure that the specialty landscape in the next 20 years will meet the healthcare needs of the community in an effective and sustainable manner.[10, 18]

Key messages

The current landscapes of medical specialties

The landscape is **changing** – populations, workforce, technology, demand, care delivery

The landscape is **pressured** – systems are fragmented, expensive and inflexible

The landscape has **problems** – access, responsiveness, sustainability, community need

The landscapes are **different** – similar problems but context-specific solutions

The future landscapes of medical specialties

The landscape **needs** – leadership, collaboration, integration, flexibility, coordination

The landscape of the future will be **different:**

1. **Training** – flexible and targeted to need
2. **Doctors** – different mix, type, numbers with careers of continuous learning
3. **Care** - team-based, data-enhanced, technology-enabled
4. **Technology and information** – predictive, preventative, personalised and participatory
5. **Focus** – holistic views of health, disease and patients
6. **Accountable** – outcome-informed accountability
7. **Patients** – more autonomy, different expectations and roles

Generalism – part of the solution to future challenges?

The landscape **needs:**
1. Context-specific solutions
2. Generalist doctors and generalist principles
3. Specialists and subspecialists in specific areas of care
4. Proactive, flexible, cohesive, patient-centred workforce targeted to community need to address issues of access and responsiveness.

Overall

Those involved in governance and delivery of education, training and health care are **accountable** for the health of people and populations. Better collaboration is needed to ensure that the specialty landscape in the next 20 years will meet the healthcare needs of the community in an effective and sustainable manner.

Glossary of terms

Regulation	Any laws or other government-endorsed 'rules' where there is an expectation of compliance (Department of Prime Minister and Cabinet [30]).
Accreditation	Accreditation of courses ensures that the education and training leading to registration as a health practitioner is rigorous and prepares the graduates to practise a health profession safely (AHPRA [31]).
Governance	System of management. In this report this is referring to the multiple stakeholders and systems responsible for managing and oversighting healthcare training and delivery at all levels. In this context it is not specifically about governments.
Primary care	Generalist healthcare services, available to anyone regardless of their health condition, and are usually the first point of contact with the healthcare system (Primary Health Care Limited [32]).
Tertiary/ secondary care	Services which are accessed by referral, are more specialised, and address either a specific health condition, specific part(s) of the body, or a specific health problem. (Primary Health Care Limited [32]).
Registration/licensing (Registration requirement)	A registration requirement records the practitioner's approved area of practice details or supervision arrangements, which are inherently required for registration. The practitioner may only practice the profession within the parameters of their approved area of practice details or supervision arrangements (AHPRA [31]).
Postgraduate training	Internship is a period of mandatory supervised general clinical experience. It allows medical graduates to consolidate and apply clinical knowledge and skills while taking increasing responsibility for the provision of safe, high quality patient care (MBA [33]).
Specialty education and training	'The phase in which doctors develop competencies under supervision towards independent practice after completion of their basic medical qualification, and might comprise pre-registration education (leading to right to independent practice), systematic vocational/professional education, specialist and sub-specialist education or other formalized education programmes for defined expert functions.' (WFME [34])
Specialty landscape	In this report the specialty landscape is used to describe the systems of education, training and delivery of specialist care.

Revalidation	The process by which doctors have to regularly show that their knowledge and skills are up to date, and fit to practise medicine. The term 'up-to-date' refers to the concept of professional development and requires all doctors to be able to produce evidence of currency. The term 'fit to practise medicine' refers to an appropriate level of performance in the practice of medicine, linked directly to patient outcomes. Revalidation is closely aligned with the term 'recertification' as used in other countries (IAMRA [35]).
Continuing professional development	Continuing professional development (CPD) is the range of learning activities through which medical practitioners maintain, develop, update and enhance the knowledge, skills and performance required for safe and appropriate practice in the relevant specialty. A CPD program is the range of resources and activities to support CPD; a mechanism for participants to plan, document and self-evaluate activity; processes for assessing and crediting activities, and procedures for monitoring program participation and, where applicable, activity, quality and auditing compliance (AMC [36]).

Contents

Report introduction

Internationally, the healthcare environment is changing rapidly with population health needs, community expectation, medical knowledge and practice, technology and models of care. [1-7] In this context, there are increasing discussions about whether the current system for educating and training medical professionals, and the delivery of care in the healthcare system more broadly, will meet the future population health needs. [6, 9, 11, 17, 37]

Further to this, there are important discussions ongoing about the accountability of those responsible for medicine at all levels (including those involved in governance and delivery of education, training and health care) to ensure their activities are aligned with health requirements of the populations.

Some key drivers for change of medical specialties into the future are likely to be linked to the cost and sustainability of the system, demand in terms of population health requirements, advances in technology and data and new models for evaluation of outcomes. Further to this, only what is funded will be delivered. [38]

'We are living in an age of unprecedented demand, change and innovation.' [UKSTSG [9]]

In order to better understand the current priorities, challenges and future directions the Australian Medical Council has collaborated in a project with the Medical Specialties Council of the Royal Dutch Medical Association to explore international perspectives on the future of the specialty landscape (including the education, training and delivery of specialist care).

The objectives of this report were to explore:

- The current state of specialty landscapes and how they will progress in the next 20 years in the following countries: Australia; Canada; Germany; Japan; the Netherlands; the United Kingdom; and the United States.

- If, in the aforementioned countries, the discussion about generalism and specialisation is current, and if so, the direction or outcome of the discussion.

This report presents information that aims to describe the current context and drivers for change, the possibilities for the future and to explore generalism as one specific example of a solution to future challenges.

The report includes three sections:

Section 1		The **current landscapes** of medical specialties: including priorities and challenges

Section 1 aims to set the scene about the current landscapes and to give indications about the pressures that are likely to drive changes into the future.

The way medicine is governed, regulated, taught and practised differs between countries, which influences the types of issues and the possible solutions. The report provides a summary of the context of medical education and training in each country to facilitate a better understanding of the challenges and levers for change. It then describes the current priorities and challenges of the specialty landscape that will focus the future solutions.

Section 2		The **future landscapes** of medical specialties

Section 2 presents future directions for the medical specialties as developed from published material contemplating the future of healthcare delivery and from discussions with stakeholders in each country.

Section 3		Generalism – part of the solution to **future challenges**?

Section 3 explores generalism as one widely discussed possible solution to the current challenges, including the status and relevance of this discussion.

Method

In conducting this project, research literature and policy documents from Australia, Canada, Germany, Japan, the Netherlands, the United Kingdom and the United States were analysed and one to two stakeholders were interviewed in each country to gather different international perspectives. [20-22, 24, 39-44]

Initially the objectives of the project included consideration of Belgium, China and France. Inability to identify key stakeholders, the breadth of the subject and time limitations did not permit their inclusion. It is also noted that there was not an opportunity to interview stakeholders from the United States, and this has limited the data specific to this country in the report.

A number of the limitations of this project related to time and the breadth of the objectives. This report provides an overarching summary, but it is noted that a number of the topics explored are incredibly detailed and complex. Further consideration of this area would benefit from a more specifically defined question, a literature review and a larger sample of stakeholder discussions with representatives across the system of government, education, health service delivery and practice.

In particular, it is noted that in a number of sections of the report broad concepts are provided, rather than detailed and country-specific information. Given the differences in the specialty landscapes and varied roles and responsibilities across countries the approach to addressing

the question more specifically would require a broader approach to reviewing literature and stakeholder input.

Data in each country would benefit from validation by those responsible in that country. Finding country-specific information can be challenging and sometimes is based on a different study's interpretation of that data.

Section 1: Current landscapes of medical specialties

Contents

1.1 Introduction

This section aims to set the scene by providing a snapshot of systems for medical education, training and health care in Australia, Canada, Germany, Japan, the Netherlands, the United Kingdom, and the United States and a summary of the pressures that are likely to drive changes into the future.

The way medicine is governed, regulated, taught and practiced differs between countries. Understanding the differing responsibilities and processes is important to understand the current issues and mechanisms for creating change. This section also provides a summary of specialist workforce data to help in understanding the context and making comparisons across counties. [18]

The section concludes with a summary of key findings regarding current priorities and challenges identified in national reviews of medical workforce, healthcare delivery and training. It is considered these areas are likely to drive changes in the future landscape.

1.2 Snapshot of healthcare delivery and specialty training

The following section provides key points about the healthcare systems and specialist education, training and regulation across the seven countries.

Overall, these differences have some important implications for the challenges experienced and potential solutions within each country. In particular, models for governance, funding and workforce planning significantly influence capacity to develop and implement national-level strategies.

1.2.1 Governance, funding and delivery of care

Governance of healthcare delivery is complicated in that it involves multiple stakeholders with overlapping, and sometimes competing priorities. [6, 17, 25, 45-48] The complexity of the systems links to the challenges discussed in section 1.4. There is also significant variation in the models for governance, funding, delivery of care across different countries. Table 1.1 provides a high-level summary across countries.

Some important differences are noted:

- In most countries national level government is responsible for funding and policy setting with administration and delivery of care conducted locally. However, the level of decentralisation and relative autonomy of the local governments is varied, this is not necessarily well reflected in the table. For example, Australia has a highly decentralised model and the states and territories have significant autonomy in policy, planning and delivery of care. [25, 47]

- Systems of funding and access to care are different between countries. Most of the healthcare systems explored are based on universal access with a publicly tax-funded system, with some variation. The exception to this is the United States, however it is noted that there are significant reforms occurring in the healthcare system. [45-51]

- There are differences in the interfaces between the primary care and secondary care systems. For example healthcare delivery is based on a primary care system with secondary access to specialists through referral in Australia, Canada, the Netherlands. Germany is currently considering the role of general practitioners as the gatekeeper to specialty access. [45-51]

- Variation exists in the mixture of private and public models for provision of care. In Australia and Canada the systems are a mixture of public and private, whereas in the Netherlands and the United States the majority of providers are private. [45-51]

- There are significant differences in the workforce planning approaches. In the Netherlands, Germany and the UK there are more centralised approaches to national planning, including the ability to determine the number of doctors entering into specialty programs [7]. Whereas, medical workforce planning in countries such as Australia has not been systematically coordinated at a national level. [45-54]

Table 1.1: Summary of health governance, funding, delivery and workforce planning

	Governance	Funding	Delivery	Workforce
AU	Federal government primary funder and policy setter, however states and territories administer relatively autonomously.	Publically funded through general taxation. Private funders and providers increasing.	Primary care system with secondary access to specialist services by referral. The system is a mixed public-private.	National planning not previously systematically conducted. National advisory group established in 2014.
CA	Federal government provides funding, sets national policies. Local responsibility for delivery of healthcare.	Publically funded through general taxation. National health insurance scheme and coverage is universal.	Primary care system with secondary access to specialist services by referral.	Provincial governments have a significant role in deciding the mix and distribution of specialists in training.
DE	Federal, state and local governments share varying levels of functional and fiscal responsibility for healthcare planning and delivery.	Statutory health insurance supplemented by taxation, private health insurance and out of pocket expenses. Insurance is income dependent and shared by employer and employee.	General practitioners do not have a gatekeeping function. Mix of both private and public systems.	Workforce planning conducted at national level, number of doctors, and also areas of specialisation is set by the numerus clauses.
JP	Government controls most aspects of the health system, service delivery at the prefectural and municipal government level.	Based on a social insurance system with tax subsidies and some amount of out of pocket payment.	There is no strict gatekeeping function for primary care services. Mix of both private and public systems.	Medical workforce planning at national level. High level of professional autonomy.
NL	Governance shared among government, professional organisations and health insurers. Government has a more distant role as supervisor and facilitator.	Compulsory health insurance with additional general taxation. Contributions to competing insurance funds and into a central fund spreading risk across insurers. Some out of pocket expenses.	Primary care system with secondary access to specialist services by referral. Private providers and insurers are primarily responsible for the provision of services.	Medical workforce planning conducted at national level. Number of doctors, and also areas of specialisation is set by the numerus clauses.
UK	Governance of functional and fiscal responsibilities mostly devolved to England, Scotland, Wales and Northern Ireland which have advisory, planning and monitoring processes for healthcare.	Primarily funded by taxes and is mostly free at point of access. Private healthcare insurance is also available.	Primary care system with secondary access to specialist services by referral. Mix of both private and public systems.	The number of specialty training places is arrange in negotiation between Local Education and Training Boards and the Department of Health.
US	Federal, state and local governments share varying levels of functional and fiscal responsibility for healthcare planning and delivery.	No single national system of health insurance. Public and private payers purchase healthcare services from providers. Reform with the Affordable Healthcare Act.	Gatekeeping function of primary care system is not uniform. Predominately private system for healthcare provision.	Varying roles and responsibilities at federal and state levels for medical workforce planning.

References: [25, 45-56]

1.2.3 Regulation and accreditation of specialist education and training and specialty practice

The way specialist medical education and training and specialty practice is regulated and accredited is different internationally in a number of ways, including the distribution of roles and responsibilities between different organisations and the level of accreditation.

Regulation of the profession is important in defining professional standards and scopes of practice. In general there has been increased statutory regulation of the profession internationally and narrowing of scopes of practice, including countries such as Australia and the United Kingdom. [16, 57]

Processes for assessing and determining the development of new medical specialties and subspecialties has an impact on the specialisation of the workforce. In countries such as Australia, the Netherlands and the UK there has been a tightening of the processes for recognition of new specialties. In fact, the General Medical Council website indicates 'currently, we do not recognise new sub-specialties.' [58]

In the UK and the Netherlands there is one body that is responsible for accreditation and registration of medical specialists whereas in Australia these responsibilities are separated between two organisations. However, Australia has one national body with accreditation responsibilities across the continuum of medical education and training. In Canada and the US there are multiple bodies with responsibility for accreditation and regulation of medical specialties, however there are efforts ongoing to combine the requirements nationally between these various bodies. Japan is in the process of establishing these structures.

The number of bodies that regulate, accredit and approve new specialties and their relative areas of focus and autonomy, has important impacts on the current status and future changes in the specialty landscape.

Table 1.2: Summary of regulation and accreditation of specialist education and practice

	Registration of individuals	Exam	Accreditation of training	Approval of specialties
AU	Australian Health Practitioner Regulation Agency, Medical Board of Australia regulates the medical profession through registering practitioners and developing standards for professional practice.	No	Australian Medical Council accredits specialist medical programs and their continuing professional development programs. 16 specialty colleges accredit the training posts at health services.	Tightly regulated process with the Medical Board of Australia, Australian Medical Council and national level government involved.
CA	Provincial and territorial medical regulatory authorities set the requirements for and issues the education or practice licenses in their	Yes	The Royal College of Physicians and Surgeons of Canada, the Collège des Médecins du Québec and the College of Family Physicians of Canada define national	The royal colleges are responsible for defining the requirements for recognition.

	individual province or territories.		requirements and maintain the standards for evaluation and accreditation of postgraduate training.	
DE	State health authorities (Approbationsbehörden) issue licenses to practice.	Yes	German Medical Association (Bundesärztekammer). National level body represents State Chambers of Physicians. Oversights the professional code and speciality training regulation. The 17 State Chambers of Physicians set professional standards, specialty training, accreditation and continuing education requirements.	Regulated process including the German Medical Association.
JP	Japanese Board of Medical Specialties (JMSB), is responsible for developing standards for specialty certification. A new system has been launched in 2018 to certify medical specialists under a common set of standards	No	Currently no national accreditation system for postgraduate accreditation. System being implemented for undergraduate education currently.	New framework being established. Japanese Board of Medical Specialties.
NL	Royal Dutch Medical Association regulates the medical profession. Registration and licensing of medical practitioners is conducted by the RGS. There are three main registers.	No	Royal Dutch Medical Association is responsible for accreditation of the medical profession. The CGS sets the requirements for medical specialty programs and determines which specialties are recognized.	Tightly regulated process. CGS of the Royal Dutch Medical Association.
UK	General Medical Council regulates the profession and registers medical practitioners.	No	General Medical Council Accredits (Local Education and Training Boards), training posts and programs and the curricula and assessment of the training programs.	Tightly regulated process. General Medical Council
US	American Board of Medical Specialists (ABMS) or the American Osteopathic Association (AOA) are responsible for certification of practitioners.	Yes	Accreditation of training programs conducted by three organisations the American Osteopathic Association (AOA), American Association of Colleges of Osteopathic Medicine (AACOM) and the Accreditation Council for Graduate Medical Education	American Osteopathic Association (AOA), American and the Accreditation Council for Graduate Medical Education (ACGME).

		(ACGME). Currently transitioning to a single accreditation system for graduate medical education.	

References: [11, 36, 44, 59-66]

1.2.3 Specialist education and training

Responsibility for managing, administering and delivering specialty education and training varies. For the countries considered in this report the medical education and training continuum consists of three or four phases:

Phase 1	**Undergraduate medical education**, mostly delivered by university medical schools	All countries
Phase 2	1 – 2 year **internship**, period of supervised practice consisting of rotations through clinical disciplines	AU, JP and UK
Phase 3	**Specialty (postgraduate) training**, managed by a range of different oganisations and delivered within health services	All countries
Phase 4	**Continuing education**, varying requirements and managed by a range of organisations	All countries

References: [59, 64]

The relative autonomy and communication between the groups involved in setting the national direction of specialty training and education is varied across countries. In Canada there are national colleges that manage specialty education and training and accredit training programs. In Australia there is an oversighting accreditation body that accredits 16 independent organisations (specialty colleges) that administer specialist education and accredit the training posts and programs.

