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Commission



## TASK SHIFTING AND HEALTH SYSTEM DESIGN

Report of the  
**Expert Panel on effective ways of  
investing in Health (EXPH)**

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Expert Panel on effective ways of investing in Health  
(EXPH)

Task shifting and health system design

The EXPH adopted this opinion at its 16<sup>th</sup> plenary on 26 June 2019  
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### **About the Expert Panel on effective ways of investing in Health (EXPH)**

Sound and timely scientific advice is an essential requirement for the Commission to pursue modern, responsive and sustainable health systems. To this end, the Commission has set up a multidisciplinary and independent [Expert Panel\\*](#) (which provides advice on effective ways of investing in health ([Commission Decision 2012/C 198/06\\*\\*](#))).

The core element of the Expert Panel's mission is to provide the Commission with sound and independent advice in the form of opinions in response to questions (mandates) submitted by the Commission on matters related to health care modernisation, responsiveness, and sustainability. The advice does not bind the Commission.

The areas of competence of the Expert Panel include, and are not limited to, primary care, hospital care, pharmaceuticals, research and development, prevention and promotion, links with the social protection sector, cross-border issues, system financing, information systems and patient registers, health inequalities, etc.

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[https://ec.europa.eu/health/expert\\_panel/wg-task-shifting-healthcare-systems\\_en](https://ec.europa.eu/health/expert_panel/wg-task-shifting-healthcare-systems_en)

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### ABSTRACT

Imagine a health professional in any European country who fell asleep in 1960 and awoke in a health facility in 2019. Much of what the observer saw would be quite different. There would be many more patients who were surviving into old age thanks to advances in therapy. Many of the treatments that they were receiving would be much more complex, involving radically new techniques such as laparoscopic or even robotic surgery, and they would be amazed by the advances in diagnostic capacity. Yet, in many health systems, some things would have changed very little. Among them would be the traditional roles of different types of health worker, with responsibility for certain task being reserved for those with particular qualifications based on custom and practice rather than on evidence.

This opinion argues that this situation must change. There is now an impressive body of evidence that things can often be done differently. This does not mean that they should be. Change is only appropriate where it helps to achieve the goals of the health system and allows it to provide better care in ways that are more responsive to the needs of users.

Tasks can be shifted from health workers to patients and their carers, to machines, and to other health workers. Where these shifts have been evaluated, they often, but not always, are associated with outcomes that are as good or even better than with the status quo. However, the results are often context dependent, and it cannot be assumed that what works in one situation will apply equally to another. What matters is the evidence, rather than traditional, but often obsolete rules.

If a health system can ensure that tasks are being undertaken by those most appropriate to do them, it will enhance patient care. However, change is often difficult. Those involved must be convinced of the rationale for change and must be supported in implementing it. This should recognise that any change in roles will have implication for their status and thus existing hierarchies. It may also be necessary to challenge outdated legislative or regulatory barriers.

Finally, it is essential the changes are evaluated, results are documented, and lessons are learned, both in relation to what works and in what circumstances.

Task shifting, where it is based on robust evidence and implemented effectively, can make a major contribution to health outcomes and to the sustainability of health systems. It is not, however, a panacea for all of the challenges health systems face.

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Task shifting and health system design, 26 June 2019

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### EXECUTIVE SUMMARY

Health systems, those who design, fund and manage them, those who use and work within them, and those who train the professionals on which the running of the system depends, are all faced with the growing challenge of functioning efficiently and effectively to meet present need and prepare for future need. They are required to achieve this within the context of established norms and practices, guided by varying forms and sources of evidence. In this context it is evident that health systems and their workforce skills and composition need to be dynamic, resilient, and evidence-based to maximise impact using the resources at hand while minimising waste and harm within ever evolving environments. Many of these changes involve a fundamental reappraisal of who does what within the health system and leads to questions of what is the optimal skills and staff mix and who should be doing what, in what circumstances and context? This is the issue that the Expert Panel aimed to examine: in these changing circumstances, who within health systems should do what?

The question that has been asked relates to what has been termed task shifting. Task shifting can be seen as way of strengthening health system resilience, efficacy and effectiveness as well as patient experience and autonomy. While much of the focus has been on task shifting in the context of low and middle income countries in which there are markedly limited resources and few qualified health professionals, we have taken a broader and more nuanced approach to conceptualising task shifting. We ask whether the division of labour, as is currently organised, is appropriate. Are there tasks being done by one type of health worker that would, more appropriately, be done by another? However, our analysis goes further, asking whether there are tasks reserved for qualified health workers that, more appropriately, might be undertaken by patients and carers? And, given advances in technology, are there tasks currently being performed by health workers that would more appropriately be undertaken by technology? We also view task shifting as a bidirectional phenomenon. If change is required in the existing allocation of tasks, the optimal change may not translate to delegating responsibility downwards. Instead, the task may actually require someone with a higher level of skills than at present for change to realise the desired benefits.

Thus, the premise for the opinion is that what matters is what model of care achieves the best results and outcomes, given the available workforce and the following points in turn guided the analysis:

1. How to identify and characterize “tasks” suitable for a “task shifting” process?

2. What are the main enabling conditions and difficulties/risks that have to be taken into account when defining “task-shifting” measures as part of a health system reforms?
3. How to measure the impact of “task shifting” in contributing to the effectiveness of the health system using an evaluation framework to inform decision-making?

There are at least four reasons why it is timely to consider task shifting within health systems; (1) task shifting has the potential to contribute to the *sustainability of the health workforce*, (2) it can contribute to the *financial sustainability* of health system as well as *social sustainability*, (the maintenance of a health system trusted and utilised by communities), (3) task shifting can be a means to improve *quality* of care, and (4) task shifting can enhance the *resilience* of the health system, especially where different professional groups can substitute for one another in emergency settings. However, to realise these potential benefits, action must be informed by the evidence and be guided by clear and defined goals to enhance health systems functioning and ultimately patient and population outcomes. We therefore sought to synthesise the evidence on task shifting, its drivers and barriers, to better inform discussion on the role of task shifting in meeting health systems challenges in Europe.

