1 | *Skill-mix for primary and chronic care: definitions, conceptual framework and relevance for policy and practice*

CLAUDIA B. MAIER, GEMMA A. WILLIAMS, HANNAH BUDDE, LAURA PFIRTER, REINHARD BUSSE, MATTHIAS WISMAR

1.1 Introduction: why skill-mix?

Access to and the quality of health services are closely linked to the density and skill-mix of a country's health workforce (OECD, 2016; World Health Organization, 2006, 2016). High rates of chronic conditions and multimorbidity, new treatment options, and technological advances and economic pressure have led to fundamental changes to health systems and have impacted on the daily work of health professionals. Many countries worldwide are experiencing a shortage of primary care providers, particularly in rural or socially deprived urban areas (OECD, 2016; World Health Organization, 2013). Primary care systems face the challenge of ensuring a sustainable workforce to allow timely access to services, high-quality care and person-centred services (Kringos et al., 2015a, 2015b). Against this backdrop, the skills and composition of the workforce have changed in many countries and settings to meet the increasing and diversifying demands of patients (Dubois & Singh, 2009; Freund et al., 2015). At the same time, health promotion and prevention are gaining increasing attention among primary care providers to ensure that all people can live in good health. Moreover, the global coronavirus disease 2019 (COVID-19) pandemic has brought to the forefront the necessity of having a well-qualified health workforce that has surge capacity, competencies and flexibility to react to short-term crises (WHO Regional Office for Europe, 2020). The pandemic has not only attracted more policy interest in strengthening the health workforce, it has also triggered a change in the public's view of the value and importance of health professionals and their contribution to the health of individuals and patients.

1

In a context where health care needs, demands and resources are rapidly changing, policy-makers aim to better understand which skill-mix reforms and strategies are effective. Global debates have in the past frequently focused on the required density and distribution of specific health professions to ensure universal access to and coverage of health services (for example, the number of physicians, nurses or other professions per population) (Campbell et al., 2013). There has been limited attention on identifying the right composition and skill-mix of the health workforce. This has changed over the past decade, with the World Health Organization (WHO), Organization for Economic Co-operation and Development (OECD) and European Commission moving skill-mix higher up the political agenda. The notion that the education, skills and competencies of health professions are essential for high-quality care and efficiency has been increasingly recognized. For instance, the OECD report "right skills, right jobs, right places" took an integrated approach covering the density, distribution and skill-mix of health professions (OECD, 2016). The WHO has published several reports on the health workforce including skill-mix or task shifting specifically (World Health Organization, 2007, 2008, 2016).

Yet, there has been a lack of common understanding of what skill-mix is, what professions are involved and what models exist in different care contexts. This knowledge is critical for identifying the effects of skill-mix on outcomes for patients, population groups and health systems. It is likewise important to identify lessons for implementation. Previous research has primarily focused on skill-mix among individual professions or between two professions, with less evidence available covering multiple professions. One skill-mix example that has been the subject of a considerable amount of research is the changing roles of nurses at the interface to the medical profession (Maier, 2015; Maier & Aiken, 2016; Maier, Aiken & Busse, 2017; Maier et al., 2016; Martínez-González et al., 2014a, 2014b, 2015a, 2015b; Morilla-Herrera et al., 2016; Swan et al., 2015). Fewer studies have analysed skill-mix changes covering multiple professions (Dubois & Singh, 2009; Freund et al., 2015; Sibbald, Shen & McBride, 2004; Tsiachristas et al., 2015). One cross-country analysis focused on a description of "typical" primary care teams in six countries (the United States of America, Canada, Australia, England, Germany and the Netherlands) (Freund et al., 2015). It found that general practitioners (GPs) and nurses were the main professions providing primary care in all countries, but they performed considerably different

tasks and roles. Moreover, the number and contributions of medical assistants and other support workers varied considerably within practices. According to an international study on primary care systems in Europe, the organizational structures of primary care providers also vary, ranging from primarily solo practices to health centres (Kringos et al., 2015a, 2015b). These cross-country variations in the composition and roles of the health workforce and health systems are critical to identify as important contextual factors, which will be described in Section 1.5. A systematic review (Tsiachristas et al., 2015) analysed the effects of new professional roles on a variety of outcome parameters, including all professions. It identified primarily studies on nurses and a few studies on new professional roles among other professions. The review included all care sectors, including hospital settings. It did not differentiate by care sectors, conditions or care contexts and concluded that more research on the optimal skill-mix is required (Tsiachristas et al., 2015).