In the Netherlands, Canada and the UK the overarching accreditation/regulation body has a role in approving specialty curriculum and accrediting individual specialty training posts and programs. Whereas in Australia curriculum and assessment for each specialty is developed by the individual specialty colleges in line with high-level national standards set by the national accreditation body. Information about the types of specialties and data on the numbers of practitioners is provided in section 1.3.

Another interesting point of difference is the selection processes, this is also partly linked to previous comments about the capacity of the country to influence the number of medical graduates that enter into training pathways.

All countries considered have some form of continuing education requirements and or revalidation process to maintain registration. The organisations that develop and accredit the programs and practitioners against these requirements vary. However, there is general recognition the continuing education processes require strengthening and this is being

undertaken across a number of countries including Australia, Canada, the Netherlands and the UK.

These differing roles and responsibilities will influence the appetite and ability of the education and training system to proactively and cohesively respond to the changing healthcare context.

Table 1.3: Summary of specialist education and training

	Governance	Training	Continuing education
AU	**Managed:** Australian Medical Council sets high level standards. 16 independent specialist colleges, responsible for developing and administering the programs, including accrediting training posts in health services. **Delivered:** Training delivered by health services accredited by specialist colleges.	**Specialties:** 23 specialties, 64 fields of specialty practice. Including general practice. **Selection:** Open and competitive. All specialist colleges have different entry requirements. **Education and training:** Developed by the individual specialist colleges in line with high-level standards set by the Australian Medical Council.	**Continuing professional requirements:** Specialist practitioners must meet continuing professional development requirements delivered by the relevant specialist medical college for every specialty they hold specialty registration.
CA	**Managed:** Three national colleges: Royal College of Physicians and Surgeons of Canada (RCPSC), Collège des Médecins du Québec (CMQ) and the College of Family Physicians of Canada (CFPC) that define national standards and accredit university-run programs. **Delivered:** Faculties of medicine, university-run residency programs within health services.	**Specialties:** The Royal College: 28 specialties, 37 subspecialties, three special programs and 13 Areas of Focused Competence (AFC-diplomas) delivered by 17 Canadian Faculties of Medicine. CMQ: 60 specialties, some specialties recognised by Royal College are not recognised by the CMQ. General practice/Family Medicine is separate to this. **Selection:** National matching system. **Education and training:** Nationally defined competencies: CanMEDs. Family Medicine Triple C, curriculum based on CanMEDS.	**Continuing professional requirements:** There are continuing professional development requirements of practising physicians to maintain their license to practise.
DE	**Managed:** German Medical Association sets national level regulations. Regulations then conextualised regionally by the State Chambers of Physicians. **Delivered:** Approved specialty training facilities: university or college hospital, or medical care institution approved by the chamber of physicians.	**Specialties:** 33 specialty fields, 23 specialist competencies, 9 subspecialties and additional training qualifications. **Selection:** Open, competitive. Graduates can apply for any program. **Education and training:** Length of training, procedures and skills required are set at the federal level.	**Continuing professional requirements:** Required to document and verify have undertaken continuous professional education. CPE must meet the regulations on continuing education set by the German Medical Association.

JP	**Managed:** Japanese Board of Medical Specialties sets national level regulations. New framework currently being established. **Delivered:** Teaching hospitals and clinical departments of medical schools.	**Specialties:** 19 basic specialty training programs. Subspecialties exist but not yet officially approved in the new system. General practice only recently created as separate specialty. **Selection:** National matching system for postgraduate training but open and competitive for specialty training. **Education and training:** Not set nationally.	**Continuing professional requirements:** An area of development. There is no process for recertification and requirements for professional development are less well established.
NL	**Managed:** Medical Specialties Council (CGS) of the Royal Dutch Medical Association sets the requirements. Medical societies responsible for developing and administering the programs. **Delivered:** Training delivered in health services accredited by the Royal Dutch Medical Association.	**Specialties:** 34 specialties (including general practice) and 4 independent profiles. There are also 18 subspecialties recognised by scientific societies. **Selection:** Open and competitive. All graduates can apply, however competition is high for some specialties. Clinical experience, education (e.g PhD) are an advantage. **Education and training:** National requirements. Curriculum developed by medical societies approved by the Medical Specialties Council.	**Continuing professional requirements:** Requirement for continuing medical education and re-registration to maintain the maintain the right to practice. Must participate in continuous professional development.
UK	**Managed:** General Medical Council sets national requirements. Four statutory post-graduate medical bodies manage the programs in each country. Royal colleges for each specialty develop training programs. **Delivered:** Local education providers.	**Specialties:** 65 specialties and 32 subspecialties. **Selection:** Open, competitive. Graduates can apply for any program. **Education and training:** Developed by colleges to national level requirements and GMC and government have a role in approving the curriculum.	**Continuing professional requirements:** Revalidation process every five years with evidence of completion of professional development activities required.
US	**Managed:** Accreditation Council for Graduate Medical Education and the American Osteopathic Association set national standards for postgraduate programs. **Delivered:** University of community hospital sites.	**Specialties:** ABMS 40 specialty certificates and 124 subspecialty certificates, AOA 29 specialties, 77 subspecialty certificates. **Selection:** National matching system. **Education and training:** Residency Review Committees for each specialty.	**Continuing professional requirements:** Must participate in continuing medical education. Re-registration required and must demonstrate maintained safe practice and continuing medical education.

References: [18, 44, 55, 57, 59, 62, 67-69]

1.3 Data on medical specialties and specialty workforce

The following section presents data on the medical specialties and medical workforce. This provides important context to the discussions about current challenges and also future directions of the specialty landscapes in the report.

1.3.1 Types of specialties

The types of specialties and subspecialties vary between countries. Lists of the specialties and subspecialties in each country are provided at **ATTACHMENT 1.** A comparison of the specialties and subspecialties between countries is provided at **ATTACHMENT 2.**

A summary of the number of specialties in each country is provided below. While efforts were made to ensure the information is correct, including verifying with relevant stakeholders where possible, it was not always possible to verify the accurateness or interpretation. It provides a high-level indication of the variation in the level of specialisation and types of specialties in each of the countries considered.

Countries	Specialties	Subspecialties	Other
Australia	23	64	
Canada • Royal College	28	37	13 areas of focused competence
• CMQ	60		
Germany	33	23	9 subspecialties and additional training qualifications
Japan	19		Subspecialties exist not yet confirmed in new system.
Netherlands	34	18 *approved by scientific societies	4 independent profiles
United Kingdom	65	32	
United States • ABMS	40	124	13 areas of focused competence

• AOA	29	77

References: See attachments 1 and 2 [59]

Note: Details on the specialties approved by the College of Medicine Quebec were not able to be found and Family Medicine is not included in the total number of Royal Colleges but is included in the CMQ. In Japan subspecialties exist but are not yet confirmed in the new system.

1.3.2 Specialty workforce in numbers

Physicians density (per 1000 population) 2014
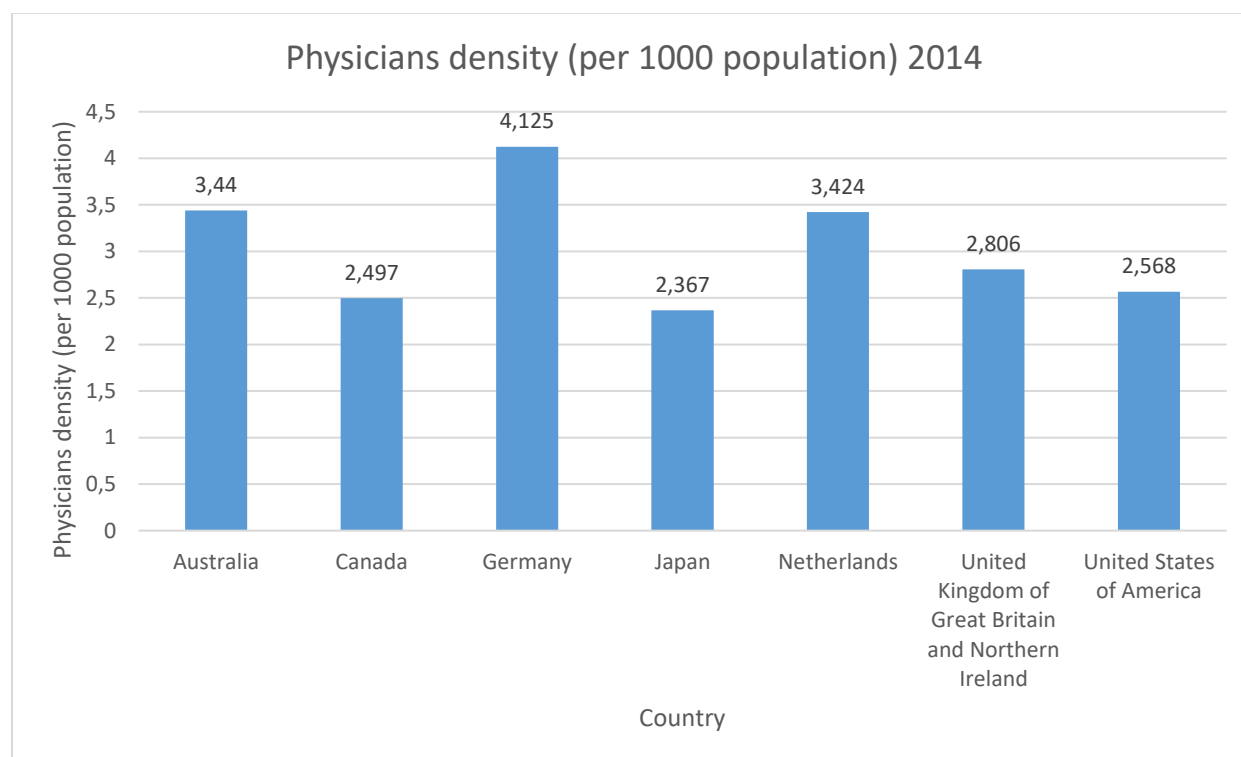
Reference: OECD Health Statistics 2014 [70]

1.3.3 Generalists and specialists as a share of all doctors 2015

Generalists and specialists as a share of all doctors, 2015 (or nearest year)

	Generalists [1]	Specialists [2]	Medical doctors not further defined
Australia	44,8	48,9	6,3
Canada	47,2	52,8	
Germany	41,2	58,8	
Netherlands	44,6	55,4	
United Kingdom	28,3	72,0	
United States (2014)	11,9	88,1	
OECD32	29,9	62,8	7,3
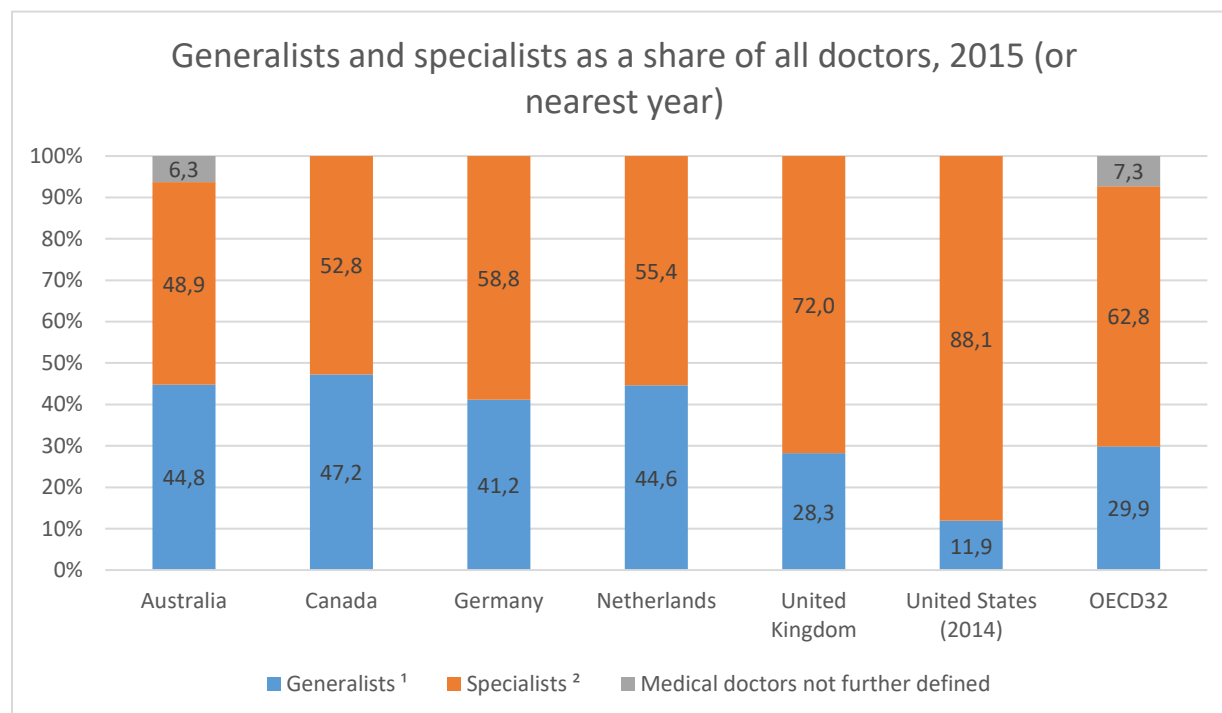
1.Generalists include general practitioners/family doctors and other generalist (non-specialist) medical practitioners.

2. Specialists include paediatricians, obstetricians/gynaecologists, psychiatrists, medical, surgical and other specialists.

Reference: OECD Health Statistics 2017 [71]

1.3.4 Health Expenditure as Percentage of Gross Domestic Product

Health Expenditure as Percentage of Gross Domestic Product (WHO 2017)

Legend:
- Australia
- Canada
- Germany
- Japan
- Netherlands
- United Kingdom of Great Britain and Northern Ireland
- United States of America
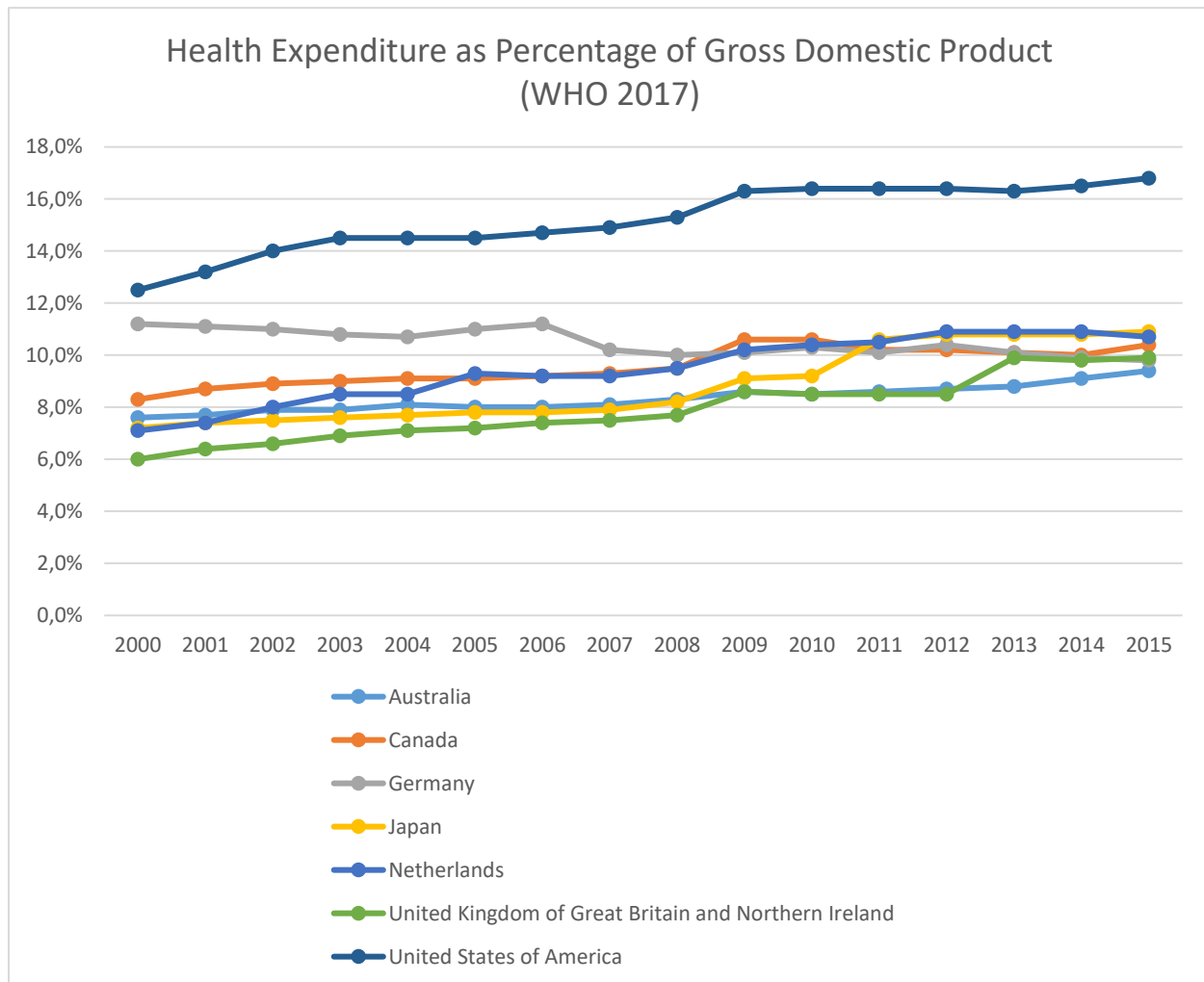
Reference: WHO Global Health Observatory data repository 2017 [72]

The importance of the data presented in this section is to provide context to the challenges and priorities experienced by each country and their future directions relative to their current systems.