We propose that task shifting can be categorised within the following taxonomy: enhancement, substitution/delegation and innovation. Building upon this, and guided by the literature, we identify multiple forms of task shifting. For example, tasks can be shifted from health workers to patients and their carers, to technology, and to other health workers. The evidence for each of these categories and forms varies, for example, in methods used, outcomes measured and contexts. The available evidence is much less than would be desired but it does show that many of the tasks once reserved for particular groups can be undertaken as effectively, or more so, by others, but each case should be assessed on its merits. Importantly, there is little evidence for the rigid demarcation between different health professionals, such as doctors and nurses, that exists in many countries. It is clear that groups other than physicians, and especially nurses and pharmacists, can undertake substantially expanded roles compared to what has traditionally been the case. However, they require adequate training and support within in integrated teams and open approaches to information-sharing. There is limited understanding of the optimal combination or “package” of changes and additions that can act synergistically to improve the quality and safety of healthcare as well as patient experience. While it is not necessary nor feasible to evaluate every change, there is a strong argument for doing so where major changes are taking place, as there are real and perceived risks of unintended consequences. This should not, however, be an argument for inaction.

Understanding of the drivers, enablers, and barriers of successful implementation and trialling of task shifting as well as complementary policy and working environments is critical to the adoption of effective and safe changes. Multiple drivers are likely to co-exist and change depending on policy and health system environments as well as population and service contexts. The drivers of change may be diverse, with the analysis identifying desire to improve patient experiences and clinical outcomes, optimise resource use and availability, address increasing and changing patient need, and maximise cost effectiveness, among others, as potential incentives to task shifting. Country-level analyses provide insight into what is known about enablers and barriers to successful task shifting. Such analyses reveal a broad range of factors that have the potential to enhance or hinder task shifting, ranging from legal, cultural and financial factors to staff shortages and the use of pilot projects. It is likely that at any given point in time, multiple factors are influencing the adoption of task shifting and may be related to the health care worker, human factors, and organisational factors.

Base on the evidence reviewed, the panel supports the view that European health systems must embrace flexibility in professional roles, including task shifting, if they are to respond to changing circumstances and maximise health gains. Crucially, task shifting should not be viewed in isolation but seen in the wider context of the health system. A change in roles will likely have wide ranging consequences, challenging traditional hierarchies and professional norms. Although, many barriers to change are likely to exist, including unsupportive and rigid attitudes, legislative, regulatory and financial constraints, if carefully managed, these can often be overcome. Sometimes, this may be as simple as optimising and formalising what already practiced, albeit informally, whereas, in other circumstances, it requires wide system redesign.

While explicit protocols of which tasks, and to whom, should be shifted are inappropriate, the evidence reviewed demonstrates that many tasks traditionally been done by one type of health worker, can be performed as well or even better by others. We also show that because something works in one context does not mean that it will necessarily be beneficial in another, given the diversity in health systems, public and professional expectations, and regulation of professions. Consequently, we do not prescribe any formal constraints on what tasks can be shifted but argue that whether they can or should be will be dependent upon a range of circumstances: (1) is there a case for shifting the task and will it contribute to meeting health system goals, (2) does the individual taking on the new task have the skills and expertise necessary or can they acquire them with appropriate training, (3) are there any legal or regulatory barriers to shifting the task that can be changed, and (4) what are the consequences for the working of the organisation and will these require adoption of new organisational models, including where necessary changes in the status of the health workers involved.

Following these considerations, it is recommended that, when undertaking task shifting, the objective being pursued is clear, the rationale for selecting task shifting as a means to achieve that objective explained, and the evidence on which the decision is based presented. Task shifting should be planned carefully, taking full account of the implications both for the individuals concerned and for the wider health sector. Those responsible for implementing task shifting should also actively engage in dialogue with those who will be affected by it, including patients and their carers where appropriate, to understand expectations and fears. Importantly, task shifting to patients and their carers should be guided by their goals, expectations, and capacities, while ensuring that they are empowered to co-design their care packages and that these are subject to ongoing monitoring and evaluation. There should also be increased investment in research on task shifting, aiming to increase studies from settings that are under-represented and build understanding of the contextual factors that determine what works and in what circumstances.

More broadly, to support the creation of environments and systems that support effective and efficient task shifting and oversight, health worker training should foster positive attitudes to interprofessional and team working, and provide opportunities for interprofessional learning experiences and development of specific skills necessary for evidence-based task shifting. Health systems and legislative and regulatory systems should be evaluated to assess the extent to which they support or place unjustifiable barriers in the way of more flexible ways of working, and, where appropriate and necessary, action taken to address barriers, taking account of the growing body of evidence on the potential benefits of task shifting in particular contexts.

### 1. BACKGROUND

Health systems must adapt to constant change in the causes of ill-health in the population, technological advances in the ability to respond to the changing disease burden, and evolving evidence on the optimal models of providing care, including changes in professional roles, in increasingly complex circumstances. Many of these changes involve a fundamental reappraisal of who does what within the health system. The argument that this is the way that something has always been done is no longer sustainable. This is the issue that the Expert Panel has been asked to examine. In these changing circumstances, who within health systems should do what?

The question that has been asked relates to what has been termed task shifting. We have, however, taken a somewhat different approach from that which dominates the literature on this topic, much of which comes from resource constrained low income settings. That literature often takes as its starting point a situation in which qualified health workers are few in number and asks whether the pressure is upon them can be alleviated by shifting some of the less complex tasks to others with lower levels of training and, in many cases, who receive lower pay. This is, of course, one of the ways in which tasks undertaken within the health system can be shifted. However, in this opinion, which while drawing on experience globally, focuses on the situation in Europe, takes a more nuanced approach.

As with much of the literature, it asks whether the division of labour, as is currently organised, is appropriate. Are there tasks being done by one type of health worker that would, more appropriately, be done by another? However, it goes further, asking whether there are tasks reserved for qualified health workers that, more appropriately, might be undertaken by patients and their carers? And, given advances in technology, are there tasks now being done by health workers that would more appropriately be undertaken by technology?

It also differs from some of the existing literature by viewing task shifting as a bidirectional phenomenon. If change is required in the existing allocation of tasks, it may not necessarily follow that this should involve delegating responsibility downwards. In some cases, the task may actually require someone with a higher level of skills than at present.

Our opinion sees health systems as complex adaptive systems. Any changes will have consequences, some of which can be anticipated and some of which are unpredictable. Changing someone's responsibilities is likely to lead to a change in their status and their expectations, something that can challenge traditional hierarchies. It is unreasonable to make one important change but expect everything else to remain the same.