1.2   Aims of this skill-mix volume

Given the general paucity of systematic reviews on skill-mix covering multiple professions and a break-down by patient groups, this volume seeks to provide a synthesis of skill-mix in primary care and ambulatory care and outcomes in individuals and health systems. The volume therefore addresses skill-mix changes aimed at different population or patient groups, ranging from prevention to long-term and palliative care. Moreover, this volume aims to identify country reforms, common developments and lessons for implementation.

This volume has two overarching aims:

- First, to identify skill-mix changes, and in particular skill-mix innovations and the evidence on outcomes in patients and health systems. Within health systems, the role of health care professionals is critical, so a particular emphasis was given on outcomes for health professionals.
- Second, to identify lessons for implementation in different contexts and countries. The volume will analyse what the common barriers and enablers are that have been shown to influence the uptake of new skill-mix reforms in practice. It will address if and how education, regulation, financing and payment policies impact on the timely implementation of skill-mix reforms. Based on the evidence from

country experiences, it will suggest lessons to overcome barriers in practice. Moreover, it will analyse what factors and strategies exist to implement skill-mix changes in health care organizations.

How are skill-mix innovations defined for the purpose of this study? Skill-mix innovations are examples of changes to the skills, roles or clinical activities involving at least two professions, and characterized by three parameters: first, (perceived as) new in a country-specific context (novelty); second, discontinuous with previous practice (disruptive); and third, aimed at improving at least one health outcome (aimed at value), for example, with positive effects on access, quality, patient experience, coordination of care and/or costs (Greenhalgh et al., 2004).

This volume was written before the COVID-19 pandemic; therefore the book does not cover the literature on skill-mix changes that originated during the pandemic. Moreover, as the pandemic is still ongoing, it is premature to analyse what effects changes to the roles, tasks and competencies of specific health professionals have had on patient or health system outcomes.

1.3　Policy relevance: why now?

The notion that the health workforce is instrumental for improving access to health services as well as the quality of care has been recognized for decades, most notably with the publication of the *The World Health Report 2006: working together for health* (World Health Organization, 2006). Investing in the health workforce has received renewed policy attention recently during the COVID-19 pandemic (WHO Regional Office for Europe, 2020), in addition to previously ongoing WHO action on strengthening the health workforce (Campbell et al., 2013; Cometto et al., 2013). Achieving universal health coverage and other health-related sustainable development goals (SDGs) is dependent on a multitude of investments and reforms, including a sufficiently educated health workforce with the right skills and competencies (Cometto et al., 2013; World Health Organization, 2016). There is increasing evidence that strengthening the health workforce can not only have positive effects on health (for example, maternal and child health, among many others) (World Health Organization, 2006), but can also positively impact on other sectors beyond health. Effects beyond health include multiple potential spill-over effects on the economy, women's participation and

societal well-being (World Health Organization, 2018). Yet, globally, health worker shortages, skill-mix imbalances, maldistribution and barriers to interprofessional collaboration prevail and are among the main obstacles preventing countries from reaching universal health coverage (Cometto et al., 2013).

The Global Burden of Disease study suggested that the health worker density would need to increase from a global average of 5.9 physicians, nurses and midwives per 1000 population in 2015 to 10.9 in 2030 (Global Burden of Disease 2017 SDG Collaborators, 2018). The study recognized the limitation of not covering other health professions, nor taking account of team composition and skill-mix requirements in reaching the SDGs. From an international perspective, there is little research evidence available that goes beyond density levels per profession and covers teams, the composition and the specific division of roles and tasks in practice. This is of relevance for all health systems and all care sectors, including primary care. Primary care is the care sector that has been estimated to determine to a large extent whether the goals of achieving universal health coverage and the SDGs can be met (Campbell et al., 2013; Cometto et al., 2013), yet, it is often less financed and not as attractive to health professionals compared with the secondary and tertiary care sectors.

The year 2016 was a landmark year with the creation of the United Nation's High Level Commission of Health Employment and Economic Growth (United Nations, 2016). The commission increased policy attention and commitment internationally on the necessity of strengthening the health workforce towards achieving the SDGs. The commission brought together heads of state and government, health and finance ministers and a wide research and practice community to demonstrate the evidence and create awareness of the link between strengthening the health workforce, economic growth and gender equality, which mutually reinforce each other on the quest towards the SDGs. There is increased recognition now that investment in a strong health workforce is required to reach the SDGs. The Commission developed a *Five year action plan for health employment and inclusive economic growth* led by the WHO, OECD and the International Labour Organization (ILO) in 2018 (World Health Organization, 2018). The action plan aims to strengthen the health and social care workforce globally as an important means to achieve the SDGs. The plan lists ten recommendations and five immediate actions, including actions to improve the education,

skills and jobs of all health professionals, but with a particular focus on those countries with the largest shortage of health professionals in low- and middle-income countries. The action plan recommends the assessment of skill-mix shortages and suggests strategies to overcome these shortages. At the same time, the action plan is directed at all countries, including high-income countries. The reason is that many countries worldwide are facing challenges in ensuring a sustainable health workforce, particularly in primary care, long-term and palliative care and in underserved regions. The plan identifies interprofessional education and multiprofessional service provision, including the identification of skills and competencies as critical to achieve integrated people-centred care (World Health Organization, 2018, p. 15).