1.4 Current priorities and challenges influencing future landscapes

The current priorities and challenges of the specialty landscapes will focus the future solutions. This section of the report provides a summary of key findings regarding current priorities and challenges identified in national reviews of medical workforce, healthcare delivery and training. This section is also informed by stakeholder discussions.

'There is a need for a 'system that evaluates health care on the value it provides to society, not the inputs it demands.' [Japan 2035[1]]

Internationally, many countries are facing similar challenges in health care such as equity of access, changing population health needs and fragmentation of delivery of care [7, 17, 18, 25, 52]. While it is interesting to consider and compare these issues, it must be noted that the context of the challenges and priorities varies widely between countries, which means the mechanisms to address these issues will too.

The current priorities and challenges relate to both delivery of care and education and training, and responsibility for addressing challenges and setting future directions belongs to multiple stakeholders. This is not an extensive list but a high-level summary of a number of the national issues identified.

There are 11 main challenges and priorities that were identified across the review of the countries in this report, which are represented in the following diagram, and described in further detail below.

1.4.1 Governance

The complexity (in number of groups involved and their roles and responsibilities) and lack of coordination of governance across healthcare training and delivery systems is an issue that was identified across multiple countries including Australia, Canada, Europe, Japan, the UK and the United States [6, 7, 18, 54, 64, 73]. The focus of this report is on specialty training and care delivery, however it is important to note that the issues with governance are broadly applicable to many facets of health care.

The nature and severity of the challenges, is different across countries and determined by the individual structures. Overall, the information gathered indicates there is a need for more transparency, better integration, leadership, collaboration and communication to improve the accountability, responsiveness and sustainability of medicine. [6, 7, 13, 50, 58, 67]

Countries with particularly complex governance structures include Australia, Canada and the United States. [25, 45-56] A number of past healthcare reviews identify structural arrangements that add to institutional 'silos', waste of resources and barriers to integrated care. [18, 51, 74] It is noted that in many countries there have been efforts to improve integration of care, however over the healthcare systems as a whole these problems remain. Coordination of care and integration of services is becoming particularly important in the context of changing healthcare needs. [2, 3, 6, 16, 17, 29, 50, 75]

Similarly, the number of bodies responsible for education and training of the specialty workforce and the lack of communication and coordination across the medical education continuum and between education and health service provision has been identified as a significant issue in a number of countries. [6, 18, 25] It should be noted that Canada has created a joint governance council for key stakeholders in specialty education, further information is provided in secton 2. [23]

The following issues relating to governance were identified across a number of countries:

Priorities and challenges		Countries
Fragmentation of healthcare	Fragmentation of healthcare governance and delivery is identified as a significant challenge. There is an identified need for better integration of services for better patient care, particularly in the context of changing healthcare needs.	All
Fragmentation of training	Limited communication and coordination across the medical training continuum, including between different phases of education and between education providers and health service providers. Difficult to define shared expectations and overall responsibility with multiple stakeholders.	All
Reform	The US is undertaking radical transformation of the healthcare system through the Affordable Care Act. Japan is in the process of significant change, establishing frameworks for postgraduate regulation, accreditation and training.	US, JP

References: [2, 4, 7, 18, 25, 51, 64, 76]

1.4.2 Health of populations

The population dynamics and health needs are changing in developed countries which includes ageing populations and increases in chronic and complex multi-morbid diseases. (Refs) Changing healthcare needs will result in changes to the care required. This is currently having significant impacts on the cost, efficiency and sustainability of current systems which were developed to provide acute and episodic care. It is expected that this change in demand,

will have wide-ranging impacts on the future medical landscape including medical education and training, models of care and the mix and distribution of the medical workforce.

Priorities and challenges		Countries
Demographics	Changing health requirements with changing population demographics, in particular increasing life expectancy and ageing populations.	All
Diseases	Increases in non-communicable diseases and mental illness. Rise of chronic and complex multi morbid diseases. Changes in healthcare needs and models of care required.	All
Environment	Indoor and ambient air pollution identified as the greatest environmental health risk and is increasing with continued urbanisation.	All
Socio-economic determinants	Growing recognition of the impacts of social and economic factors on health and disease. There is a need for consideration of this in the way doctors are trained and the way healthcare is delivered.	All

References: [2, 4, 6, 8, 17, 19, 20, 22, 25, 42, 77, 78]

1.4.3 Accountability

The accountability of medical training and healthcare delivery to multiple stakeholders is not a new concept, but has been attracting significant attention in recent years [1, 9, 17]. In particular, the social accountability of medicine and also measures of evaluation (e.g. outcome measures of value rather than volume). These concepts are distinct but related in their links to the value health care provides to society.

'The public expects the [Graduate Medical Education] system to produce a physician workforce of sufficient size, specialty mix, and skill to meet society's needs. Many observers from both public and professional vantage points feel it is currently falling short in each of these dimensions.' [11]

A number of reviews of medical training and healthcare delivery describe a need for a shift from the concept of professional-driven medical education and delivery, to training and delivery that is accountable to patients. [9, 13, 55, 77]

In addition to social accountability there are also changes to methods for evaluating the quality of care being explored. The focus is shifting from volume-based measures to quality indicators. Japan's 2035 health report states the need for a 'system that

evaluates health care on the value it provides to society, not the inputs it demands. [79]

A summary of key areas identified is below:

Priorities and challenges		Countries
Social accountability	This relates to medical education and training, workforce planning and medical practice. To identify and address the healthcare needs of the community, including disparity of access.	All
Outcomes of training	Increased focus on whether medical training is meeting the needs of the healthcare system and the community at large. Whether education currently prepares doctors for the healthcare system and the future healthcare needs and mechanisms for evaluation to inform this.	AU,CA,UK, US
Outcomes of healthcare	Evaluation of the effectiveness of care changing from volume based to quality measures such as value-based or outcomes-based care. Significant area of focus for the United States with the review of the Affordable Care Act.	All

References: [4, 8, 13, 17, 20, 21, 42, 51]

1.4.4 Sustainability

Globally, healthcare delivery and training is expensive and the costs are increasing. The sustainability of healthcare systems was an issue that was unanimously raised in workforce reports across the countries considered. [5, 19, 60, 80] An Organisation for Economic Cooperation and Development (OECD) report indicated that around 20% of health care expenditure is wasteful and of low value. [15, 80]

This is particularly relevant in view of changing population healthcare requirements, and a need for better integrated and community-based care. Each of the seven countries face slightly different issues with regard to the sustainability of health care and this is partly linked to differences in the governance, funding and healthcare delivery models.

> *'Health spending accounts for almost 10% of GDP on average in the OECD area and health systems are struggling to demonstrate value for money and to deliver good care aligned to the needs of ageing populations.'* [4, 15]

The cost of health care in relation to the healthcare outcomes is known to be a significant issue in countries such as the United States and is being considered as part of the current healthcare transformation.

Priorities and challenges		Countries
Cost of health care	Significant and rising costs of health care has been identified as a key issue across all countries. Drivers for increased spending include increasing and changing demands, developing market expansion, advances in medical treatments and rising labour costs. There are also concerns about duplication of effort, waste and addressing preventable errors,	All
Cost and length of training	The cost and length of time to train medical practitioners is raised in many countries. Also linked to the flexibility and responsivness of the workforce.	All

References: [4, 8, 15, 64, 80]

1.4.5 Technology and information

The information gathered suggests that rapid advances in technology and information (data) will have a significant impact on the way medicine (and health care more broadly) is taught and delivered. [7, 19]

It is recognised that with the significant opportunities offered by advances in technology there are also new challenges to consider such as how the technologies are regulated and what infrastructure is required to support the technology. Similarly big data has the potential to advance the practice of medicine but also comes with risks such as data privacy and other ethical and legal considerations. [15] Another challenge is limited ICT skills, particularly in the older generations of the health workforce.

Priorities and challenges		Countries
Technology	Technology will drive significant change in diagnostics, therapeautics and medical practice.	All
Information (data)	Data is rapidly expanding, and access to information and patient management is expected to radically change, through greater use of electronic records, shared registers and big data.	All
Infrastructure and skills	Updates to infrastructure are required to support the advances in technology predicted. The health workforce needs stronger competencies in ICT.	All

References: [15, 20-22, 24, 39, 40, 42, 43, 81]

1.4.6 Medical workforce

The effectiveness of medical workforce planning is broader than medical specialties but is an issue that was raised across numerous health workforce reports. This was particularly true for countries such as Australia, Canada, the UK and the US.

A report by Health Workforce Australia in 2014 stated 'There is no tangible mechanism to coordinate the training efforts of state and territory health systems (collectively responsible for funding virtually all specialty training, excluding general practice) or to align those efforts to national workforce needs (numbers, distribution and generalist: specialist mix). This is contributing to: maldistribution between specialties; lengthening of time taken to produce independently practising specialists; and lost opportunities to better target geographical distribution and promote a better balance of generalist: specialist: sub-specialist training.'[25, 82]

As per section 1 of the report, approaches to workforce planning are different internationally, this has an influence on the significance and types of issues encountered. Noted this is linked to issues with equity of access and changing healthcare needs.

Priorities and challenges		Countries
Workforce planning	The need for more proactive, responsive, effective and systematic workforce planning was raised across multiple countries. The scale of the problem is worse in some countries however there is an agreed need for better data to ensure the workforce better meets community need in terms of the number, mix and distribution.	All
Numbers	Some countries are facing an overall shortage of medical professionals in both numbers and hours worked.	UK, DE
Distribution	The distribution of the workforce was raised as a particular issue with a number of underserved populations such as rural and remote and Indigenous groups. This links to access.	AU, US, CA, JP, DE
Mix	Many countries face imbalances in the mix of specialties. The types of specialists are different across the different countries. There is an increasing demand for general practitioners and a trend of specialisation and subspecialisation of the workforce.	All
Changing workforce	There are changes in the physician population with aging (retiring) and more part-time work.	All

References: [3, 4, 29, 75]

1.4.7 Access (disparity of outcomes and inequity of access)

Across all countries explored, issues exist with access to and quality of care for marginalised groups including those living in rural and remote communities, refugee populations and lower socioeconomic groups. [FMEC PGME 2012, HWA 2014].

'Unbalanced distribution of health personnel between and within countries is a worldwide, long stranding and serious problem.' [Dussault 2006]

In Australia, Canada and the United States there also exists significant disparity of health outcomes and inequity of access to care for Indigenous people.

It is also noted that equity of access (as with many of the issues raised in the report) is a multi-faceted and structural issue that is not limited to medicine and that cannot be solved by medicine alone. However, medicine and the specialty workforce do have a role to play in addressing these issues now and into the future.

Key issues related to fairness and equity of access identified across countries included:

Priorities and challenges		Countries
Indigenous health	Disparity of Indigenous health outcomes and access to care.	AU,CA,US
Geographical misdistribution	Rural workforce shortages of medical specialists and access to care.	AU,CA, JP, DE, US
Socioeconomic status	Socioeconomic factors, including associated disadvantage, are important determinants of health and wellbeing.	All
Primary care	Primary care access specifically is a signifficant issue in some countries such as UK.	UK, DE, US

References: [2, 4, 7, 8, 17, 25, 75, 76]

1.4.8 Patients

The expectations of doctors towards patients and of patients themselves are changing. In the future patients are expected to have more of a role in their healthcare, this includes more autonomy and responsibility. Linked to the changes in population health, it has also been identified that, models of care will need to be more focused on whole patient care with better integration and coordination of services.

Priorities and challenges		Countries
Role of patient	The role of patients is changing. They are expected to have more of a role in their own health care, which includes autonomy and responsibility for their own health.	All
Whole of patient care	Whole of patient care is linked to social determinants of health and requires consideration of more than the medical condition(s) but also consideration of the psychosocial context, attitudes and beliefs.	All

References: [4, 8, 20-22, 24, 42, 79]

1.4.9 Healthcare models

Healthcare models are changing. For a variety of reasons and in a variety of ways there are changes occurring internationally in the way health care is viewed and delivered. There have been changes to increase the focus on preventative care and social and economic determinants of health, to better integrate care, to increase multi-disciplinary and inter-professional ways of learning and practising and expanded settings for training and healthcare delivery. [9, 83-85]

A number of countries have identified a need to strengthen primary care services. State of Health in Europe 2016 report stated that 'Strong primary care can contribute to strengthening the overall health system's performance by, inter alia, providing affordable and accessible care; coordinating care for patients so that they are given the most appropriate services in the right setting; and reducing avoidable

'More than one in four patients across the EU still visit an emergency department because of inadequate primary care. Strong primary care is the key to integration and continuity.' [State of EU 17 [7]]

hospital admissions. The right combination of incentives helps achieve optimal delivery not only of primary care, but also of secondary care, hospital, and emergency services – and building in a gatekeeping or referral system is increasingly part of the mix.' [7]

Priorities and challenges		Countries
Preventative health	Increasing focus on the importance of preventative health. This will become particularly important with the shifts in the burden of disease and more proactive, structural and multi-faceted approaches to health is required.	All
Integration	Stated as a priority for healthcare delivery and training. Required for better patient outcomes and in particular to manage complex comorbid diseases.	All

Patient centered and holistic	Need for care centered on the patient and considering the whole patient, including a biopsychosocial view of health and wellbeing.	All
Expanded settings	Expanded delivery of care and training outside of hospital settings such as ambulatory and community-based care.	AU, CA, US, UK, JP, NL
Primary care	Strengthening primary care is an area that has been identified by multiple countries as a priority.	All

Reference: [4, 7, 27, 86, 87]

1.4.10   Medical education and training

Medical education has continued in a system of linked but independent silos for the past 100 years. In the current changing context of health there are discussions occurring about whether there is a need for more significant and systematic reform in the education and practice of medicine [17, 88, 89]. Certainly there is agreement that education and training needs to be aligned with community needs and there is growing interest in outcome measures to inform learning.

Current challenges and priorities in medical education and training include a need for better transitions through the continuum of education and training, advances in education and assessment models, the effectiveness of training and safe and supportive learning environments.

Priorities and challenges		Countries
Flexibility	The systems currently lack flexibility in training and there is little to no ability to transition between training programs.	All
Training environments	Tension between training and service delivery; more support required for learners. Ensuring safe and supportive learning environments, including professional role models.	All
Curriculum and assessment	Changes occurring to competency-based systems with consideration of entrustable professional activities and individualised training.	CA, UK, NL
Transition points	Attention needed regarding transition points in medical education and collaboration between relevant organisations to ensure competence is at the level required.	CA, US, AU
Reform	Changes proposed and underway in medical education and training in the UK including more generic and flexible approaches to training. Japan is currently undergoing	CA,UK, NL, JP

	significant reform in the governance, regulation and training of medical specialties; medical education system has been undergoing rapid development. Canada and the Netherlands are both implementing a system based on competency rather than time.	
Expectations	The need for medical education to provide clear advice about expectations of doctors and their expectations in their medical career (e.g. responsibility to meet community need might result in less flexibility to 'choose').	AU, UK, CA, NL, US
Continuous learning	Continuous learning requirements are area of focus currently being strengthened across all countries.	All
Outcomes	Discussions occurring about mechanisms to assess outcomes of medical education and training to better inform learning and improve practice.	All

References: [6, 7, 17, 20-22, 24, 42, 43, 73, 88]

1.4.11   Professional practice and identity

There has been significant attention placed on the wellbeing and burnout of medical professionals, including the link between physician wellness and quality care. Professionalism and the professional identity of medical practitioners have also been identified as challenges and priorities.

Priorities and challenges		Countries
Wellbeing	Wellbeing of doctors and burnout and the link between physician wellness and quality of care have been areas receiving a large amount of attention.	AU,CA,UK, US
Professionalism	Continued area of emphasis on the responsibilities of physicians. It is important that the environment also reflects the professional qualities to emulate.	AU,CA,UK
Working and learning environments	The working environment has been an area of increased focus in recent years, in particular in light of claims of bullying and harassment in the workforce and attention to safe learning environments.	AU, CA, UK, US, NL

References: [2, 7, 17, 25, 84]

1.5 Conclusion

This section is intended to provide context for the next section of the report which focuses on what the specialty landscape will look like in 20 years.

The current landscapes vary across countries in a number of ways including the way medicine is governed, regulated, taught and practised. In particular the differing models and roles and responsibilities in the system create different challenges and influence the ability to proactively and cohesively respond to the changing healthcare context. Variation in the current landscape is also reflected in the data provided in section 1.3 which shows the number of specialties and the proportion of specialists to generalists across countries.