Yet while the changing nature of healthcare demands changes to the way in which health workers exercise the responsibility, we should not seek to implement change for change's sake. We start from the premise that change should only be implemented where there is a rationale for doing so. The goals of a health system are to promote health, to respond to the legitimate expectations of users, and to achieve financial protection. It must do so within available resources, and in particular, the existing health workforce. Our position is that task shifting should be undertaken in pursuit of these goals. Thus, what matters is what model of care achieves the best results, given the available workforce. Crucially, the availability of health workers is important not just that the overall level of the health system, but at the moment in time when patient care is being delivered. Consequently, we see task shifting as including an element of flexibility, whereby those with different professional qualifications can substitute for one another, when required.

The structure of our opinion is as follows. The next section sets out the terms of reference, as given to the Expert Panel. This is followed by an elaboration of the concepts underpinning our approach and by an exploration of the issues that have placed task shifting on the health policy agenda, thereby setting out why it is important to examine this issue now. The following section reviews the different types of task shifting. This is followed by a series of reviews of the evidence on different types of task shifting, from health workers to patients and community workers, to technology, and to different types of health worker. It then examines the factors that either enable task shifting or act as a barrier. It continues with a review of experience on task shifting and a discussion of how its impact might be evaluated, before setting out a series of recommendations.

### **TERMS OF REFERENCE**

Taking into account the ongoing work by the European Observatory on health systems and other sources of reported examples / existing studies / analysis, the Expert Panel is requested to provide its analysis on the following points:

- (a) How to identify and characterize “tasks” suitable for a “task shifting” process?
- (b) What are the main enabling conditions and difficulties/risks that have to be taken into account when defining “task-shifting” measures as part of a health system reforms?
- (c) How to measure the impact of “task shifting” in contributing to the effectiveness of the health system using an evaluation framework to inform decision-making?

### 3. OPINION

#### 3.1. What is task-shifting?

Task shifting was defined by the World Health Organization (WHO), over a decade ago, as “the rational re-distribution of tasks among health workforce teams”.(1) This has the merit of simplicity, while implying, with the word “rational”, that it should result in the task being allocated to the most appropriate person. However, the WHO goes on to qualify this, saying that “specific tasks are moved, where appropriate, from highly qualified health workers to health workers who have fewer qualifications in order to make more efficient use of the available HRH [human resources for health]”. This assumes that the most appropriate person is either the one that is already doing it or one with fewer skills and, again implied, who is less expensive. It may also suggest a level of permanence to the “task shifting” as opposed to an opportunity that can be utilised when appropriate and needed, which may be related to monetary costs or the availability of resources. The Panel considers that this is unduly limited, given that a task may be undertaken more appropriately by someone at the same level, in terms of employment grade or salary, but with different and more appropriate skills, or even by someone at a higher employment grade. Thus, there is growing evidence that reductions in qualified nursing staff in several countries, with accompanying delegation to less expensive nursing or health care assistants, is associated with lower quality care.(2) Thus, one study conducted in six European countries found that substituting one nurse assistant for a qualified nurse for every 25 patients was associated with a 21% increase in the odds of dying.(3) Thus, in this opinion, we have adopted the first part of the WHO definition, whereby the goal of task shifting is the rational distribution of tasks. It would not, in our view, be rational for a highly skilled, and thus, in most circumstances, better paid health worker to be undertaking tasks regularly that could equally well be undertaken by someone less skilled, although the importance of flexibility within teams, especially at times of high intensity workload, argues against rigid demarcation rules, but it is important that task shifting should not be seen as purely a process of delegation. Hence, while the mandate for this opinion refers to task shifting, it follows that the opinion must also consider *task distribution*, involving the development of an overview of who does what, without any implied imperative to change it, *task sharing* and *competency sharing*,(4) which recognise that responsibilities are often shared between different professional groups and with the patient and, in some cases their families. It must also consider task shifting that is *horizontal*, where roles are exchanged between those with similar status. This may arise where a particular technology is developed with a new application. For example, advances in endovascular procedures mean that different medical specialties have developed responsibility for the management of major



haemorrhage. Another example is the increased use of angioplasty to replace the more invasive coronary artery bypass, which involves a shift in tasks from cardiothoracic surgeons to interventional cardiologists. This is in addition to *vertical* task shifting, which involves the transfer of responsibility for a task up or down a hierarchy. Task shifting may also occur in response to the introduction of *new/novel* approaches to diagnosis and management, for example the role of psychologists and social workers in the care for common mental health issues.

The Panel favours a broad perspective in defining task shifting. The emphasis has traditionally been on tasks related to delivery of care and medical professionals. However, within a health care system, other tasks can also be shifted. For instance, responsibility for organization, procurement, and financing of specific types of care (such as long term care, social care or health promotion) can be shifted from central governments to regional authorities or municipalities. Insurance tasks can be shifted between public and private bodies. Such forms of task shifting can have major implications for the performance of health care systems and deciding who is best equipped to perform these tasks is not straightforward. Here, however, the focus will be on task shifting in relation to health care delivery.

Throughout this opinion we have drawn, as far as possible, on existing systematic reviews, so there may be some more recent studies that are not included, although there is a need for caution in relying too much on innovations that have not been replicated or evaluated for generalisability.

This opinion complements a related publication being developed on skill mix in the health system by the European Observatory on Health Systems and Policies.

### **3.2. Task shifting then, now, and in the future**

#### **3.2.1. Factors driving change**

The roles of health workers have changed continually throughout history.(5, 6) Once, surgeons were evaluated by speed with which they could perform amputations on the battlefield. Now, they perform intricate procedures akin to those of the watchmaker, aided by microscopes, endoscopes, and robotic instruments. Physicians were judged by their ability to provide reassurance while the patient, hopefully, recovered spontaneously, sometimes accompanied by remedies with a similar evidence base to that employed by the alchemists among whom they lived. Now, they target therapy to the individual receptors of the cells whose dysfunction is causing the disease they are treating. Nurses, once seen as the handmaidens of physicians, have become professionals in their own right, trained to have a comprehensive understanding of the many physical, psychological, and other needs of their patients, with some acquiring highly specialised

skills in areas such as neonatal and intensive care, counselling, and care for patients with chronic, and often multiple, conditions. At the same time, a constellation of new professional roles has emerged, such as electrophysiologists, ultrasound technicians, information technology specialists, and many others.