Moreover, in 2016, the WHO published the *Global strategy on human resources for health: Workforce 2030* (World Health Organization, 2016). Its main aim is to reach universal health coverage via a new global strategy for human resources for health. The strategy paper recommends the implementation of "health-care delivery models with an appropriate and sustainable skills mix in order to meet population health needs equitably" (World Health Organization, 2016). According to the WHO, the skill-mix should be community-based and include a variety of different health professions from different educational levels and backgrounds, including mid-level health workers in interprofessional primary care teams. There is limited additional guidance and evidence for what an appropriate and sustainable skill-mix entails, particularly for high-income countries and different care sectors.

For strengthening primary health care, the 2018 Astana declaration was critical to reach a renewed commitment among policymakers, 30 years after the 1978 Alma Ata declaration (World Health Organization/UNICEF, 2018). The declaration highlighted the importance of knowledge and capacity-building and strengthened capacity in human resources for health in primary health care, alongside the use of new technologies and financing. Through governmental, intersectoral action and a coordinated governance strategy, the aim is to build capacity for a high-quality, well-performing health workforce with an effective skill-set to provide high-quality, safe, comprehensive, integrated, accessible, available and affordable care (World Health Organization/ UNICEF, 2018).

At the European Union (EU) level, several initiatives have been introduced, including the *Support for the health workforce planning*

and forecasting expert network (SEPEN) (SEPEN, 2019). SEPEN was a follow-up network emanating from the Joint Action on Health Workforce Planning and Forecasting to foster exchange of knowledge, capacity and good practice in the field of European health workforce planning. The aims of the network are to encourage and sustain cross-country collaboration, to provide support to Member States and improve countries' health workforce planning processes and policy (SEPEN, 2019). The network has suggested capacity building so that the workforce can effectively work in multiprofessional teams, has access to high-quality knowledge and evidence about policies, regulations and planning. One major focus is on the mobility and migration of health professionals in the EU's single market and how countries can react and plan for inflows and outflows. Moreover, in 2019 the European Commission's Expert Panel on effective ways of investing in Health published an expert opinion on task shifting and health system design (European Commission, 2019). The publication of an opinion on this topic demonstrated the timeliness of skill-mix and health workforce themes at EU level. The opinion focused on one element of skill-mix (see definitions below, Table 1.1), namely task shifting; from one health professional to another, to patients or caregivers or to machines, hence including digital transformation. It did not, however, analyse other skill-mix changes, for instance the add-on of new roles and tasks (supplementation) or changes to multiprofessional teamwork.

The section below provides an overview of the definitions on skill-mix as an umbrella term and different typologies that fall within the definition.

1.4 Skill-mix and the health workforce: definitions

Before addressing what is meant by skill-mix, it is necessary to provide clarity on what is meant by the health workforce. The WHO defines the health workforce as "all people engaged in actions whose primary intent is to enhance health" (World Health Organization, 2006). This broad definition encompasses in its widest meaning also lay health workers, for example, community health workers, peers or family carers. To distinguish between the formally qualified and unqualified members of the health workforce, this volume will refer to health professionals as those with formal education (physicians, nurses, midwives, pharmacists, physiotherapists) and to health workers as those with no or

Table 1.1 *Definitions: skill-mix and its typologies*

Term	Definitions and examples
Skill-mix	Changes to the skills, competencies, roles or tasks within and across health professionals and health workers (including community-based workers, peers, informal caregivers) and/or teams
Skill-mix typologies	
1. Re-allocating tasks	Task-shifting (other terms: delegation, substitution) between physicians, nurses, pharmacists and other providers. Examples include: nonmedical prescribing of medicines, diagnosis performed by advanced practice providers, screening performed by nurses or pharmacists
2. Adding new tasks/ roles	Supplementation of tasks or add-on of new roles that did not previously exist or were not routinely provided. Examples include care coordination role, patient navigator, eHealth monitoring, health promotion role
3. Introducing or changing teamwork	Changes to the (way) of collaboration between at least two professions or more. Examples include shared care provided jointly by physicians and nurses and multiprofessional collaboration