Eleven key challenges and priorities were identified across the international healthcare systems which are considered likely to influence the future specialty landscapes (and health care more broadly):

1. Governance	Fragmented systems of governance for care and training with a lack of collaboration and leadership
2. Health of populations	Changes in populations and their health
3. Accountability	Focus on accountability of training and care to meet community needs and changing evaluation measures to include value and outcomes of care and training
4. Sustainability	Significant concerns about the cost and sustainability of health care
5. Technology and information	Rapid advances in technology and the availability of data
6. Medical workforce	Currently not aligned to community need. Imbalances exist in mix, numbers and distribution of workforce. Need for proactive, effective and systematic workforce planning models
7. Access	Disparity of outcomes and inequity of access to care
8. Patients	Changes in roles and expectations of patients
9. Healthcare models	Changes in the way health care is viewed and delivered
10. Medical education and training	Changes including education and assessment methods, flexibility of training and transition points
11. Professional practice and identity	Focus on professionalism, wellbeing and working and learning environments

The relevance of these issues to each country is indicated in the report, however it should be noted that there is variation in the extent and nature of these challenges and priorities in each country.

The information found suggests that healthcare settings (specialty training and practice included) are fragmented, inflexible, expensive and not always targeted to what the population needs. The responses to these priorities and challenges have the ability to significantly change the way health care is delivered and received. To address these concerns the future medical specialty landscape will need to be accountable, proactive and responsive to community need with stronger, more collaborative governance and with better integrated models of training and care.

Section 2: The future landscapes of medical specialties

'The doctor of the future will give no medicine, but will instruct his patients in care of the human frame, in diet and in the cause and prevention of disease.' [Thomas Edison]

Contents

2.1   Introduction

The doctor of the future will look different and work in a different environment. How to predict, lead and be responsive to these changes is a constant challenge for those responsible for workforce planning, healthcare delivery and training. [6, 7, 9, 17, 19] The future directions presented in this report have been developed from published material contemplating the future of healthcare delivery and from discussions with stakeholders in each country.

Extrapolating from the previous section, to address the current challenges of the system, the future medical specialty landscape will need to be more proactive and responsive to community health needs with stronger, more collaborative and transparent governance, better integrated care and training and a patient-centred focus.

'Our health systems are still facing important challenges, and a new vision for the future is needed.' [OECD Ministerial Statement 2017]

In each of the countries considered in this report, evaluation and change is occurring at different rates in response to the changing health context. The United Kingdom and Canada have done significant work in evaluating future healthcare needs and specifically how specialist training and service delivery will meet those needs.

In 2013, the United Kingdom government commissioned a review, 'The Shape of Training', which aimed to determine how medical training could better meet the needs of the community over the next 30 years. In response to this report the UK Ministers convened the UK Shape of Training Steering Group to provide policy advice on the 19 recommendations. In 2017, the Steering Group released its report which has been endorsed by the UK Ministers. Changes are now occurring in how training and service will be delivered in the UK. Specific examples are described in the sections below.[6, 9]

> '*All four nations of the UK are firmly committed to transforming delivery of services, with more care delivered in local or community-based settings, guided by an overriding principle that patient needs must drive service configuration. This will require new approaches to medical education and training to enable service providers to plan effectively and to ensure that tomorrow's doctors are equipped with the skills and attributes that patients need.*' [UK Ministers' response to USTSG report]

The Future of Medical Education in Canada is a series of projects focused on ensuring that the medical education system will meet the changing health needs now and into the future. Projects delivered to date include a vision for reform in undergraduate (FMEC MD report (2015) (2010) and postgraduate education [17, 90]. A third report on continuing professional development is underway. The FMEC PG report involved those responsible for postgraduate education and developed a national strategy with actions. Responses to the recommendations of this report are in various stages of implementation, some updates are provided below. One important outcome was the establishment of the Postgraduate Medical Education Collaborative Governance Council to provide a mechanism to bring together the relevant stakeholders (including colleges and educational and healthcare institutions) to provide clarity on strategic directions and decisions. [23]

2.2 Different education and training

As noted in section 1, to address future system challenges, including sustainability and changing disease profiles, specialty training of the future will need to be more accountable, proactive and responsive to community need. [6, 9, 17, 25]

'For the last 100 years education has continued in continuum of linked but independent silos' [88] This reinforces a self-perpetuating cycle of training and care delivery, which becomes increasingly difficult to change. A number of health reports indicate that training and care will need to change to address the changing landscape. In most instances, it appears that change is made in incremental ways by different sub-sections of the system responsible for training or care, and there is very little in the way of whole-of-system strategic and forward planning based on public health needs (rather than based on historic systems). [6, 9, 17, 25]

'… embracing a holistic scientific approach (as opposed to the reductionist research strategy used traditionally) for the understanding of human health and disease is a unique (and mandatory) opportunity to really move medical practice forward in the 21st century.' Noel 2018 [12]

As noted previously, there are discussions ongoing about the importance of more holistic approaches for teaching about health and disease, rather than the traditional reductionist view of organ or disease-based models. Interestingly, calls for more holistic approaches are occurring in both discussions about care in the context of the patient (biopsychosocial models) but also in discussions about technology-enabled care. To quote an article by Noel et al 2018 on participatory medicine in to the future it states '…embracing a holistic scientific approach (as opposed to the reductionist research strategy used traditionally) for the understanding of human health and disease is a unique (and mandatory) opportunity to really move medical practice forward in the 21st century.' [12]

Stakeholder discussions reflected changes currently occurring in specialty training systems internationally, including changes to make training more flexible and better targeted to community health needs.

Areas of predicted change		Countries
Training determined by health needs	Acknowledged as a responsibility for specialty training across all countries.	All
Flexible training	A more adaptive and flexible workforce as required by the healthcare systems. Flexibility of training is discussed as a future requirement, including flexibility in time to train and ability for practitioners to move between specialties.	CA, UK, NL
Broader initial training	Broader approach to training, apprentice style with generic capabilities and longer placements.	UK

Credentialing	Credentialing to enable more subspecialised training to occur after broader initial training and as determined by health workforce needs.	UK
Combined training	Already exists for some specialties, but expect increasing examples of combined training between specialties to address needs and achieve better health outcomes.	AU, NL, CA, US
Models of health and disease	As knowledge of health and diseases progresses and the technology and data available increases, improved understanding of models of health and disease will change the way doctors are trained.	All
Rural training pathways	Rural training pathways to encourage rural practice and address rural distribution concerns.	AU
Expanded settings	Increased training outside hospital centres, for example in community settings. Including better integration between primary and secondary care.	All
Community-engaged	Training that is not just targeted to community need but better engages with the community.	AU, CA, US, NL
Continued education	As noted in section 2.2, many countries are strengthening continuing professional development requirements and it is expected that this will be an area of particular importance into the future.	All
Outcome informed	Outcome measures of performance and training are changing with focus on value and new metrics being established. With increasing metrics and national data sets these outcome measures and metrics could be used to inform practice and learning in a more targeted way.	All
Radical reform?	A number of reports and stakeholder interviews alluded to a need for reform in models for training medical professions (away from siloed and organ-/disease-based approaches), however it was acknowledged this type of change would be difficult to achieve and there was not an example where a whole of system approach had been described.	All

References: [6, 9, 12, 20-22, 24, 37, 39, 42-44, 84, 91]

Some examples:

- **United Kingdom** - In response to the 2017 UK Shape of Training Steering Group report, changes are now occuring in the UK to create a more generic framework for curricula

for postgraduate training. Specialty colleges are required to demonstrate how their curricula addresses workforce need (which is signed off by government) and there will also be a change from time-based training to competency-based progression through training. A system of credentialling is being developed, it is intended that credentials will be used for further subspecialsed training after initial training and as determined by health service/community need. [6, 9, 42]

- Linked to the Future of Medical Education in Canada **project - The Royal College of Physicians and Surgeons** is implementing 'Competence by Design' from 2019. Moving from a time-based system to competency-based system for training supported by new educational technology and software. The intention is that this change will have a number of educational and service delivery benefits including to focus on learning, respond to changing health needs, enable smoother processes for credentialing, increase accountability and reduce issues with 'failure to fail'. [21, 92]

- The **Netherlands** is also implementing a competency-based, rather than time-based, system for specialty training. This includes assessment through entrustable professional activies. [20]

- **Germany** is currently revising the specialty training regulations with an emphasis on competencies and competence levels. [93]

- **Japan** is in the process of establishing new national level frameworks for education and training of the specialty workforce. This includes processes to certify medical specialists using common sets of standards. [64]

2.3   Different doctors

Stakeholder discussions from a number of countries indicated that the mix and type of specialties will inevitably change. They reflected that this would be due to a range of reasons including workforce demand, (influenced by patient need but also changes to models of delivery) funding pressures and technology. [20-22, 24, 39-44]

As noted in section 1, the processes for recognition of new specialties and subspecialties has been tightened across a number of countries including Australia and the United Kingdom [57, 58, 65]. As part of a separate project, it would be interesting to explore the current and emerging interest for new specialties or subspecialties in each country.

Another concept raised in discussions with stakeholders was that of a doctor of the future with a more flexible career, a portfolio of skills and a requirement for more structured continued learning targeted to meeting community needs. This included discussions about structured and regulated modularised training, which could be deployed to upskill the workforce in response to changing community needs. [20, 22, 42, 43]

Areas of predicted change		Countries
Mix/ type of specialties	The mix and type of specialties will change due to a range of reasons, including cost, workforce demand and technology. Some stakeholders suggested there would be fewer numbers of subspecialists overall.	All
Medical generalists	General specialists (e.g. General Surgeon) technically still exist in some countries. However, the number of general specialists has decreased over time and/or in practice, their scope divided. Some stakeholders suggested that the need for and number of medical generalists is already increasing.	AU, UK, JP, NL, CA
Professional identity	The professional identity of doctors is constantly changing. The doctor of the future will need to be more adaptive and flexible in their practice. Doctors will need to be technology literate, prepared to work in integrated teams and diagnose and coordinate care in different ways. The focus will be less on what you know but how you can find and interpret information.	All
Multi-skilled	Multi-skilled doctors through combined training pathways or training modules delivered after initial training, e.g. through credentialing.	AU, CA, NL
Generalist skills	More doctors with generalist skills as determined by broader based training approaches.	UK
Careers of continuous learning	Careers of doctors will be different, and will require more structured continuous learning. Strengthening of continuing professional development requirements is already occurring.	UK, AU, NL, CA

References: [1, 17, 20-22, 24, 39, 42-44, 83-85, 92]

Some examples:

- **The United Kingdom** - 2017 Report from the UK Shape of Training Steering Group (UKSTSG) proposes that doctors of the future will have a different professional career with a professional portfolio and commitment to lifelong learning. As noted previously a system of credentialing is being introduced, this was considered particularly helpful in making the workforce more adaptive and flexible to rapidly changing healthcare requirements. [9, 42]

- The concept of portfolios of skills and structured continued learning for medical practitioners was also specifically raised in interviews with stakeholders from **Australia** and the **Netherlands**. [20, 22]

- **Australia, Canada,** the **Netherlands** and the **United Kingdom,** have recently conducted, or are reviewing, continuing professional development requirements for medical practitioners. The reviews aim to strengthen the requirements and process structures. [9, 17, 20, 84, 92, 94]

- **Australia** has appointed a Rural Health Comissioner to reform rural health in Australia. There are currently discussions about developing a rural health specialist with rural training pathways to address distribution concerns. [95]

- The processes for approval of new specialties and subspecialties is being tightened internationally. However, some new medical subspecialties are still emerging in the **United States,** for example Clinical Informatics. [96, 97]

2.4 Different models of care

Healthcare delivery models will change in a number of ways and for a number of reasons including, changing diseases and expectations, advances in technology and knowledge and concerns about cost.

The United Nations has set a goal for 2030 to reduce premature mortality by non-communicable diseases by one third. This requires a much more proactive approach to prevention and consideration of social and economic determinants of health. [7, 78] Again, this is not just a priority for specialist training and practice, it requires a whole of system approach.

> '*Healthcare is undergoing a profound revolution as a consequence of three contemporary thrusts: systems medicine [1-4], big data and patient involvement in their own health through social networks. This convergence is leading to a medicine that is predictive, preventive, personalized and participatory (P4) [4-7].*' [Hood 2013]

Overall, future healthcare models are predicted to better integrate services, to strengthen primary care, to operate with team-based systems informed by national data systems and to be increasingly delivered in community settings. [3, 7, 19]

Models of care in the future will include new combinations of technology, data and patient involvement. For example P4 medicine. This aims to utilise systems medicine, technology and patient participation to create care that is predictive, preventative, personalised and participatory. If implemented on a large scale, it is intended that this would significantly increase efficiency and improve outcomes of care. [98] [12]

The roles of other health professionals will also likely change and influence the directions and this would be an important area of future research.

Areas of predicted change		Countries
Integration of care services	Integration between and within health services will be required to manage the increasing numbers of complex multi-morbid diseases effectively and efficiently.	All

Group and data based decision making	More collaboration and team work within and between professions for patient decision making. This concept also includes the potential to use national data sets in this decision making.	All
Predictive, Preventive, Personalised and Participatory medicine	Concept that systems biology and systems medicine, consumer driver health care and social networks and digital revolution will converge to provide health care that is predictive, preventative, personalised and participatory.	All
Differing settings	Changes in the healthcare needs of populations will, by necessity, drive a change in the models of delivery of care and the settings. Suggestions there will be less hospital care and stronger primary/community-based care.	All
Primary care	Strengthened in total numbers of practitioners and distribution in most countries. Noting that the degree of change is dependent on the country.	All
Roles	Consideration of the role of other health professionals and responsibilities.	All
Outcome informed	Outcome measures of performance and training are changing with focus on value and new metrics being established. With increasing metrics and national data sets these outcome measures and metrics could be used to inform practice and learning in a more targeted way.	All

References: [1, 19-22, 24, 25, 39, 42-44, 83, 84, 96, 98]

Some examples:

- As part of a national strategy a number of countries, such as **Australia** and **Canada**, have developed networked healthcare services in an attempt to improve integration of patient care between services. [16, 87]

- As technology is rapidly developing, research is already occurring on how applied systems biology and network medicine could be used for disease prevention and management. [12, 16]

- Kaiser Permanente is a healthcare organisation in the **United States** that was raised in stakeholder interviews as an example of a model of well-integrated care. [21]

2.5 Different technology and data

All the information gathered in preparing this report indicates that technology is likely to be one of the strongest drivers for change in the future of health care (the specialty landscape included). [99]

Reports indicate that new technologies are entering at an unpresented rate, including robotics genomics and artificial intelligence. [19, 99]Technology will change the way doctors practise and their interactions with patients. It has the potential to radically change the existence, nature and scope of some specialties. During stakeholder interviews, examples were given where technology had changed the practice of a specialty overnight. [20-22, 24, 39, 44]

Some studies predict that more advanced artificial intelligence will arrive within the next decade and that this technology will have a profound effect on the practice of medicine with the capacity to use algorithms to read tests, diagnose and prescribe. This will undoubtedly change the role of doctors. [12, 91, 100]

Advances in technology and information are relevant to all countries and include possible changes to diagnostics, therapeutics and medical practice. It is not possible to predict all the ways in which technology will change the practice of medicine, other than to say it will be significant and the health workforce will need to be ICT literate and infrastructure will need to be improved to support this. [7, 8, 99]

It will also be important to consider the role of doctors in navigating the legal and ethical challenges that will arise in an increasingly technology-enabled environment.

Areas of predicted change		Countries
Big data	Use of large amounts of data to create health profiles and predictive models to better diagnose and treat disease. For example a specialty registry of national level aggregated data regarding patients' diseases or conditions. As previously noted big data also has potential for measuring outcomes and informing learning and practice.	All
Artificial intelligence	The use of computers to model intelligent behavior. The capacity of AI is expected to increase as the technology advances, including the ability to use algorithms to diagnose and prescribe. Artificial intelligence will change the way medicine is practised and the roles of doctors.	All
Precision medicine	Care that is better targeted to individuals through consideration of genetic profiles and environmental exposures, enabled by technology and data.	All
Therapeutics, diagnostics and practice	Linked to other points the potential for change in therapeutics, diagnostics and practice is substantial. Examples include augmented reality, medical 3D printing, real-time diagnostics and multi-functional radiology.	All

References: [12, 19-22, 24, 39, 44, 99, 100]

2.6 Different focus

Human biology is complex. Noell et al 2018 provides the following summary 'health and disease are emergent properties of a complex, nonlinear, dynamic multilevel biological system: the human body.' [12] To further complicate matters, humans do not operate in a vacuum and health and disease is strongly influenced by the world we live in. In this regard, there has been an increasing focus on biopsychosocial models of health and disease over a number of years. For example, it is recognised that many non-communicable diseases are strongly influenced by socio-economic factors and require more proactive approaches to prevention, consideration of the patient in their broader context (biopsychosocial model), in addition to structural change. [7, 77, 98]

Education and healthcare delivery has traditionally been relatively reductionist in nature, dividing health and disease into body systems. In general, specialty training and practice is then organised around these body systems. [12, 16, 37, 77, 84, 90]

In the changing context of health, in particular with aging populations and chronic diseases that require a stronger focus on the broader context, there are calls for more holistic approaches to considering health and disease. As noted in section 1.2, interestingly there is a convergence here between technology and systems biology or medicine as a strategy to consider disease and health in a more holistic manner [12, 101].