In looking to the future it is first necessary to reflect on how task shifting has come about in the past. Historically, changing roles in the skill mix and the distribution of tasks have been driven by at least five factors, the changing pattern of disease, technological advances, professional norms, including attitudes to hierarchies, shortages of health workers, and the drive for increased efficiency and cost effectiveness. We now look at each in turn, reflecting on their importance in the past and their contemporary and future relevance.

The greatest change in the *pattern of disease* since the emergence of modern scientific medicine has been the epidemiological transition,<sup>(7)</sup> characterised by a decline in infectious disease and a growth in chronic non-communicable disease (although the threat from infections, and especially antimicrobial resistance, has never disappeared). These changes have had profound implications for the practice of medicine.<sup>(6)</sup> The first surgeons to operate within the thoracic cavity specialised in treating the cavities caused by tuberculosis or relieving the stenosis of mitral valves damaged by rheumatic fever. Yet, they were developing their new skills, however crude, at a time when the problems they were responding to were already on the wane, thanks to a combination of improved living conditions and new treatments, such as streptomycin and penicillin. However, just as some diseases were disappearing, others were appearing. Some thoracic surgeons shifted their attention to the growing burden of smoking-related lung cancer while others moved from rheumatic heart valves to diseased coronary arteries. Yet even these were only temporary respites, as the epidemics of lung cancer and ischaemic heart disease peaked and then declined, causing some to retrain with the skills required to conduct heart and lung transplants. Similarly, the orthopaedic surgeons of the 1950s, faced with a decline in the need for spinal surgery for tuberculosis or tendon transplants for polio developed new skills in joint replacement. More recently, the emergence of HIV/AIDs gave rise to an entirely new medical speciality; the development of medicines to suppress HIV is now bringing about further changes as the long-term consequences of this disease and its treatment for multiple organ systems becomes apparent.

Enhanced survival of people with other diseases has also led to changes in professional roles. New types of safe and effective treatment have allowed many more people to survive into old age, often living active and fulfilling lives. However, a growing number experience multi-morbidity, where a number of conditions coincide, sometimes with the complicating factors of renal, hepatic, or cognitive decline.<sup>(8)</sup> This also requires new

skills, with health workers who have the ability to assess and manage all of the complex and interacting needs of these patients. As more people live into very old age, the number of people experiencing frailty rises, with consequences for the roles played by nurses and a diverse array of therapists, as well as those providing social care. Among the most important is the need for team working, where a patient with complex health problems is managed by a set of individuals, including patients themselves and health professionals with a range of different, complementary skills. Within that group, different individuals will undertake different roles, but these may change over time, for example when the patient progressively develops expertise in their own condition and takes on responsibilities that were once reserved for clinicians, in some cases informed by new technologies that allow them to monitor their own physiological parameters. Within these groups, there will often be tasks that can be done by several different individuals, with the choice of who does what determined by logistical and convenience considerations.

A second, related factor is the *growth of technology*. In the 19<sup>th</sup> century, the discovery of x-rays paved the way for new methods of diagnosis, and with it radiologists and radiographers. Advances in chemistry created a need for laboratory scientists. Pasteur's discovery of bacteria led, in due course, to the emergence of microbiology. More recently, a combination of safer anaesthesia and new surgical techniques have led to the emergence of operating theatre assistants, perfusion technicians and others.(9) However, technological advances are not just creating new roles. They are also making some obsolete. Modern ECG machines not only record heart rhythm but also analyse it. Near patient testing has rendered obsolete a number of traditional laboratory activities.

This is an area that is changing rapidly, with consequences that are difficult to predict. Some technological advances are driving ever narrower specialisation, with new roles such as interventional radiology. The growth of automation will continue, for example in areas such as image processing. Thus, software programmes can achieve a high degree of accuracy in screening cervical smears. Yet, as in this example, further advances can render the technology obsolete as screening for abnormal cells is being replaced by testing for the presence of Human Papilloma Virus.(10) Shortages of health workers, discussed further below, are incentivising other types of automation, including the use of robots to provide care, albeit with mixed results.(11)

While these developments are changing the roles of health professionals, others are changing the roles of patients. Already, anyone with access to the internet can obtain large amounts of information on their symptoms or conditions, some that is helpful and accurate but much that is not.(12) They can also use a growing number of applications employing artificial intelligence to offer them potential diagnoses, although despite great enthusiasm from some, the experience so far suggests the need for considerable caution,

including the threat posed by adversarial attacks on systems by groups with a range of nefarious motivations.(13)

The third factor relates to the set of *norms* within each profession. Changes to the tasks undertaken by physicians, including many of those listed in the preceding paragraphs, are often relatively uncontroversial. In most cases, individual enthusiasts develop new services, including the accompanying new roles, and simply implement them. However, they can also reflect differences in the power of particular groups, and especially the medical profession. Thus, Nancarrow and Borthwick describe how orthopaedic surgeons concentrated on those activities that were interesting and well remunerated, creating a void that was filled by other professional groups, including podiatrists and physiotherapists.(14)

Sometimes, changes are dependent on decisions made on the basis of evidence from health technology assessment or it may require specific allocation of funding, but there is rarely a debate about whether the physician can actually undertake the new role. This is often different for other professional groups. For example, there is widespread variation, even within Europe, in the extent to which nurses have taken on extended roles.(15, 16) In some countries, it is unusual for nurses to administer vaccines or take cervical smears, whereas in others it is the norm. A review of task shifting in primary care found nurse practitioners working at high levels of advanced practice in Finland, Ireland, The Netherlands, and the United Kingdom.(17) There was some, but much more limited task shifting in Belgium, Croatia, Cyprus, Denmark, Estonia, Hungary, Iceland, Italy, Latvia, Lithuania, Luxembourg, Malta, Portugal, Slovenia, Spain, and Sweden. However, there was no significant task shifting in Austria, Bulgaria, Czech Republic, France, Germany, Greece, Norway, Poland, Romania, Slovakia, or Switzerland. These changes are challenging hierarchies, which traditionally have placed the medical profession at the head of the team. Thus, there are now some examples, such as in occupational health, where doctors may be managerially accountable to nurses, although in other countries this is still seen as unimaginable.