Source: Based on and modified from the following sources (Buchan & Dal Poz, 2002; Friedman et al., 2014; Laurant et al., 2005; Sibbald, Shen & McBride, 2004).

very limited health-related education (lay, informal, community-based or peer workers). A similar approach is taken by the International Standard Classification of Occupations (ISCO) (International Labour Organization (ILO), 2010a), which has classified the health workforce into three major functions: health professionals, health associate professionals and (personal care) workers. For example, GPs, nurses and physiotherapists are covered under health professionals; whereas nurse assistants and medical technicians are summarized under health associate professionals. Home-based personal care workers subsume a large number of diverse, primarily lay workers with considerable contribution to individual health, particularly in long-term care. This volume covers all health professions working in primary and ambulatory care settings or at the interface to hospital care, and also includes lay workers, such

as peers, community-based workers and family caregivers as long as they are covered by skill-mix changes and reforms.

What is skill-mix?

Several definitions of the term skill-mix exist in the literature with different focus, levels of breadth and depth (Buchan & Dal Poz, 2002; Dubois & Singh, 2009). Terms used commonly are skill-mix as an overarching term, but also changing roles, task shifting, task sharing, task supplementation, delegation and substitution, among others. For the purpose of this study and informed by two definitions (Buchan & Dal Poz, 2002; Sibbald, Shen & McBride, 2004), the following working definition was developed: skill-mix is defined as "directly changing the skills, competencies, attitudes, roles or tasks within and across individuals and teams". This definition was chosen deliberately with a broad remit to cover all changes that directly and purposefully change the roles of individual health professionals or teams in primary and ambulatory care settings. Differentiating between skill-mix change and a skill-mix innovation, the following additional three criteria were applied to qualify as an innovation: novelty of skill-mix changes (in its widest sense), being of disruptive nature (changing the status quo) and aimed at improving at least one health or health system outcome (Greenhalgh et al., 2004).

Further, to grasp the range and type of changes in the health workforce a modified typology of skill-mix innovations has been used for the study (Laurant et al., 2005; Friedman et al., 2014) (Table 1.1).

The first typology addresses re-allocating tasks between two professions. Commonly the term task shifting, or sometimes task sharing, has been used, although the latter term often lacks clarity over which tasks are shifted and which ones are being shared and by whom. Task shifting has also been referred to as substitution or delegation. While substitution refers to tasks being entirely shifted to a new profession, delegation is frequently referred to as the transfer of tasks to nonmedical professions such as nurses, but with physicians maintaining ultimate responsibility (Laurant et al., 2005; Sibbald, Shen & McBride, 2004). The two terms are sometimes also used simultaneously when it comes to questions of oversight and jurisdictional responsibility. This typology refers to a new division of work between at least two professions and the team in which they work.

The second typology concerns the addition of new tasks or roles, also referred to as task supplementation, such as care coordination, use of new technologies or eHealth monitoring. Adapted from Laurant et al. (2005), this typology refers to health professionals expanding their roles and performing new functions that were previously not or not routinely performed. Hence, this typology refers to expansions of the skills set and roles of an individual and the team.

The third typology covers the introduction of teamwork and collaboration for at least two professions, for instance shared care of physicians and nurses. The use of the term teamwork across this volume is based on changes to at least two professions directly affecting their method of collaboration. This also touches upon interventions to improve cooperation and collaboration such as teamwork effectiveness or interprofessional education (Friedman et al., 2014; Laurant et al., 2005).

In some cases, skill-mix changes result directly or indirectly in response to changes in service delivery models, which change the interface of care provision. A transfer of care from hospital to ambulatory or community care (such as community-based treatment and testing, for example, for HIV/AIDS, which would previously have been provided in hospitals or clinics) has major implications for the composition of teams providing this service and is also influenced by new technologies, treatment options and laboratory testing devices. Liaison functions are skill-mix changes aimed at improving the care across care settings to provide a smooth, continuous provision of services. This also applies to the relocation of care, which comprises a shift of entire service delivery models (for example, hospital-at-home). These models are more complex and although they may result in skill-mix changes, they are larger service delivery reforms of which skill-mix is only one important element among others. Hence, the evaluation of these models is more complex and attribution of causality is limited compared with the typologies 1–3 listed in Table 1.1.

1.5 The diversity and skill-mix of health professions in Europe: a snapshot

Strengthening primary care to meet the health and social care needs of an ageing population is prompting many countries in Europe to make far-reaching changes to the primary care workforce. The traditional primary care model of small, solo general practices is becoming increasingly unsustainable and unable to manage growing workloads, work