In addition to changing models of health, preventative health has been identified as an important area for future focus as a means of more proactively and efficiently managing health at a population level.

Areas of predicted change		Countries
Prevention	Stronger focus on preventative care and public health strategies.	All
Biopsychosocial	Increased focus on biopsychosocial views of health/disease, including social determinants of health.	All
Systems medicine	Concept of an interdisciplinary approach to use data to improve diagnosis, targeted therapy and prevention.	All
Shift from cure to function	Aging population with multiple chronic diseases will inevitably shift the primary focus of physicians from 'cure' of acute disease to 'ensuring function' for patients.	All

References: [7, 77, 98] [12, 16, 37, 77, 84, 90] [26, 101]

2.7 Different accountability and outcome measures

Stakeholders and health reports indicate that the drivers and outcome measures for the medical profession are changing. [1, 8, 21, 24]

As noted in section 1, there is an increased focus on the accountability of those involved in training and care delivery to meet community needs. In some countries stakeholders indicated that drivers will shift from being profession led, to being better informed by stakeholders, including the health service and community. [13, 20, 42]

Evaluation of health care is also another area that is changing from volume to measures of value and outcome. It is predicted that these outcome measures will be informed by big data, metrics on outcomes will help to drive what to learn and how.

Areas of predicted change		Countries
Accountability	Stakeholders discussed a shift from a profession-driven system to a system that is accountable, informed and driven by the healthcare needs of the community, including disparity of access.	All
Evaluation	New measures for evaluating training and care based on value and outcomes provided rather than time and volume. The use of big data to track outcome metrics and markers of performance has the potential to drive learning and practice.	All

References: [21, 22, 24]

Examples:

- **United Kingdom** – a large focus of the Shape of Training review was on the accountability of the health system to deliver training that meets community need. There have been a number of changes to the system to facilitate this change including a requirement that specialties specifically describe how their curriculum is meeting a community need which is then considered by government. [6]

- In **Canada** in response to the Future of Medical Education in Canada Postgraduate project a Postgraduate Medical Education Council (with representation from key stakeholders involved in postgraduate education) was established with a mandate to advance socially accountable postgraduate medical education system in Canada. [23]

- One of the stakeholders interviewed highlighted that markers of practice are already changing. Previously outcome markers might have included billing, number of patients and complaints per year. Now these markers can include expanded data points such as what pecentage of patients were sent home and bouncebacks. [21]

2.8 Different patients

The participants interviewed for this report indicated that patients of the future will be more health literate and have access to expanded information and technology to support this. Future workforce reports also reflected that patients of the future are expected to have a stronger role in their own self-care. [20, 22, 24]

In a statement for the Public Health Panorama on 'developments that will affect the future health workforce', Nicola Bedlington, the Secretary General of the European Patient's Forum, provided the following key issues in the context of the health workforce needed in the future "High-quality information for patients and health literacy; the new dialogue needed between patients and their trusted health care professionals; and co-decision-making and creating an enabling environment." [3]

Areas of predicted change		Countries
Participatory medicine	Concept of the patient as a consumer and producer, based on increased knowledge and emerging technology and increased role and responsibility for self-care. Patients will be more strongly involved in their care.	All
Expectations	Expectations of patients and doctors will change. Expect co-decision making. Self-management patients managing care with technological and human support.	All
Technology-enabled	Technology will change patient roles in and expectations of their health care. One example is patient use of social media for creating communities of sharing, including information on diseases, experiences and treatments, communicating with doctors and receiving education.	All

References: [3, 4, 19-22, 24, 78, 79, 99]

2.9   Conclusion

The aim of this section of the report was to explore international perspectives on how the medical specialty landscape will change over the next 20 years. Including, changes in the way doctors are trained, how they practise and the environment they operate in.

Multiple health reports suggest that the context of health is changing and there is a strong sense the system (including the way specialists are trained and practise) will need to evolve to keep up. As described in section 1, disease profiles are changing, technology and data are

rapidly expanding and there are increasing concerns about the fragmentation, expense, inflexibility and inefficiency of the current systems.

Practically speaking, the biggest drivers of change are likely to be linked to the cost and sustainability of the current models, demand driven by population health requirements and advances in technology and data. [20, 22, 24, 44, 99]

There are also important changes occurring in the way outcomes of care and training are being measured from volume-based measures to value-based measures. This is pushing for more innovative, cost-effective ways to deliver patient-centred and technology-enabled care in a variety of settings. [19]

A summary of key predicted areas of change is provided below:

1. Different training	Training in expanded settings, possibly with broader and shorter training with further sub-specialisation through modularised units targeted to health needs.
2. Different doctors	Change in mix, type and number of specialists, this might include the return of broader specialties. Doctors will have careers of continuous learning.
3. Different care	Care will be team-based, data-informed, technology-transformed, patient-engaged and delivered in expanded settings. Less hospital care and stronger primary/community-based care.
4. Different information and technology	Changes in diagnostics, therapeutics and medical practice due to advances in technology and information. Including the use of precision medicine, artificial intelligence and big data.
5. Different focus	More holistic views of health and disease. Including systems medicine and biopsychosocial models. Shift from a focus on cure to prevention and function.
6. Different accountability	New methods for evaluating the value and outcomes of training and care. Better systems for measuring and tracking outcomes to inform how and what is taught and practised.
7. Different patients	Patients with more autonomy and different expectations with an increased role and responsibility for care.

It is noted that there are likely to be varying perspectives within countries about the extent to which change is necessary, and to which change will occur. It is also important to recognise that the current landscapes and challenges are also different in each country so the level of change required will also vary. This section provides a summary of perspectives on what is needed, or predicted to happen. In addition to this, despite the predicted changes, change can take a long time in medicine for a variety of reasons, including the complexity of governance (with varying roles and responsibilities) and the length of time to train doctors. An interesting reflection in one of the stakeholder interviews was provided in response to the question 'what will the specialty landscape look like in the next 20 years', they replied 'what will they look like?...they are already in the system'. [24]

The system is rapidly changing, whatever the specialty landscape looks like in the future it will need to be more proactive, flexible and adaptive to change. It is not necessarily possible to fully predict or understand how the medical landscape will change but there is 'a need for collaboration and some shared vision between, community, education providers, medical profession, health service delivery, population health experts, government.' [2] Better collaboration is needed now more than ever to ensure that the specialty landscape in the next 20 years will meet the healthcare needs of the community in an effective and sustainable manner.

Section 3: Generalism – part of the solution to future challenges?

'The good physician treats the disease; the great physician treats the patient who has the disease' [Sir William Osler 1849-1919]

Contents

3.1   Introduction

The aim of this section of the report is to explore generalism as part of the solution to some of the current and predicted challenges in health care, such as changing health needs and system inefficiencies. It considers current discourses about generalism across the seven countries, including definitions, drivers, barriers and possible mechanisms of influence.

Section 1 of this report described challenges currently experienced across different countries that are relevant to generalism including changing population health requirements, a lack of alignment to community need, issues with access to care, concerns about the sustainability of the system, a lack of coordination, a loss of a holistic focus and increasing fragmentation of care. The medical workforce has become increasingly specialised and a number of health reports and stakeholder discussions reflect that in the current and changing context, this continued increasing specialisation of the workforce will be unsustainable [9, 10, 16, 29, 73, 102].

To understand the relevance of generalism in the current day, it is important to understand the different healthcare contexts, including challenges experienced and desired outcomes in each country. For example the differences in the strength, distribution and integration of the

primary care services, including the number of general practitioners in the system and their role. [9, 10, 16, 29, 73, 102]

3.2 What is generalism?

Generalism is not a new phenomenon. Discussions about the importance of generalism in medicine have been ongoing and date back as far as the late 19th century. [103] The intensity and nature of these discussions has ranged over time and included the role of general practitioner and the value of a generalist approach to care. Of note, the work done by Ian McWhinney in 1989 is considered of particular importance in developing the role of the general practitioner in modern medicine. [104]

There are a range of definitions used in discussions about medical generalism, from a philosophy of care, to a way of practising to a type of practitioner that has a defined broad scope of practice [10]. Discussions are often confused by use of the same term for different purposes.

To enable a clearer distinction between concepts, this report will refer to generalist principles (approaches to care), medical generalists (doctors with a generalist scope) and general practitioners (doctors that currently provide primary care services).

For the purpose of this report the following definitions are used:

1. **Generalist principles:**
- Patient-centred care
- Continuity of care
- Collaboration within larger healthcare teams
- Breadth of knowlegde and practice
- Coordination of care
- Patient advocacy
- Responsive to community need

(Adapted from Royal College of Physicians and Surgeons [10] and Atmore 2015 [16])

2. **Medical generalists:** 'A doctor that practises generalism within their specialty, such as a general physician or general surgeon, or as a generalist with a broad set of skills and expertise who provides care across specialty boundaries. The medical generalist delivers care for undifferentiated illness and works across inter-professional boundaries, is patient-centred; has expertise in whole-person medicine; and is not settings bound.' (Adapted from Atmore 2015[16]).

3. **General practitioner:** A distinct specialty. A specialist trained to work in the front line of a healthcare system and to take the initial steps to provide care for any health problem(s) that patients may have. The general practitioner takes care of individuals in a society, irrespective of the patient's type of disease or other personal and social characteristics, and organises the resources available in the healthcare system to the best advantage of the patients.' ..(Adapted from Olesen 2000 [14])

These concepts of generalism are interrelated, but not the same, and have different relevance and meaning in different healthcare settings (primary care or secondary care), including the challenges faced and the barriers and mechanisms for change. It is noted that a general practitioner is a type of medical generalist, that specialists can be medical generalists and that subspecialists can still practise with generalist principles.

Importantly generalism means different things to different people in different contexts and it is most important to determine the problem before the solution.

3.3   What is specialisation?

To understand the balance between specialisation and generalism it is important to also consider the drivers for specialisation.

In every country explored, there has been an increasing trend toward specialistion and subspecialisation of the medical workforce [9, 10, 16, 29, 73, 102]. The number of recognised subspecialties ranges from 23 to 124, and in some countries the concept of a general surgeon or physician no longer exists. Information about medical specialties in each country is provided in section 1.3.1 of the report.

Specialisation is defined as the 'adoption of an increasing level of expertise in a specific disciplinary area that is adopted by a select group of the profession and legitimised through the use of a specific title, membership to a closed subgroup of the profession, and generally involves specific training. Medical specialisation is highly structured with limited entry through select criteria, specific training and recognition of the specialty through membership of society.' [105]

There are multiple drivers for specialisation of the medical workforce, including those within and without the profession.[16] It is helpful to consider the development of the medical profession in this respect. Medicine exists in a dynamic and technologically rich environment with complex division of labour. New technologies and knowledge have enabled areas of specialised expertise to develop, this has enabled new niche markets and mechanisms for funding. This is not a phenomenon unique to medicine but similar in many industries. [106] In fact, in biology, specialisation underlies major patterns in the development and persistence of biological diversity. Miller et al 2005 states 'the classic solution to the puzzle of what allows co-existence of competitors has been that specialization on different resources reduces the strength of competition'.[107] In a very basic sense, division of resources reduces competition and creates market security, strength and autonomy. [16, 105, 106]

Specialisation has been traditionally associated with more professional autonomy, better financial reward, social prestige and increased professional security. [10, 16, 20, 28, 42, 43] It has also been suggested that the public and regulatory authorities have had a role in narrowing scopes of practice to ensure standards of care for patients.[16]

'The division of labour has been a central preoccupation since the earliest days of sociology.' [Allen.D 2015]...

It is important to acknowledge that there is general agreement that specialists and subspecialists are, and will remain, a fundamental part of the future health workforce. Indeed, evidence suggests better patient outcomes for certain medical procedures. [10, 16] However, in the face of the changing healthcare needs of populations, the demand for certain specialists will change and/or decrease and there is a need for care that is better integrated and training pathways that are more flexible and cohesive. As noted earlier in the report, some stakeholder discussions predicted that despite the continued importance of specialists, in the future the total number of specialists will reduce, and the types of specialists will be different.

3.4   Drivers: a solution to current problems?

As noted in section 1, the countries investigated in this report are facing some similar challenges across healthcare systems including changes in population health, concerns about the sustainability of the healthcare system, issues of access and shifting focuses on health from cure to prevention and function.

The following section provides a summary of information proposing why generalist principles (including breadth of knowledge, patient-centred care and coordination of care) and/or more medical generalists (including general practitioners) could be approaches to address some of the current and future issues faced by healthcare systems worldwide. Simply put, it seems there are two separate but related issues in this discussion that relate to problems solved by generalist doctors and/or problems solved by generalist approaches in systems. It is acknowledged that the roles of other health professionals is critically important in this area, but not the focus of this report. It should be noted that there are a number of assumptions made in linking the current challenges and the reasons why a medical generalist or generalist principles are potential solutions to these challenges.

The focus of this report is generalism in medicine but it is acknowledged that a whole of system and interdisciplinary discussion is of critical importance in this area.

Medical generalist (including general practitioners)

Areas of challenge		Medical generalist as solution
Sustainability	There are concerns the current models of healthcare delivery will be unsustainable into the future. As an example, adequately staffing hospitals becomes	Medical generalists (including physicians and surgeons) with broader capability and skill mixes to manage complex, undifferentiated

	increasingly difficult with increasing specialisation.	presentations in hospital and community settings.
Population health	The changing profiles of disease with chronic diseases and longer term care required across developed countries are raising concerns that there will not be sufficient resources to manage the number of patients inside and outside hospital settings.	Strengthening of primary care with more general practitioners, and or more medical generalist, or different doctors and healthcare professionals.
Equity of access	Some countries are facing problems with distribution of workforce, including shortages of doctors in certain areas. The highly specialised hospital centre is not an effective solution in all cases. Primary care access is also an issue in some countries.	More health professionals with broader and more general skills required to provide the care in underserved communities.

References: [10, 26, 29] [85] [9, 10, 16, 29, 73, 102].

Generalist principles

Areas of challenge		Generalist principles as solution
Changing focus	Health care is shifting from a focus on curing acute diseases to long term management of chronic diseases and prevention strategies.	Holistic approaches to consider the patient in their biopyschosocial context required to understand and effectively engage in preventative and function-based care.
Fragmentation	Fragmentation of care and lack of continuity has been discussed as a significant issue for patient outcomes in a number of countries.	Need for team-based and patient-centric coordination and continuity of care between primary and secondary care services.
Inflexible workforce	Need for adaptive and flexible workforce. The current training of specialists is considered to be very structured and rigid.	The future health workforce will need to be more adaptive and flexible. For example if training is broad in its beginning then specialised based on community need this would enable easier trainsition between programs.

References: [9, 17, 25, 26, 52, 108, 109]

3.5 Barriers: to medical generalism

The medical generalists and generalist principles are undoubtedly important in the practice of medicine and the concepts make sense, particularly in the context of current and predicted issues with the health workforce. However, it is acknowledged that there are a number of challenges and practical considerations that need to be considered regarding 'increasing generalism'. It is also important to determine if generalist principles (e.g. better coordination of care or patient-centred care) and/or a type of medical generalist (including general practitioners) are required.

Despite the relevance and prevalence of the discussions about the importance of medical generalism and logical arguments made in its favour, it can be difficult to find research to support policy making decisions and practical implementable solutions. This is an area that requires in context and a whole of system investigation.

> *'The public wants miracles done by health care but they also want a system where everyone gets what they need. Solidarity is required, but it is also a contradiction'* [Professor Fedde Scheele]

The following section describes barriers to medical generalism raised by stakeholders or in reports. In this case the barriers are related to making changes to specialty training, to interest in generalist training and to models of service delivery.

Barriers		Countries
The profession	In stakeholder discussions this was considered the key barrier to creating a more generalist medical workforce. Linked to a number of issues including competition for resources and market security.	All
Governance	Multiple stakeholders with competing interests across the healthcare systems and in many cases, a profession-driven approach to training doctors. General practice is often accredited or coordinated differently leading to a separation of general practice from other specialties.	All
Status	Perception of generalism by the profession and the community as a lesser profession. Less prestige and autonomy associated with generalism. Training in some countries is less extensive.	All
Expanding knowledge	In the current context of expanding medical knowledge, interventions and technology the concept of a medical generalist is challenged by the fact it is difficult to know enough about everything.	All

Financial incentives	Some countries have significantly lesser salaries for general practitioners/medical generalists.	All
Regulation	Regulation of the medical profession has led to increasingly defined scopes of practice for each specialty. From a quality and safety perspective this is important but also creates a potential barrier to broader and more flexible practice.	All
Career expectations	Currently medical practitioners expect to have a choice in their future specialties, not for this to be determined by community need.	All
System pressures	Current systems are highly pressured with time and volume demands that are not compatible with a patient-centred approach to care.	All
Training	Training is delivered through linked but independent silos that are often centred around organ/disease systems.	All
Care delivery	Healthcare models, particularly secondary care, is currently based on a specialised workforce.	All
Research and implementation	Difficult to find evidence and examples of how these concepts can be implemented in practice, and a practical and realistic description of the change required.	All

References: [9, 17, 20-22, 24-26, 39, 42, 43, 52, 108, 109]

3.6   Mechanisms: to increase generalism

The following section provides a summary of mechanisms that have been discussed, or implemented to drive a change in the value of generalist principles and/or to increase medical generalists. It demonstrates that there are many possible ways that change can be made across systems. However, this is not an analysis of the effectiveness of these mechanisms for making change.