These differences reflect a variety of factors, the most important of which is financial. It seems more difficult to shift responsibility away from physicians in those cases where they may lose income as a result (e.g. in a fee-for-service payment system). Decisions about the allocation of roles are also influenced by the extent to which the relationship between physicians and other health workers is based on a hierarchy or a collaboration between equals, with the latter increasingly becoming the dominant paradigms, even if the pace of change varies greatly among countries. In parallel with the erosion of traditional hierarchies, and reflecting some of the same social forces, there has been a growing focus on empowerment of patients, with important decisions on management

shared between the patient and their health professional and the patient assuming a much greater role in self-management. This factor also encompasses the *changing role of communities and patients in healthcare*. A shift is taking place towards community empowerment and greater patient engagement. Traditional paternalistic practice styles of health care providers create dependency of patients on providers and on the health care system, which can adversely affect quality of care, patient experience, and clinical outcomes. An informed and empowered patient has the knowledge, skills and confidence to manage its own health and health care, make healthy lifestyle choices and make informed and personally relevant decisions about their treatment and care. They are more likely to adhere to treatment regimes, experience fewer adverse events, and use fewer health care resources. Enhancing health literacy, supporting self-management, and facilitating patient participation are three key ways health care providers can support empowered communities and engaged patients for quality services, including greater adherence to treatment regimens and fewer adverse events, better patient experience and ultimately, improved clinical outcomes. This, however, requires a new set of skills and competencies of providers.

The *fourth* factor is a shortage of health workers. In many parts of the world, including, in previous times in Europe, a shortage of health workers simply meant that people were denied access to care. However, once states took responsibility for expanding coverage, they needed to find the workers to deliver it. There were two broad approaches. One, which was developed to its greatest extent in the USSR, was the development of mid-level health workers, or feldshers.<sup>(18)</sup> These individuals had basic medical training, with the skills to provide first aid and simple care for patients with chronic diseases, constrained by shortages of equipment and medicines. However, they were able to offer something to those living in remote areas that would otherwise lack anything. In western Europe, in contrast, health systems were able to recruit health workers from low and middle income countries, in some cases benefitting from a common language with former colonies, a practice that has attracted growing criticism because of the adverse impact on countries of origin.

A *fifth* factor is the need to address rising health care costs and identify more cost effective approaches to health care delivery that maximise efficiency and use of limited resources while meeting the needs and demands of local populations. Countries the world over are faced with the challenge of identifying how to deliver an effective and efficient health care system that is also sustainable, which has led to changes in the configuration of health care staff, their tasks, and the skills required to undertake these evolving roles.

Now, the challenges are especially severe as European countries are facing a combination of falling birth rates, with consequent reductions in the share of the population in working

ages, ageing populations with multiple health problems, as discussed above. One recent analysis estimates that, by 2030, there could be a global shortage of 15 million health workers, with the problem greatest in high-income countries.(19) The challenges relate to both the absolute numbers of health workers and their distribution, with particular difficulties in attracting and retaining health workers in rural and remote areas, sometimes called "medical deserts".(20) This has long been a problem in some parts of the world, in most cases leading to severely limited access to care by those living in these areas, while in others there have been a range of responses including flying doctors, in Canada, Australia, and East Africa.

Finally, the need to maximise efficiency contributed to a process of *decentralisation of responsibility*, especially in those countries where traditional hierarchies were most rigid. This envisages health professionals and patients being educated and empowered to develop, jointly, solutions that, while strongly rooted in evidence, allow for adaptation to the particular circumstances that prevail. Thus, responsibilities may differ in a dense urban setting and a rural one where settlements are extremely isolated. This process can be facilitated by advances in technology and in the acquisition of new roles and responsibilities by different groups of health worker. However, it also requires health workers to develop new managerial skills in planning and co-ordination.

### 3.2.2. Different paces of change

The preceding paragraphs provide many examples of how responsibilities for different tasks have shifted over time. However, as noted, change has happened at different speeds in different places and, as alluded to in the paragraph on professional norms, there are many barriers to adopting new models of care.

One problem is the *limited evidence base*, as many of the changes that take place are never evaluated. In contrast to the introduction of pharmaceuticals and other innovative products and interventions, which are subject to intensive evaluation and lengthy approval processes, the adoption of new professional roles often takes place without any scrutiny, unless it is linked to the implementation of new technology. Even then, attention typically focuses on the equipment rather than the entire package, comprising the technology, the operator, and the supporting system. Yet, as will be described later in this opinion, there is extensive evidence that a move away from traditional roles can be associated with as good or higher quality care, such as the routine management of uncomplicated chronic disease by nurses or non-physician health workers rather than doctors.(21, 22) A related issue, which becomes important when considering whether research findings can be transferred from one setting to another, is definitional. The 2013 Question of the Year in the Journal of the Association of American Medical Colleges was "What Is a doctor? What is a nurse?". (23) The authors noted how roles and functions of

health care providers have changed considerably in the last three decades. However, the pace of change has varied greatly among countries.

A second problem is that changing roles can threaten *established hierarchies*. Artificial restrictions, unsupported by evidence, on what some professional groups can do often relate more to maintaining the dominance of one group over another rather than the welfare of the patient. The situation is further complicated when changing responsibilities have financial implications for those involved.

A third, and related problem, of much greater importance in some countries than others, is where these hierarchical divisions are enshrined in *legislation or regulation*, both of which may be very difficult to change as they often reflect well-established power imbalances, in many occasions manifest as institutionalised financial incentives which, unless changed, can inhibit reform.

### **3.2.3. Why is it important to re-examine task shifting now?**

There are at least four reasons why it is timely to consider task shifting within health systems. The first is that task shifting can contribute to the *sustainability of the health workforce*. As noted above, health systems in all countries are facing shortages of health workers, with different groups affected to greater or lesser degrees. Historically, in high income these shortages have been met, to some extent, by inward migration, and in some cases by increasing training capacity, yet challenges remain. In these circumstances, it makes little sense for scarce health workers to be undertaking roles that can easily be undertaken by others. Task shifting may also help to address the increasingly recognised problem of burnout among health workers.(24) There is growing evidence that burnout rates are substantially higher among health professionals than in the general population,(25) associated with long hours of work, shift work, and the need to deal with stressful situations.(26, 27) It is associated with risks to the health of those affected, the loss of highly skilled professionals in the workforce, and lower quality of care, in particular through medical errors.(28-31) Research using a variety of methods identifies lack of administrative support, requiring health professions to undertake inappropriate tasks, as a key factor.(24, 32)

Again, this is an area where advances in technology may be able to play a role, yet paradoxically, some new technologies have actually had the opposite effect, so that traditional administrative roles have disappeared, leaving health professionals responsible for, for example, data entry and written communications, tasks that can easily consume considerable amounts of time, if not decreasing quality of care provided (when a general practitioner seeing a patient spends more time looking at a computer than at a patient being a common example).