As noted in section 3.3, generalism is issue that has been considered for many years and different countries have responded by making changes in different ways over this time (for example strengthening primary care). Given the breadth of the topic and the complexity (in roles and responsibilities) of the system, the issues of generalism and the mechanisms to address them will not be the same in each country. Countries that have done work recently on generalism include Canada and the United Kingdom.

The Future Medical Education in Canada Project (2010-2012) conducted a review of postgraduate medical education. Valuing generalism was identified as an area of focus. The

Postgraduate Medical Education Collaborative Governance Council (governance council comprising key stakeholders in the postgraduate space) was established in response to recommendations from the FMEC project to create collaborative governance systems for postgraduate education. The PGME Collaborative Governance Council established a Generalism Working Party in 2016 which has done a lot of work in considering how generalism should be reflected in postgraduate medical education as it relates to the needs of healthcare systems. A final report is yet to be released. [10, 110]

The United Kingdom Shape of Training Report 2013 called for more generalists. The UK Shape of Training Steering Group did significant work to interpret what 'generalism' meant in the UK context including workshops with a range of stakeholders to determine the practical implications. The report states 'The challenge for the UKSTSG was to identify areas where patients would benefit from specialisation without diluting the proposal that most doctors in the future must retain sufficient breadth of practice to provide unscheduled care.' Based on this work the UKSTG developed broad principles for implementation. This work formed part of the changes to training discussed in section 2.1. [6, 9]

Whole system

Lever	Mechanism	Concept
Governance	To increase the number of generalists or the types of specialties effectively through a change to the way doctors are trained (e.g. more generalist training) or the way health care is delivered, requires a whole of system commitment and approach.	Generalist principles and doctors
Value	This is considered a key barrier to increasing the number of medical generalists in the workforce. Valuing generalists or generalist principles requires a system approach, including funding.	Generalist principles and doctors
Incentives	Increasing the incentives for medical generalist practice is discussed as one potential lever.	Generalist doctors

References: [20, 28, 42, 104]

National level/Government

Lever	Mechanism	Concept
Workforce planning	There is a need for more systematic, effective and collaborative workforce planning that considers the community health needs and works across the training pipeline. Some countries, such as the Netherlands, have stronger approaches than others to manage the numbers in different training pathways.	Generalist doctors

Funding	What is funded will be delivered.	Generalist doctors

References: [20, 39, 42, 43]

Regulation and accreditation

Lever	Mechanism	Concept
Regulation	Consideration of the breadth of the defined scopes of practice.	Generalist doctors
New medical specialties	In some countries such as Australia, the UK and the Netherlands the process for recognition of new medical specialties is highly regulated and in recent years development of new specialties has been discouraged.	Generalist doctors
Accreditation	Accreditation can influence through standards and processes. For example through accreditation standards setting the requirements for education providers/programs. Different accrediting authorities have varying levels of influence depending on their scope. Those with influence over curriculum can directly drive change.	Generalist doctors and principles
Continuing professional development	Continuing professional development requirements could be used to require maintenance of a broader scope of practice or to upskill the workforce in different ways. A number of countries are in the process of strengthening the CPD requirements in recognition that current systems are not very strong in influencing practice.	Generalist doctors and principles

References: [16, 58, 104]

Training programs/providers

Lever	Mechanism	Concept
Education and training	The curriculum and structure of training programs to make change such as more broad training or focus on generalist principles. This is dependent on the levers for national change, some counties have a stronger central influence over the curriculum delivered in postgraduate training.	Generalist principles and doctors
Dual training, multiple	Consideration of joint training programs between specialties or combinations of skills to address workforce needs. In rural Australia and rural Canada, comprehensive primary care	Generalist principles

skills or expanded scope	encompasses hospital, emergency and population health care, with expanded scopes of services in anaesthetics, obstetrics and surgery.	
Different practitioners	Change the specialty types or create a different type of medical generalist. Scotland is developing generalist doctors in hospitals.	Generalist doctors
Role models	In order to change the value of generalist practice in the system, role models are required in all phases of education and care delivery.	Generalist doctors and principles
Broad based exposure	In Australia and the UK the intern year is intended to provide broad-based exposure prior to specialisation. Currently consideration of community settings to be included in these experiences.	Generalist doctors and principles
Expanded settings	In some countries there has been consideration of expanded settings in undergraduate and postgraduate training. In Australia for example there has been increased exposure to general/community practice.	Generalist principles

References: [10, 16, 22, 39, 42, 104]

Health service/ employers

Lever	Mechanism	Concept
Healthcare models	Health service delivery models have been changing over time to encompass more community-based care and to better network and integrate care. For example care networks have been developed in Australia and Canada.	Generalist principles
Positions	To increase the medical generalist workforce changes are required to create roles and reward broader scopes of practice and to incorporate generalists in patient care teams.	Generalist doctors
Role models	Agreement that in order to change the value of generalist practice in the system, role models are required in all phases of education and care delivery.	Generalist doctors and principles

References: [10, 16, 20, 22, 39, 42, 104]

3.7   Conclusion

This section explores generalism as part of the solution to some current and predicted challenges in health care, such as changing health needs, issues of access and system inefficiencies. It considers current discourses about generalism across the seven countries, including definitions, drivers, barriers and possible mechanisms of influence.

It is important to note that the aim of this section is not to argue for or against generalism, rather to summarise why and how generalism is being considered across the seven countries. Perhaps the most important point is that this is a complex topic that requires whole of system thinking to identify challenges and solutions, in context.

Defining generalism is important because it is a broad topic with a range of meanings and discussions can be confused by use of the same term for different purposes. [10, 16] To enable a clearer distinction between concepts, this report refers to generalist principles (approaches to care), medical generalists (doctors with a generalist scope) and general practitioners (doctors that currently provide primary care services).

In addition to understanding the concept of generalism, it is important to consider why the workforce is specialising and to acknowledge that for many reasons, this has been necessary and has improved health outcomes [9, 10, 16, 29, 73, 102]. It is also not helpful to consider generalism and specialisation as two separate and opposing forces but to recognise they are both essential and interdependent elements of the healthcare system that exist on a spectrum, and that discussions about future healthcare systems should focus on the balance and cohesion between them where possible. However, in the face of changing healthcare environments a number of stakeholder discussions and health policy reports predict that continued increasing specialisation of the workforce will be unsustainable [9, 10, 16, 29, 73, 102].

Drivers for generalism (both approaches to care and generalist doctors) as solutions to current and future challenges are explored. As described in section 1, there are challenges across the seven countries that include issues with access to care, changing diseases, concerns about the sustainability of the system and fragmentation of care. We know there are increasing numbers of elderly patients who will require longer term and primary care which will put pressure on our current systems. We know that given the importance of social determinants on health, we need practitioners to consider the whole context of patients. We know we need better coordination and integration of care. We know we have underserved communities with access issues that cannot be solved with the current super-specialised models of care. We also know we need more flexibility in the current workforce to be responsive and adaptive to changing health needs. A summary of how the values of generalism could be considered to address current challenges is provided below.

Generalism	Current challenge	Why generalism could be considered a solution
Medical generalist	Sustainability Access	More general practitioners and strengthened primary and community-based care
	Population health Access Inflexible workforce	More broadly skilled practitioners to enable better coverage of services and distribution of care

Generalist principle	Access	Models of care better suited to underserved communities
	Population health Access	Broader skill mixes to manage complex and undifferentiated patients
	Fragmentation	Better integration of care within and between services
	Population health Changing focus	Care that is focused on the whole patient in their context
	Population health Changing focus	Care focused on prevention and function rather than cure
	Fragmentation	Coordination of care within a complex and fragmented system

Barriers to changing the current system to increase generalism are explored. Depending on the nature of change envisaged, the challenges are significant and unavoidable without better understanding and collaboration across the system. In particular: issues of the profession and resistance to change; the fact that specialisation reduces competition and in many instances improves health outcomes; and that traditional models of education, funding and care delivery support the specialised systems [9, 17, 20-22, 24-26, 39, 42, 43, 52, 108, 109].

The report then considers possible mechanisms to create change. Change might be in the way all medical practitioners are educated to embody generalist principles, to create fewer and broader specialties, more and/or differently educated general practitioners, a new specialty role for a doctor or health professional focused on delivering the elements of care inherent to generalism, or a combination of some or all of these approaches. Of the mechanisms presented, it is considered that some of the most important influencers for change are collaborative governance and system-level commitment and leadership, funding and increased value placed on generalism. [10, 16, 20, 22, 39, 42, 104]

One of the aims of this report was to determine if the discussion about generalism and specialisation is relevant in each country and the outcomes of this. The information gathered suggests yes, the discussions are relevant and increasingly so in the changing context of health with fragmented systems and changing population health needs. However, as the report describes, generalism is a broad and context-specific topic, particularly given the differences in the current specialty landscapes (in numbers, mix and distribution), different training pathways and governance structures. Generalism is also a topic that has been considered for many years and a number of countries have made a number of changes, in a number of ways, over a number of years which is difficult to quantify. As noted in the report, the United Kingdom and Canada have done some specific work in this area recently.

To understand the relevance of generalism in the current day, it is important to understand the different healthcare contexts, including challenges experienced and desired outcomes in each country. For example the differences in the strength, distribution and integration of the primary care services, including the number of general practitioners in the system and their role. [9, 10, 16, 26, 85, 105]

Overall, considering the information gathered, a number of discussions about generalism at a system level appear to link to issues with access and responsiveness of the system. This is relevant beyond the current and predicted challenges of burdens of disease and healthcare system pressures. While the next predicted phase of disease is from acute to chronic, this might change again, and a highly subspecialist workforce with little to no cohesive links between their training and practice overall is not sustainable in this changing context. So the issue is also about creating a more cohesive and responsive medical workforce to solve problems of access and responsiveness.

Report conclusion

> *'[Those responsible for medical education and service delivery have] the obligation to direct their education, research and service activities towards addressing the priority health concerns of the community, region, and/or nation they have a mandate to serve. The priority health concerns are to be identified jointly by governments, healthcare organizations, health professionals and the public.'* [WHO 1995 – adapted]

Health landscapes are rapidly changing, and in this changing context, concerns exist about whether the current systems for educating medical professions and healthcare delivery will meet future healthcare needs. Furthermore, discussions are arising about the accountability of governments, education providers, healthcare providers, professionals and the public to predict, lead and adapt to these new health landscapes.

The aim of this report is to understand the changing landscapes in Australia, Canada, Germany, Japan, the Netherlands, the United Kingdom, and the United States and furthermore, to consider the relevance and outcomes of discussions about generalism and specialisation in these countries. To address these objectives the report presents information that aims to describe the current context, drivers for change, the possibilities for the future and to explore generalism as part of the solution to future challenges.

Section 1		The **current landscapes** of medical specialties: including priorities and challenges

The report provides the context of the current specialty landscapes in each of the seven countries including governance, accreditation, regulation and education and training models. This shows some important differences including the number of organisations involved with varying responsibilities, different approaches to workforce planning, and the relative autonomy of those involved to set a national direction for specialty training and care delivery. In particular the differing systems will influence the need for change, and the appetite and ability of the system to proactively and cohesively respond to the changing healthcare context.

It is likely that the current priorities and challenges of the specialty landscape will focus the future solutions. The report identifies 11 key findings regarding current priorities and challenges identified in national reviews of medical workforce, healthcare delivery and training that are considered likely to influence the future landscape:

1. Governance	Fragmented systems of governance and a lack of leadership

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2. Health of populations	Changes in population health
3. Accountability	Changes in community expectation and shifts in measures for evaluating care
4. Sustainability	Concerns about the cost and sustainability of health care
5. Technology and information	Rapid advances in technology and the availability of data
6. Medical workforce	Imbalances in mix, numbers and distribution of workforce
7. Access	Disparity of outcomes and inequity of access
8. Patients	Changes in roles and expectations of patients
9. Healthcare models	Changes occurring in the way health care is viewed and delivered
10. Medical education and training	Changes in training environments, developments in curriculum and assessment, flexibility of training and transition points
11. Professional practice and identity	Focus on professionalism, wellbeing and professional identity of medical practitioners

The relevance of these issues to each country is indicated in the report, however it should be noted that there is variation in the extent and nature of the problems in each country.

The responses to these priorities and challenges have the ability to significantly change the way health care is delivered and received. To address these concerns the future medical specialty landscape will need to be accountable, proactive and responsive to community need with stronger, more collaborative governance and with better integrated models of training and care. Models for determining workforce, delivery and training need to be far more focused on the healthcare requirements and the best way to deliver those in a strategic and systematic manner.

Section 2		The **future landscapes** of medical specialties

The doctor of the future will look different and work in a different environment. How to predict, lead and be responsive to these changes is a constant challenge for those responsible for workforce planning, healthcare delivery and training. [9, 15, 17, 19]

Practically speaking, the biggest drivers of change are likely to be linked to the cost and sustainability of the current models, demand driven by population health requirements and advances in technology and data.

The report provides some examples of possibilities for the future landscape of medical specialties, as described by interviewed stakeholders and identified in future health workforce studies. Some of the areas of predicted change are provided below.

1. Different training	Training in expanded settings, possibly broader and shorter training with further subspecialisation through modularised units targeted to health needs.
2. Different doctors	Change in mix, type and number of specialists, this might include the return of broader specialties. Doctors will have careers of continuous learning.
3. Different care	Care will be team-based, data-informed, technology-transformed, patient-engaged and delivered in expanded settings. Less hospital care and stronger primary/community-based care.
4. Different information and technology	Changes in diagnostics, therapeutics and medical practice due to advances in technology and information. Including the use of precision medicine, artificial intelligence and big data.
5. Different focus	More holistic views of health and disease. Including systems medicine and biopsychosocial models. Shift from a focus on cure to prevention and function.
6. Different accountability	New methods for evaluating the value and outcomes of training and care. Better systems for measuring and tracking outcomes to inform how and what is taught and practised.
7. Different patients	Patients with more autonomy and different expectations with an increased role and responsibility for care.

It is noted that there are likely to be varying perspectives within countries about the extent to which change is necessary, and to which change will occur. It is also important to recognise that the current landscapes and challenges are also different in each country so the level of change required will also vary. This section provides a summary of perspectives on what is needed, or predicted to happen. Where a change is specifically planned or being implemented by a country, this is noted. The United Kingdom and Canada have done significant work in evaluating future healthcare needs and specifically how specialist training and service delivery will meet those needs. [9, 23]

It is not necessarily possible to fully predict or understand how the specialty landscapes will change but the information gathered suggests the future landscapes will better integrate services, operate with team-based systems, be informed by data, be enabled by technology, be influenced by different outcome measures and be increasingly delivered in community settings.

.Section 3		Generalism – a part of the **solution to future challenges**?

The report explores generalism as part of the solution to some current and predicted challenges in health care, such as changing health needs, issues of access and system inefficiencies. It considers current discourses about generalism across the seven countries, including definitions, drivers, barriers and possible mechanisms of influence.

Defining generalism is important because it is a broad topic with a range of meanings and discussions can be confused by use of the same term for different purposes. [10, 16] To enable a clearer distinction between concepts, this report refers to generalist principles (approaches to care), medical generalists (doctors with a generalist scope) and general practitioners (doctors that currently provide primary care services).

Drivers for generalism (both approaches to care and generalist doctors) as solutions to current and future challenges are explored. As described in section 1, there are challenges across the seven countries that include issues with access to care, changing diseases, concerns about the sustainability of the system and fragmentation of care. A summary of how the values of generalism could be considered to address current challenges is provided below. [9, 17, 25, 26, 52, 108, 109]

Generalism	Current challenge	Why generalism could be considered a solution
Medical generalist	Sustainability Access	More general practitioners and strengthened primary and community-based care
	Population health Access Inflexible workforce	More broadly skilled practitioners to enable better coverage of services and distribution of care
Generalist principle	Access	Models of care better suited to underserved communities
	Population health Access	Broader skill mixes to manage complex and undifferentiated patients
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	Population health Changing focus	Care that is focused on the whole patient in their context
	Population health Changing focus	Care focused on prevention and function rather than cure
	Fragmentation	Coordination of care within a complex and fragmented system

Barriers to changing the current system to increase generalism depend on the nature of change envisaged, however the challenges are not insignificant and are unavoidable without better understanding and collaboration across the system. In particular: issues of the profession and resistance to change, the fact that specialisation reduces competition and in many instances improves health outcomes, and that traditional models of education, funding and care delivery support the specialised systems. [9, 17, 20-22, 24-26, 39, 42, 43, 52, 108, 109].

In addition to understanding the concept of generalism, it is important to consider why the workforce is specialising and to acknowledge that for many reasons, this has been necessary

and has improved health outcomes. It is also not helpful to consider generalism and specialisation as two separate and opposing forces but to recognise they are both essential and interdependent elements of the healthcare system that exist on a spectrum, and that discussions about future healthcare systems should focus on the balance and cohesion between them where possible. However, in the face of changing healthcare environments a number of stakeholder discussions and health policy reports predict that continued increasing specialisation of the workforce will be unsustainable. [9, 10, 16, 29, 73, 102].