Second, task shifting can contribute to the *financial sustainability* of health system. Many health professionals spend a considerable amount of their time undertaking activities for which they are overqualified. If it is possible to transfer these responsibilities to less qualified and, consequently, less highly paid health workers, it will reduce costs without affecting health outcomes therefore improving the efficiency of the health system. The saved resources can contribute to sustainability of health spending and/or be re-invested in other valuable healthcare. In other circumstances, transferring roles to a higher qualified health worker, even if more expensive to employ, may be more efficient if their greater expertise means that they use fewer resources or achieve better health outcomes. Task shifting may also support *social sustainability*, meaning the maintenance of a health system that societies trust and want to use.

These changes may involve the transfer of responsibility for an entire package of care, for example where a doctor's role is taken over by a nurse or a nurse's role is taken over by a healthcare assistant. It may also involve separating out the elements of a package, for example where the more routine elements of a surgical procedure are undertaken by someone other than a surgeon but with specialised training in a particular area. There may be cases where the allocative efficiency of the health system is still improved even if task shifting implies a (small) reduction in health outcomes if the costs savings that arise can be re-invested in healthcare with larger health benefits. Task shifting does not have to involve transfers of task exclusively across personnel. Health workers may also be able to be much more efficient if adequately supported by technology. This is an area that is likely to expand considerably in future years, with advances in artificial intelligence, although experience points to the need for a healthy scepticism about many of the claims that are being made.

Third, task shifting can be a means to improve *quality* of care, where evidence shows that activities are performed better by one group than another, such as the example of routine management of uncomplicated chronic disease by nurses cited above, although often this will depend on the context.

Finally, task shifting can enhance the *resilience* of the health system, especially where different professional groups can substitute for one another in emergencies. However, this requires the existence of established, and tested, systems and mechanisms through which task shifting can be adopted and supported in a timely manner. Assembling the right mix of skills in the right place is challenging, given the complexity of modern healthcare. Task shifting can contribute to the flexibility necessary to respond when the system is under pressure.



### **3.3. Types of task shifting**

In thinking about task shifting, we draw on a simplified version of a framework developed by Sibbald et al. to describe potential changes in skill mix in healthcare (Box).(33)

#### **Box 1 A taxonomy of changes in skill mix**

Changing roles	
Enhancement	Increasing the depth of the job by extending the role or skills of a particular group of workers
Substitution/ delegation	Exchanging one type of work from one profession to another profession, breaking traditional professional divides
Innovation	Creating new jobs by introducing a new type of worker (or technology)

Source: Sibbald B, Shen J, McBride A. Changing the skill-mix of the health care workforce. *Journal of health services research & policy* 2004; 9 Suppl 1: 28-38.

#### **3.3.1. Enhancement**

As has been described previously, medical progress has been characterised by a continuing process of enhancement of skills and the corresponding tasks performed, driven by changing patterns of disease and technological advances. Examples include minimally invasive procedures to replace open surgical operations, interventional cardiology in the management of myocardial infarction, or dialysis of patients with acute renal failure. However, similar processes have been taking place with other professional groups. Among them, enhancement of the role of nurses has attracted most attention from researchers, in areas such as the management of chronic disease. There is now considerable evidence that nurse led clinics achieve better results than those conducted by physicians in the management of uncomplicated chronic diseases,(34) although not when the disease is severe.(35)

Another area that has been studied is the enhanced role of pharmacists, who in a number of countries are taking on a much more active role in the management of medicines regimes, advising on interactions, supporting and adherence by patients, and in some cases, prescribing or monitoring the effects of treatment. For example, pharmacists perform as well as or better than physicians in managing anticoagulation.(36, 37)

Midwives have also experienced enhancement of their roles in many countries. A systematic review identified five sets of non-traditional roles that have been assumed by midwives in a number of countries. These are: high dependency care/managing chronic or critical illness in pregnant women; midwife-led care where the midwife is responsible for overall care; neonatal care to maintain a continuity of care with midwife, mother and child; genetic screening and counselling; and abortion services.(38)

A 2016 Cochrane review of prescribing by non-medical health workers found 45 studies in which nurses or pharmacists with high levels of prescribing autonomy were compared with medical prescribers.(22) It concluded that outcomes for non-medical prescribers were comparable to medical prescribers for: high blood pressure (moderate certainty of evidence); diabetes control (high certainty of evidence); high cholesterol (moderate certainty of evidence); adverse events (low certainty of evidence); patient adherence (moderate certainty of evidence); patient satisfaction with care (moderate certainty of evidence); and health-related quality of life (moderate certainty of evidence).

A third group comprises those health workers who crew emergency vehicles. Once, their role was limited to driving ambulances and provision of immediate basic first aid. Now, in many countries, they are trained and equipped to provide advanced life support, including the administration of thrombolytic drugs for patients with suspected myocardial infarctions, initiation of intravenous infusions, and advanced airways management. However, the limited evidence relating to this development is mixed. One early study found a higher mortality among trauma patients treated by paramedics compared to the traditional model whereby patients were taken straight to hospital, attributed potentially to longer delay at the scene of the injury.(39) There is also some evidence that the use of doctors for pre-hospital management of trauma can achieve better results than when it is given by other health workers.(40) However, a cluster randomised controlled trial of paramedics with advanced skills found that they could reduce hospitalisation rates and achieve higher levels of satisfaction compared to a model in which ambulance staff provided only transport.(41) The most recent Cochrane review, from 2014, concluded that there is no benefit for patient outcomes of advanced life support training for ambulance crews.(42)

### **3.3.2. Substitution/ delegation**

Substitution is intrinsically linked to enhancement of roles, for example where one group of workers, such as nurses, enhance their skills and takeover roles that had previously been undertaken by doctors. This is happening in many countries but is proceeding at different rates. A study of nine European countries, comparing 2010 and 2015, found that the scale of change had been considerably greater in The Netherlands, England, and

Scotland, all three of which had implemented regulatory or legislative changes, than in the Czech Republic, Germany, Italy, Norway, Poland, or Turkey.(43)