Of the mechanisms presented to increase generalism, it is considered that some of the most important influencers for change are collaborative governance and system level commitment and leadership, funding and increased value placed on generalism.

One of the aims of this report was to determine if the discussion about generalism and specialisation is relevant in each country and the outcomes of this. The information gathered suggests yes, the discussions are relevant and increasingly so in the changing context of health with fragmented systems and changing population health needs. However, as the report describes, generalism is a broad and context-specific topic, particularly given the differences in the current specialty landscapes (in numbers, mix and distribution), different training pathways and governance structures. Generalism is also a topic that has been considered for many years and a number of countries have made a number of changes, in a number of ways, over a number of years and this is difficult to quantify.

To understand the relevance of generalism in the current day, it is important to understand the different healthcare contexts, including challenges experienced and desired outcomes in each country. For example the differences in the strength, distribution and integration of the primary care services, including the number of general practitioners in the system and their role. [9, 10, 16, 29]

Overall, considering the information gathered, a number of discussions about generalism at a system level appear to link to issues with access and responsiveness of the system. This is relevant beyond the current and predicted challenges of burdens of disease and healthcare system pressures. While the next predicted phase of disease is from acute to chronic, this might change again, and a highly subspecialist workforce with little to no cohesive links between their training and practice overall is not sustainable in this changing context. So the issue is also about creating a more cohesive and responsive medical workforce to solve problems of access and responsiveness.

Access	Broader capability and skill mixes to manage complex, undifferentiated presentations in hospital and community settings
Responsiveness	Models for training practitioners and delivering care need to be far more flexible and responsive to predict and adapt to changing healthcare needs. For example a broader approach to training with modularised upskilling in line with patient need or better cohesion between specialties including transfer between pathways and relevant upskilling

There is a need for national level agreement and response to what the community needs and a commitment to meet that need. What that change looks like and how it is 'branded' requires further research in the context of the challenges and system requirements of each country.

The values inherent to generalism are considered important in the current and future healthcare settings but how this is achieved is likely to be different.

It is clear that the world is facing a changing health context and medicine needs to adapt. Ultimately it has to be about achieving safe, effective and efficient care that enables access to all and is responsive and aligned to community needs.

Overall, the information indicates that to address current priorities and challenges with respect to the accountability, responsiveness and sustainability of medicine, the future medical specialty landscape will need to be more proactive to community need, with more collaborative governance, better integration of training and care delivery and a more holistic focus. [7] Change has to be practical and implementable, but should also not necessarily be constricted by the current models of education and care. Innovative, socially accountable and practical thinking is required. Better collaboration is needed now more than ever to ensure that the specialty landscape in the next 20 years will meet the healthcare needs of the community in an effective and sustainable manner.

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Attachment 1 – Lists of specialties and subspecialties across countries

Contents

1. Australia
2. Canada (Royal College of Physicians and Surgeons of Canada – Collège des Médecins du Québec not included)
3. Germany
4. Japan
5. The Netherlands
6. The United Kingdom
7. The United States:
   a. US Osteopathic Board
   b. American Board of Medical Specialties

Medical Board of Australia – Specialty and Subspecialty Certificates	
General Certificates (23)	**Subspecialty Certificates (64)**
• Addiction Medicine	No subspecialties
• Anaesthesia	No subspecialties
• Dermatology	No subspecialties
• Emergency Medicine	• Paediatric Emergency Medicine
• General Practice	No subspecialties
• Intensive Care Medicine	• Paediatric Intensive Care Medicine
• Medical Administration	No subspecialties
• Obstetrics and Gynaecology	• Gynaecological oncology • Maternal–fetal medicine • Obstetrics and gynaecological ultrasound • Reproductive endocrinology and infertility • Urogynaecology
• Occupational and Environmental Medicine	No subspecialties
• Ophthalmology	No subspecialties
• Paediatrics and Child Health	• Clinical Genetics • Community Child Health • General Paediatrics • Neonatal and Perinatal Medicine • Paediatric Cardiology • Paediatric Clinical Pharmacology • Paediatric Emergency Medicine • Paediatric Endocrinology • Paediatric Gastroenterology and Hepatology • Paediatric Haematology • Paediatric Immunology and Allergy • Paediatric Infectious Diseases • Paediatric Intensive Care Medicine • Paediatric Medical Oncology • Paediatric Nephrology • Paediatric Neurology • Paediatric Nuclear Medicine • Paediatric Palliative Medicine • Paediatric Rehabilitation Medicine • Paediatric Respiratory and Sleep Medicine • Paediatric Rheumatology
• Pain Medicine	No subspecialties
• Palliative Medicine	No subspecialties
• Pathology	• General Pathology • Anatomical Pathology (including Cytopathology • Chemical Pathology • Haematology • Immunology • Microbiology • Forensic Pathology
• Physician	• Cardiology • Clinical Genetics • Clinical Pharmacology • Endocrinology • Gastroenterology and Hepatology

	• General Medicine • Geriatric Medicine • Haematology • Immunology and Allergy • Infectious Diseases • Medical Oncology • Nephrology • Neurology • Nuclear Medicine • Respiratory and Sleep Medicine • Rheumatology
• Psychiatry	No subspecialties
• Public Health Medicine	No subspecialties
• Radiation Oncology	No subspecialties
• Radiology	• Diagnostic Radiology • Diagnostic Ultrasound • Nuclear Medicine
• Rehabilitation Medicine	No subspecialties
• Sexual Health Medicine	No subspecialties
• Sport and Exercise Medicine	No subspecialties
• Surgery	• Cardio-Thoracic Surgery • General Surgery • Neurosurgery • Orthopaedic Surgery • Otolaryngology – Head and Neck Surgery • Oral and Maxillofacial Surgery • Paediatric Surgery • Plastic Surgery • Urology • Vascular Surgery

Source: Medical Board of Australia: https://www.medicalboard.gov.au/registration/types/specialist-registration/medical-specialties-and%20specialty-fields.aspx

Royal College of Physicians and Surgeons of Canada – Specialty and Subspecialty Certificates	
Primary Specialties (28)	**Subspecialty (37)**
• Anatomical Pathology	• Forensic Pathology
• Anesthesiology	• Clinical Pharmacology and Toxicology • Critical Care Medicine • Pain Medicine
• Cardiac Surgery	• Critical Care Medicine
• Dermatology	No subspecialties
• Diagnostic Radiology	• Interventional Radiology • Neuroradiology • Pediatric Radiology
• Emergency Medicine	• Clinical Pharmacology and Toxicology • Critical Care Medicine • Pediatric Emergency Medicine
• General Pathology	• Forensic Pathology
• General Surgery	• Colorectal Surgery • Critical Care Medicine • General Surgical Oncology • Pediatric Surgery • Thoracic Surgery
• Hematological Pathology	No subspecialties
• Internal Medicine	• Cardiology • Clinical Immunology and Allergy • Clinical Pharmacology and Toxicology • Critical Care Medicine • Endocrinology and Metabolism • Gastronenterology • General Internal Medicine • Geriatric Medicine • Hematology • Infectious Diseases • Medical Biochemistry • Medical Oncology • Nephrology • Occupational Medicine • Respirology • Rheumatology
• Medical Genetics and Genomics	No subspecialties
• Medical Microbiology	No subspecialties
• Neurology (Adult or pediatrics)	No subspecialties
• Neuropathology	No subspecialties
• Neurosurgery	No subspecialties
• Nuclear Medicine	No subspecialties
• Obstetrics & Gynecology (OBGY)	• Gynecologic Oncology • Gynecologic Reproductive Endocrinology & Infertility • Maternal-Fetal Medicine
• Ophthalmology	No subspecialties
• Orthopedic Surgery	No subspecialties
• Otolaryngology – Head and Neck Surgery	No subspecialties

• Pediatrics	• Adolescent Medicine • Cardiology • Clinical Immunology and Allergy • Clinical Pharmacology and Toxicology • Critical Care Medicine • Developmental Pediatrics • Endocrinology and Metabolism • Gastroenterology • Infectious Diseases • Medical Biochemistry • Neonatal-Perinatal Medicine • Nephrology • Pediatric Emergency Medicine • Pediatric Hematology/Oncology • Respirology • Rheumatology
• Physical Medicine and Rehabilitation	No subspecialties
• Plastic Surgery	No subspecialties
• Psychiatry	• Child and Adolescent Psychiatry • Clinical Pharmacology and Toxicology • Forensic Psychiatry • Geriatric Psychiatry
• Public Health and Preventive Medicine	• Occupational Medicine
• Radiation Oncology	No subspecialties
• Urology	No subspecialties
• Vascular Surgery	No subspecialties

Source: Internal documentation provided by the Royal College of Physicians and Surgeons of Canada: Accredited RCPSC Programs 2018-07-24

German Medical Specialties – Specialty and Subspecialty Certificates	
General Certificates (33)	Subspecialty Certificates (33)
• General Medicine	No subspecialties
• Anaesthesiology	No subspecialties
• Anatomy	No subspecialties
• Occupation Medicine	No subspecialties
• Opthamology	No subspecialties
• Biochemistry	No subspecialties
• Surgery	• General Surgery • Vascular Surgery • Cardiac Surgery • Paediatric Surgery • Orthopaedics and Accident Surgery • Plastic and Aesthetic Surgery • Thoracic Surgery • Visceral Surgery
• Gynaecology and Obstetrics	• Gynaecological Endocrinology and Reproductive Medicine • Gynaecological Oncology • Special Obstetrics and Perinatal Medicine
• Otorhinolaryngology	• Otorhinolaryngology • Speech, Voice and Paediatric Hearing Disorders
• Dermatological and Venereal Diseases	No subspecialties
• Human Genetics	No subspecialties
• Hygiene and Environmental Medicine	No subspecialties
• Internal Medicine	• Internal Medicine • Internal Medicine and Angiology • Internal Medicine and Endocrinology and Diabetology • Internal Medicine and Gastroenterology • Internal Medicine and Haematology and Oncology • Internal Medicine and Cardiology • Internal Medicine and Nephrology • Internal Medicine and Pneumology • Internal Medicine and Rheumatology
• Paediatric and Juvenile Medicine	• Paediatric Haematology and Oncology • Paediatric Cardiology • Neonatology • Neuropaediatrics
• Paediatric and Juvenile Psychiatry and Psychotherapy	No subspecialties
• Laboratory Medicine	No subspecialties
• Microbiology, Virology and Infection Epidemiology	No subspecialties
• Oromaxillofacial Surgery	No subspecialties
• Neurosurgery	No subspecialties
• Neurology	No subspecialties
• Nuclear Medicine	No subspecialties
• Public Health	No subspecialties

• Pathology	• Neuropathology • Pathology
• Pharmacology	• Clinical Pharmacology • Pharmacology and Toxicology
• Physical and Rehabilitative Medicine	No subspecialties
• Physiology	No subspecialties
• Psychiatry and Psychotherapy	• Forensic Psychiatry
• Psychosomatic Medicine and Psychotherapy	No subspecialties
• Radiology	• Paediatric Radiology • Neuroradiology
• Forensic Medicine	No subspecialties
• Radiotherapy	No subspecialties
• Transfusion Medicine	No subspecialties
• Urology	No subspecialties

Source: Internal document provided by stakeholder interviewed Dr A Jaekel from the German Medical Association, (Model) Specialty Training Regulations 2003

Japan Specialties and Subspecialties	
General Certificates (19)	Subspecialty Certificates
• Anesthesiology	
• Dermatology	
• Internal medicine	
• Neurosurgery	
• Obstetrics/gynecology	
• Otolaryngology	
• Surgery	
• Pediatrics	
• Psychiatry	
• Orthopedics	
• Ophthalmology	
• Urology	
• Radiology	
• Emergency medicine	
• Rehabilitation	
• Plastic surgery	
• Pathology	
• Clinical laboratory	
• General practice	

Source: Internal documentation provided by stakeholder interviewed Dr H Onishi http://www.japan-senmon-i.jp/ program/application_flow.html

Netherlands Medical Specialties – Specialty and Subspecialty Certificates	
Specialties (38)	**Subspecialties (26)**
Cluster 1	
• General Practitioner	No subspecialties
• Elderly Care	No subspecialties
• Care for the Disabled	No subspecialties
• Addiction Medicine (Independent Profile)	No subspecialties
• International Healthcare and Tropical Medicine	No subspecialties
Cluster 2	
• Anesthesiology	No subspecialties
• Cardiology	No subspecialties
• Thoracic Surgery	No subspecialties
• Dermatology and Venereology	No subspecialties
• General Surgery	• Surgical Oncology • Gastrointestinal Surgery • Lung Surgery • Vascular Surgery • Trauma Surgery • Pediatric Surgery
• General Medicine	• Acute Medicine • Allergology/Clinical Immunology • Blood Transfusion Medicine • Endocrinology • Hematology • Infectious Diseases • Intensive Care • Clinical Pharmacology • Medical Oncology • Nephrology • Geriatric Medicine • Vascular Medicine
• Otorhinolaryngology	No subspecialties
• Pediatrics	No subspecialties
• Medical Genetics	No subspecialties
• Geriatrics	No subspecialties
• Respiratory Medicine	No subspecialties
• Gastroenterology	No subspecialties
• Microbiology-Bacteriology	No subspecialties
• Neurological Surgery	No subspecialties
• Neurology	No subspecialties
• Nuclear Science	No subspecialties
• Obstetrics and Gynecology	No subspecialties
• Ophthalmology	No subspecialties
• Orthopedics	No subspecialties
• Pathology	No subspecialties
• Plastic Surgery	No subspecialties
• Psychiatry	No subspecialties

• Radiology	No subspecialties
• Radiotherapy	No subspecialties
• Rheumatology	No subspecialties
• Rehabilitation Medicine	No subspecialties
• Sports Medicine	No subspecialties
• Urology	No subspecialties
• Hospital Medicine (Independent Profile)	No subspecialties
• Emergency Medicine (Independent Profile)	No subspecialties
Cluster 3	
• Occupational Medicine – Medicine Related to Work	No subspecialties
• Occupational Medicine – Insurance Medicine	No subspecialties
• Community Medicine	• Policy and Advice • Donor Medicine • Forensic Medicine • Tuberculosis Control • Youth Health Care • Medical Environmental Science • Social Medical Indication and Advice • Infectious Disease Control

Source: Internal document provided by Medical Specialties Council, KNMG

UK Medical Schools Council Specialties – Specialty and Subspecialty Certificates	
General Certificates (16)	**Subspecialty Certificates (51)**
• Anaesthesia	No subspecialties
• Clinical Oncology	No subspecialties
• Clinical Radiology	No subspecialties
• Community Sexual and Reproductive Health	No subspecialties
• Emergency Medicine	No subspecialties
• General Practice (GP)	No subspecialties
• Intensive Care Medicine	No subspecialties
• Medicine	• Acute internal medicine • Allergy • Audiovestibular medicine • Cardiology • Clinical Genetics • Clinical neurophysiology • Clinical pharmacology and therapeutics • Dermatology • Endocrinology and diabetes • Gastroenterology • General internal medicine • Genitourinary medicine • Geriatric medicine • Immunology • Infectious diseases • Medical oncology • Medical ophthalmology • Neurology • Nuclear Medicine • Palliative medicine • Pharmaceutical medicine • Rehabilitation medicine • Renal medicine • Respiratory medicine • Rheumatology • Sport and exercise medicine • Stroke medicine • Tropical medicine
• Obstetrics and gynaecology	No subspecialties
• Occupational medicine	No subspecialties
• Ophthalmology	No subspecialties
• Paediatrics	• Paediatric cardiology • Paediatrics
• Pathology	• Chemical pathology • Haematology • Histopathology • Medical microbiology and virology
• Psychiatry	• Child and adolescent psychiatry • Forensic psychiatry • General psychiatry • Liaison psychiatry

	• Medical psychotherapy
	• Old age psychiatry
	• Psychiatry of intellectual disability
• Public Health	No subspecialties
• Surgery	• Cardiothoracic surgery
	• General surgery
	• Neurosurgery
	• Oral and maxillofacial surgery
	• Otorhinolaryngology (ear, nose and throat surgery)
	• Paediatric surgery
	• Plastic surgery
	• Trauma and orthopaedic surgery
	• Urology
	• Vascular surgery

Source: General Medical Council:https://www.gmc-uk.org/education/standards-guidance-and-curricula/curricula

US Osteopathic Board Certification of Specialties – Specialty and Subspecialty Certificates		
Primary Certification (29)	**Subspecialty Certification (77)**	**Conjoints**
• Anesthesiology	• Critical Care • Pain Management • Pediatric Anesthesiology	
• Dermatology	• Dermatopathology • MOHS Micrographic Surgery • Pediatric Dermatology	
• Emergency Medicine	• Emergency Medical Services • Medical Toxicology	• Hospice and Palliative Medicine • Sports Medicine • Undersea and Hyperbaric Medicine
• Family Medicine/OMT • Family Medicine/OMT with OSC Special Emphasis in Hospital Medicine		• Hospice and Palliative Care Medicine • Pain Medicine • Sleep Medicine • Sports Medicine • Undersea & Hyperbaric Medicine • Correctional Medicine
• Internal Medicine	• Cardiology • Clinical Cardiac Electrophysiology • Critical Care Medicine • Endocrinology • Gastroenterology • Geriatric Medicine • Hematology • Infectious Disease • Interventional Cardiology • Nephrology • Oncology • Pulmonary Disease • Rheumatology	• Addiction Medicine • Pediatric & Adult Allergy & Immunology • Correctional Medicine • Hospice and Palliative Care Medicine • Pain Medicine • Sports Medicine • Sleep Medicine • Undersea and Hyperbaric Medicine
• Neurology • Psychiatry	• Child/Adolescent Neurology • Child/Adolescent Psychiatry • Geriatric Psychiatry • Neurophysiology	• Addiction Medicine • Hospice & Palliative Medicine • Sleep Medicine
• Neuromusculoskeletal Medicine & OMM		
• Nuclear Medicine		
• Obstetrics and Gynecology	• Female Pelvic Med/Reconstructive Surgery • Gynecologic Oncology	

	• Maternal & Fetal Medicine • Reproductive Endocrinology & Infertility	
• Ophthalmology • Otolaryngology/Facial Plastic Surgery	• Otolaryngic Allergy	• Sleep Medicine
• Orthopedic Surgery	• Hand Surgery • Orthopedic Sports Medicine	
• Anatomic Pathology • Laboratory Medicine	• Forensic Pathology	• Dermatopathology
• Pediatrics	• Adolescent Medicine • Neonatology • Pediatric Endocrinology • Pediatric Pulmonology	• Pediatric & Adult Allergy & Immunology • Sports Medicine
• Physical Medicine Rehabilitation		• Hospice and Palliative Medicine • Pain Medicine • Sports Medicine
• Aerospace Medicine • Occupational/Environmental Medicine • Public Health/Community Medicine	• Occupational Medicine	• Undersea and Hyperbaric Medicine • Correctional Medicine
• Proctology		
• Diagnostic Radiology • Radiation Oncology	• Neuroradiology • Pediatric Radiology • Vascular & Interventional Radiology	
• Cardiothoracic Surgery • General Surgery • Neurological Surgery • Plastic & Reconstructive Surgery • Vascular Surgery • Urological Surgery	• Surgical Critical Care	

Source: Americal Osteopathic Association: Osteopathic Board Certification https://certification.osteopathic.org/bureau-of-osteopathic-specialists/

American Board of Medical Specialties – Specialty and Subspecialty Certificates	
General Certificates (40)	**Subspecialty Certificates (129)**
• Allergy and Immunology	No subspecialties
• Anesthesiology	• Critical Care Medicine • Hospice and Palliative Medicine • Neurocritical Care* • Pain Medicine • Pediatric Anesthesiology • Sleep Medicine
• Colon and Rectal Surgery	No subspecialties
• Dermatology	• Dermatopathology • Pediatric Dermatology
• Emergency Medicine	• Anesthesiology Critical Care Medicine • Emergency Medical Services • Hospice and Palliative Medicine • Internal Medicine-Critical Care Medicine • Medical Toxicology • Neurocritical Care* • Pain Medicine • Pediatric Emergency Medicine • Sports Medicine • Undersea and Hyperbaric Medicine
• Family Medicine	• Adolescent Medicine • Geriatric Medicine • Hospice and Palliative Medicine • Pain Medicine • Sleep Medicine • Sports Medicine
• Internal Medicine	• Adolescent Medicine • Adult Congenital Heart Disease • Advanced Heart Failure and Transplant Cardiology • Cardiovascular Disease • Clinical Cardiac Electrophysiology • Critical Care Medicine • Endocrinology, Diabetes and Metabolism • Gastroenterology • Geriatric Medicine • Hematology • Hospice and Palliative Medicine • Infectious Disease • Interventional Cardiology • Medical Oncology • Nephrology • Pulmonary Disease • Rheumatology • Sleep Medicine • Sports Medicine • Transplant Hepatology

Primary Specialty Certificates • Clinical Biochemical Genetics • Clinical Cytogenetics and Genomics • Clinical Genetics and Genomics (MD) • Clinical Molecular Genetics and Genomics • Laboratory Genetics and Genomics	• Medical Biochemical Genetics • Molecular Genetic Pathology
• Neurological Surgery	No subspecialties
• Nuclear Medicine	No subspecialties
• Obstetrics and Gynecology	• Critical Care Medicine • Female Pelvic Medicine and Reconstructive Surgery • Gynecologic Oncology • Hospice and Palliative Medicine • Maternal and Fetal Medicine • Reproductive Endocrinology/Infertility
• Ophthalmology	No subspecialties
• Orthopedic Surgery	• Orthopedic Sports Medicine • Surgery of the Hand
• Otolaryngology	• Neurotology • Complex Pediatric Otolaryngology* • Plastic surgery within the Head and Neck* • Sleep Medicine
Primary Specialty Certificates • Pathology - Anatomic/Pathology - Clinical • Pathology - Anatomic • Pathology - Clinical	• Blood Banking/Transfusion Medicine • Clinical Informatics • Cytopathology • Dermatopathology • Hematopathology • Neuropathology • Pathology - Chemical • Pathology - Forensic • Pathology - Medical Microbiology • Pathology - Molecular Genetic • Pathology - Pediatric
• Pediatrics	• Adolescent Medicine • Child Abuse Pediatrics • Developmental-Behavioral Pediatrics • Hospice and Palliative Medicine • Medical Toxicology • Neonatal-Perinatal Medicine • Pediatric Cardiology • Pediatric Critical Care Medicine • Pediatric Emergency Medicine • Pediatric Endocrinology • Pediatric Gastroenterology • Pediatric Hematology-Oncology • Pediatric Hospital Medicine* • Pediatric Infectious Diseases • Pediatric Nephrology • Pediatric Pulmonology • Pediatric Rheumatology

	- Pediatric Transplant Hepatology - Sleep Medicine - Sports Medicine
Physical Medicine and Rehabilitation	- Brain Injury Medicine - Hospice and Palliative Medicine - Neuromuscular Medicine - Pain Medicine - Pediatric Rehabilitation Medicine - Spinal Cord Injury Medicine - Sports Medicine
Plastic Surgery	- Plastic Surgery Within the Head and Neck* - Surgery of the Hand
Primary Specialty Certificates - Aerospace Medicine - Occupational Medicine - Public Health and General Preventive Medicine	- Addiction Medicine - Clinical Informatics - Medical Toxicology - Undersea and Hyperbaric Medicine
Primary Specialty Certificates - Psychiatry - Neurology - Neurology with Special Qualification in Child Neurology	- Addiction Psychiatry - Brain Injury Medicine - Child and Adolescent Psychiatry - Clinical Neurophysiology - Consultation-Liaison Psychiatry - Epilepsy - Forensic Psychiatry - Geriatric Psychiatry - Hospice and Palliative Medicine - Neurocritical Care* - Neurodevelopmental Disabilities - Neuromuscular Medicine - Pain Medicine - Sleep Medicine - Vascular Neurology
Primary Specialty Certificates - Diagnostic Medical Physics - Diagnostic Radiology - Interventional Radiology and Diagnostic Radiology - Nuclear Medical Physics - Radiation Oncology - Therapeutic Medical Physics	- Hospice and Palliative Medicine - Neuroradiology - Nuclear Radiology - Pain Medicine - Pediatric Radiology
Primary Specialty Certificates - Surgery - Vascular Surgery	- Complex General Surgical Oncology - Hospice and Palliative Medicine - Pediatric Surgery - Surgery of the Hand - Surgical Critical Care
Thoracic and Cardiac Surgery	Congenital Cardiac Surgery
Urology	- Female Pelvic Medicine and Reconstructive Surgery - Pediatric Urology

Source: Americal Board of Medical Subspecialties: https://www.abms.org/member-boards/specialty-subspecialty-certificates/

*Subspecialties that have been approved, but not yet issued.

Attachment 2 – Summary of specialties across countries

This table has been adapted from a study by Weggemans et al 2017 to include the specialties for Japan.

Legend: Dark shading = Specialty; Light grey shading = Subspecialty.

(Sub)specialty	Australia50	Canada52,53	Germany40	Japan 19	Netherlands49	UK48	USA51
Acute internal medicine					Subspecialty	Specialty	
Addiction medicine	Specialty				Specialty		
Addiction psychiatry							Subspecialty
Adolescent medicine		Subspecialty					Subspecialty
Adult congenital heart disease							Subspecialty
Advanced heart failure and transplant cardiology							Subspecialty
Allergy (and immunology)	Subspecialty	Subspecialty			Subspecialty	Specialty	Specialty
Anatomical pathology	Subspecialty	Specialty					
Anatomy			Specialty				
Anesthesiology	Specialty	Specialty	Specialty	Specialty	Specialty	Specialty	Specialty
Audio vestibular medicine						Specialty	
Aviation and space medicine					Specialty	Specialty	Specialty
Brain injury medicine							Subspecialty
Cardiac anesthesiology					Subspecialty		
Cardiac surgery		Specialty	Subspecialty				
Cardiology (Cardiovascular disease)	Subspecialty	Subspecialty	Subspecialty		Specialty	Specialty	Subspecialty
(Cardio-)thoracic surgery	Subspecialty	Subspecialty	Subspecialty		Specialty	Specialty	Specialty
Chemical pathology	Subspecialty					Specialty	Subspecialty
Child abuse pediatrics							Subspecialty
Child and adolescent psychiatry		Subspecialty			Subspecialty	Specialty	Subspecialty
Child mental health						Subspecialty	
Clinical biochemical genetics							Specialty
Clinical cardiac electrophysiology							Subspecialty
Clinical cytogenetics and genomics							Specialty
Clinical informatics							Subspecialty
Clinical laboratory				Specialty			
Clinical molecular genetics and genomics							Specialty
Clinical pharmacology and therapeutics (and toxicology)		Subspecialty				Specialty	
Clinician investigator program		Subspecialty					
Colorectal surgery		Subspecialty					Specialty
Community child health	Subspecialty					Subspecialty	
Community sexual and reproductive health						Specialty	
Congenital cardiac surgery						Subspecialty	Subspecialty

Specialty	1	2	3	4	5	6	7
Cosmetic dermatology					�		
Critical care medicine		░					░
Cytopathology						░	░
Dermatology (and venereal diseases)	■	■	■	■	■	■	■
Dermato-oncology					░		
Dermatopathology							░
Developmental-behavioral pediatrics		░					░
Diagnostic ultrasound	░						
Elderly care					■		
Emergency medicine	■	■		■	■	■	■
Endocrinology (and metabolism / diabetes mellitus)	░	░	░		░	■	░
Epilepsy							░
Family medicine / General practice	■	■	■		■	■	■
Female pelvic medicine and reconstructive surgery							░
Forensic medicine			■		░		
Forensic (histo)pathology	░	░				■	
Forensic psychiatry		░	░			■	░
Gastro-enterology (and hepatology)	░	░	░		■	■	░
Gastro-intestinal surgery					░		
General medicine	░			■			
Genetics (and genomics)	░	■	■		■	░	■
Geriatric medicine	░	░			░	■	░
Geriatric psychiatry		░					░
Gynecologic oncology	░	░				░	░
Gynecologic reproductive endocrinology and infertility	░	░	░			░	░
Gynecological and obstetric ultrasound	░						
Gynecology and obstetrics	■	■	■	■	■	■	■
Hand surgery							░
Hematological pathology		■					░
Hematology	░	░	░		░	■	░
Hepatology					░	░	
Histopathology						■	
Hospital medicine					■		
Hygiene and environmental medicine			■				
Immunology	░					■	
Infectious diseases	░	░			░	■	░
Insurance medicine					■		
Intellectual disability medicine					■		
Intensive care medicine	■				░	■	
Internal medicine	■	■	■	■	■	■	■
Internal Medicine and Angiology			░				
Interventional cardiology							░
Interventional radiology		░			░		■
Laboratory medicine		■	■				
Liaison psychiatry						░	

Specialty	1	2	3	4	5	6	7
Maternal and fetal medicine	▨	▨				▨	▨
Medical administration	■						
Medical biochemical genetics							▨
Medical biochemistry		■	■				
Medical microbiology	▨	■	■		■	■	▨
Medical physics							▨
Medical psychotherapy			■			■	
Medical virology						■	
Metabolic medicine						▨	
Military medicine					■		
Molecular genetic pathology							▨
Neonatalogy (and perinatal medicine)	▨	▨	▨		▨	▨	▨
Nephrology (Renal medicine)	▨	▨				■	▨
Neuro-anaesthesiology					▨		
Neurodevelopmental disabilities							▨
Neurology	▨	■	■		■	■	■
Neuromuscular medicine							▨
Neuropathology		■	▨			■	▨
Neuropediatrics			▨				
Neurophysiology						■	▨
Neuroradiology		▨	▨		▨		▨
Neurosurgery	▨	■	■		■	■	■
Neurotology							▨
Nuclear medicine	▨	■	■		■	■	■
Nuclear radiology							▨
Obstetric anesthesiology					▨		
Occupational medicine	■	▨	■		■	■	■
Old age psychiatry					▨	■	
Oncology	▨	▨			▨	■	▨
Ophthalmology	■	■	■		■	■	■
Oral and maxillofacial surgery	▨		■		■	■	
Orthopedic sports medicine							▨
Orthopedic surgery (and trauma)	▨	■	▨	■	■	■	■
Osteopathic neuromusculoskeletal medicine							
Oto(rhino)laryngology	▨	■	■		■	■	■
Pain medicine	■	▨			▨		▨
Palliative medicine	■	▨			▨	■	▨
Pathology	■	■	■	■	■		■
Pediatric allergy, immunology (and infectious diseases)	▨				▨	▨	
Pediatric anesthesiology					▨		▨
Pediatric cardiology	▨	▨	▨		▨	■	▨
Pediatric clinical pharmacology and therapeutics	▨					▨	
Pediatric critical care medicine		▨					▨
Pediatric dermatology					▨		▨
Pediatric emergency medicine	▨	▨				▨	▨

Specialty	1	2	3	4	5	6	7
Pediatric (diabetes and) endocrinology	▒	▒			▒	▒	▒
Pediatric gastro-enterology and hepatology (and nutrition)	▒	▒			▒	▒	▒
Pediatric hematology (and oncology)	▒	▒	▒		▒		▒
Pediatric hospital medicine							▒
Pediatric infectious diseases	▒	▒			▒		▒
Paediatric inherited metabolic medicine						▒	
Pediatric intensive care medicine	▒				▒	▒	
Pediatric nephrology	▒						
Pediatric neurodisability							
Pediatric neurology	▒	▒				▒	█
Pediatric nuclear medicine	▒				▒	▒	
Pediatric (medical) oncology	▒				▒	▒	
Pediatric otolaryngology							▒
Pediatric palliative medicine	▒					▒	
Pediatric (and perinatal) pathology						▒	▒
Pediatric (and juvenile) psychiatry and psychotherapy			█				
Pediatric radiology		▒	▒		▒		▒
Pediatric rehabilitation medicine	▒						▒
Pediatric respiratory (and sleep) medicine / Pediatric pulmonology	▒	▒			▒	▒	▒
Pediatric rheumatology	▒	▒			▒	▒	
Pediatric surgery	▒	▒	▒		▒	█	▒
Pediatric transplant hepatology							▒
Pediatric urology							▒
Pediatrics (and juvenile medicine)	█	█	█	█	█	█	█
(Clinical) Pharmacology (Pharmaceutical medicine)	▒	█	█		▒	█	
Pharmacology and toxicology		▒	▒				
Phlebology					▒		
Physiology			█				
Photodermatology					▒		
Plastic surgery	▒	█	▒	█	█	█	█
Plastic surgery within the head and neck							▒
Pre-hospital emergency medicine						▒	
Proctology					▒		
Psychiatry	█	█	█	█	█	█	█
Psychiatry of learning disability						█	
Psychosomatic medicine (and psychotherapy)			█				▒
Public health (and preventive medicine)	█	█	█		█	█	█
Radiotherapy (Radiation oncology)	█	█	█		█		█
Radiology	█	█	█	█	█	█	█
Rehabilitation medicine	█	█	█	█	█	█	█
Rehabilitation psychiatry						▒	
Respiratory medicine (Pneumology)	▒	▒	▒		█	█	▒

Specialty							
Rheumatology	░	░	░		░	▓	░
Sexual health medicine	▓				░		
Sleep medicine							░
Special obstetrics and perinatal medicine			▒				
Speech, voice and pediatric hearing disorders			░				
Spinal cord injury medicine							░
Sport and exercise medicine	▓				▓	▓	░
Stroke medicine						░	
Substance misuse psychiatry						░	
(General) Surgery	▓	▓	▓	▓	▓	▓	▓
Surgical critical care							░
Surgical dermatology					░		
Surgical oncology		░			░		░
(Medical) Toxicology							░
Transfusion medicine			▓		░		░
Transplantation medicine					▓		
Transplant hepatology							░
Tropical medicine (and international health)					▓	▓	
Undersea and hyperbaric medicine							░
Urogynaecology	░					░	
Urology	░	▓	▓	▓	▓	▓	▓
Genito-urinary medicine						▓	
Vascular and interventional radiology							░
Vascular medicine					░		
Vascular neurology							░
Vascular surgery	░	▓	░		░	▓	▓
Visceral surgery			░				

* Some specialties have been clustered for comparison between the six different countries.

40,48-53 Numbers refer to references. Please see reference list of main article for specific references.