Levels of patient satisfaction are often better with nurses than primary care doctors. However, nurse consultations are often of longer duration and are associated with more return visits. All but one of the randomised controlled trials included had been conducted in high income countries. Obviously, these results will be context dependent. Other research suggests that, at the risk of generalisation, nurses often have greater interpersonal skills while physicians are better at resolving technical problems.(44) However, that research is now 20 years old, since when medical education in some countries has placed a much higher emphasis on communication skills,(45-47) while nurse education has become more technical. A number of studies have looked at the role of nurses in specialised areas, finding, for example, that they are less likely to intervene in neonatal care than are doctors, while achieving comparable outcomes.(48) Childbirth is an area where there is wide variation in professional roles among countries, reflecting a combination of historical norms and financial incentives. In general, midwives achieve higher levels of maternal satisfaction, better assessments of mothers and children, and at the same time cost savings. Some hospitals have introduced the model of emergency nurse practitioners, with one randomised trial finding that they achieve similar outcomes but higher levels of patient satisfaction, while delivering better documentation than junior doctors.(49) Another found them to deliver similar quality of care to junior doctors, although both performed less well than more experienced doctors.(50) Yet another trial found that the quality of care was similar to that delivered by junior doctors but nurses were reported as giving more information and achieving higher patient satisfaction.(51) Finally, one study found them to be equally skilled at interpreting radiographs.(52) The development of other professional groups allied to medicine has taken place to varying extents across Europe. A recent systematic review of spinal manipulative therapy by chiropractors found that the quality of evidence was generally poor but it did seem to achieve similar results to conventional therapy in relief of pain but better restoration of function, although with a potential risk of adverse effects.(53)

In general, therefore, non-medical groups with specialised expertise, such as dieticians and physiotherapists, get better results than physicians undertaking the corresponding roles among many others.

Much of the evidence on delegation relates to the transfer of tasks from trained nurses to less skilled individuals, a group that goes under various names including healthcare assistants and nursing assistants. This is not necessarily cheaper, with some research suggesting that lower skilled nursing assistants may have higher rates of absenteeism and turnover, while they may be less willing to take the initiative when patients have

problems. There is also a growing body of research showing that outcomes, including in-hospital mortality, are improved where there are more trained nurses.(2, 3, 54, 55)

A substantial amount of care has always been provided by informal carers. The ANCIEN study, using Eurobarometer data from 2007, in 2012, found that, on average, 14% of respondents were providing care for someone unable to perform at least one activity of daily living, varying from just over 10% in Denmark to almost 19% in Lithuania.(56) It identified four clusters of countries, defined in terms of how long-term care is provided. The first comprises the Nordic countries, where care of older people is largely the responsibility of the state and where people pay high taxes but get generous provision in return. The second are the Anglo-Saxon countries, where people pay low taxes but then take responsibility for themselves, with the state providing a safety net once they have run out of money (and assets). The third comprises the Mediterranean countries, where the family is the natural provider, with the state only becoming involved where this fails. The fourth group are the countries of Central and Eastern Europe, where those who did live into old age were looked after mainly by relatives. In all of these clusters, informal care is about twice as likely to be provided by women. There is a clear association with age, with 5-8% of those aged 15-29 acting as carers, with the corresponding figures 13-20% among those aged 65+.

Finally, task shifting can be from health workers to patients. The concept of the "expert patient" recognises that individuals with long term conditions often develop a high levels of skills in managing them. Thus, since the first glucometer was developed in 1970, patients with type 1 diabetes have been monitoring their condition using test strips, now being replaced by continuous glucose monitoring, adapting their insulin dosage, which they self-administer, as required. Self-management is increasingly being used with other chronic conditions. A Cochrane review of self-management of chronic obstructive pulmonary disease found that those that included a plan for managing exacerbations were associated with improved quality of life and fewer admissions, with no increase in all-cause mortality.(57) It is also important to recognise when shifting to self-management has been found to be challenging for patients and may require additional educational and psychological support, for example during the transition from adolescence to adulthood.(58, 59)

During the public hearing the role of patients' organisations was raised but this goes beyond this particular opinion and was addressed in the public hearing, as can be seen in the report available on the Panel website.

### 3.3.3. Innovation

This can involve the development of new types of existing professionals, following the acquisition of new skills. Examples might be nurses specialising in the care of patients recovering from cancer, providing care for those with colostomies or post mastectomy. Others are entirely new types of worker. Over the past 30 years, many health systems have introduced phlebotomists to take blood samples, a task that would once have been the responsibility of the doctors or nurses. More recently, some countries are introducing physician's assistants, to take over some of the work undertaken by doctors. Another form of innovation, used increasingly in low and middle income settings, but also in some high income settings, is the employment of community health workers, both paid and volunteers. For example, there are many systematic reviews supporting the effective use of task shifting for mental health in LMICs, including those focused on specific populations such as people living with HIV/AIDS or mothers with post-partum depression. While the promotion and development of new professional roles have the potential to support cost containment and improved health care delivery, the optimal skill-mix needed to realise such benefits deserves further scrutiny and future research.(60)

In addition, other areas falling within this category involve the transfer of tasks from humans to technology, for example in laboratories. Many of these changes have taken place without attracting much attention. Thus, BP is now commonly measured using an automated sphygmomanometer, rather than a mercury one, which required a trained health professional. This has made it possible for those with hypertension to take control of their condition, monitoring their blood pressure on a daily basis.

Innovation can also lead to the withdrawal of certain roles or tasks. For example, patients can often make medical appointments and order repeat medications using website interfaces or mobile phone apps. Similarly, patients can self-test for HIV using kits ordered via the internet. These systems may reduce the need for administrative or pre-test counselling roles.

Looking ahead, this is an area where there is much interest in the use of artificial intelligence, example being the automated reading of mammograms.

Beyond that, there is considerable theoretical potential for shifting responsibility for the diagnosis and management of some conditions to individuals, taking advantage of wearable technology.(61) Thus, many existing phones have the ability to track levels of physical activity.

### 3.4. What tasks can be shifted? The evidence

#### 3.4.1. Task shifting from health professionals to patients

In deciding whether a particular task can be undertaken by a specific type of professional, several issues must be considered. First, does the task need to be carried out by a health professional at all? As noted above, patients with long term conditions (or parents of children who have these conditions) often become experts in monitoring and managing these conditions. Increasingly, they can draw on support from technology, including devices that can monitor physiological parameters in real time, such as blood glucose.

A 2014 review of self-management of COPD traced how this concept had changed over four decades.(62) It began with a description of patients in a classroom, being taught in a didactic manner by a nurse, taken from a 1971 paper.(63) The focus is on the pathophysiology of the condition and the patients are expected to be passive recipients of information. Yet, it is now recognised that this approach is of very little value, with patient education and treatment plans largely ineffective.(64)

A widely used definition of self-management is the ability to *"... manage the symptoms, treatment, physical and psychosocial consequences and life style changes inherent in living with a chronic condition. ... [the] ability to monitor one's condition and to effect the cognitive, behavioural and emotional responses necessary to maintain a satisfactory quality of life"* (65) It emphasises the importance of adopting the patient's point of view and provides an agenda for health professionals and others to encourage patients to acquire and apply certain skills to help them manage their illness. These skills are gathering information, managing medication, managing symptoms, managing psychological consequences, adjusting their lifestyle, using social support, and communicating effectively.

It is beyond the scope of this opinion to review comprehensively the evidence on self-management of chronic conditions. A search of the Cochrane Library conducted in March 2019 using the key word "self-management" identified 75 systematic reviews, with most addressing specific diseases, such as epilepsy, diabetes, or stroke, while others focus on specific methods, such as mobile phone messaging or mobile technology interventions. The authors' conclusions from relevant reviews published since 2014 are set out in Annex 1.

These reviews suggest that the evidence base for self-management of many long term conditions is relatively weak, reflecting a combination of limitations of many of the studies that have been undertaken and a lack of studies on key issues. It does seem to be associated with improved quality of life for patients with stroke and COPD, although

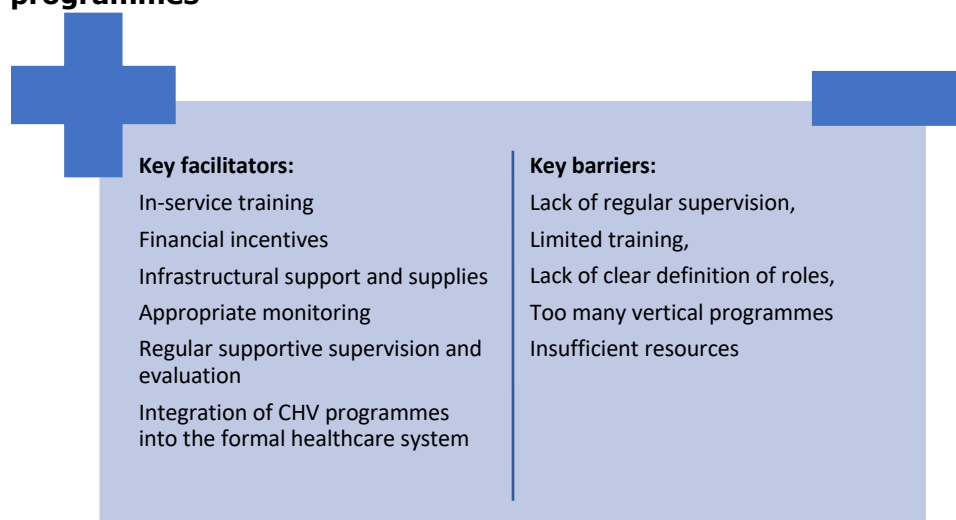
self-management of exacerbations of COPD may be associated with higher respiratory mortality. The evidence in support of technology is also limited; it has been associated with better control of oral anti-coagulation but other forms of monitoring, such as pulse oximetry, are not supported. Similarly, the role of peer workers, who are usually individuals that have experience of living with a particular condition who then offer support to others, is attracting growing attention.(66) However, at least in mental health, the area where it has been studied most, the evidence of effectiveness is weak,(67) although a meta-analysis finds that it can reduce symptoms of depression compared with usual care, but is no better than cognitive behavioural therapy.(68)

### **3.4.2. Task shifting to community workers**

A systematic review of the use of community health workers for maternal and child health found that they were providing a range of preventive interventions in low- and middle-income countries.(72) The review found some evidence of effective strategies but concluded that there was insufficient evidence for most interventions. A scoping review of the role of community health workers in Canada and other high-income settings, found that while there was evidence to suggest that this group of workers provide a range of health-related services and represent an often under-utilised public health work force, much of their activities are unregulated and unrecognised.(73) Therefore, they require better integration into the health and social care systems in order to realise the full potential of their roles. Similarly, another scoping review of 20 studies concluded that while patient navigators may facilitate connecting patients who require primary care to the relevant health professional as well as supporting the wider agenda of patient-centred care.(74) However, further research is needed to detail the impact and cost-effectiveness of this role and the experience of patients and their families who interact with them and the service they provide.

A recent umbrella review of the use of community health volunteers found 39 systematic reviews.(75) Most concluded that services provided by these volunteers were not inferior to those provided by other health workers, and sometimes better. However, they performed less well with more complex tasks such as diagnosis and counselling. Many of the reviews concluded that their performance could be strengthened by regular supportive supervision, in-service training and adequate logistical support, as well as a high level of community ownership. This review identified a series of facilitators and barriers to successful implementation (Figure 1). It seems especially important to ensure that adequate training is provided and ongoing supportive environments exist. The review found no evidence supporting their involvement in the management of complex care activities.

**Figure 1 Key facilitators and barriers to success of volunteer-led health programmes**



Source: Woldie et al. 2018

### 3.4.3. Task shifting from health workers to technology

Manufacturing and services industries are being transformed by the introduction of new technology, such as robots(76), internet-based applications, and blockchain, making it possible to organize work in new ways, giving rise to the term “industry 4.0”.(77) These developments have had a major impact on other industries, such as transportation, where monotonous work that once involved processing of documents is being shifted to autonomously acting agents. So far, the impact on health services has been somewhat less, in part because of the nature of the interaction between the patient and health professional, characterised by empathy and responsiveness to subtle verbal and non-verbal cues. Nonetheless, there are a growing number of tasks that are being shifted from health workers to technology (Table 1).

**Table 1 Potential areas of task shifting to technology**

<ul style="list-style-type: none"> <li>• autonomous embodied agents (e.g. apps to support people with mental health problems)</li> <li>• digital image processing (e.g. radiology, sperm counts, haematology/ cytology)</li> <li>• replacing laboratory personnel by automated production lines (3D printing of implants, automated biochemical analysis, microbial genetic analysis replacing culture)</li> <li>• autonomous monitoring and alert systems based on wearable technologies supported by artificial intelligence on servers and cloud technology (e.g. blood pressure, ECG, oximetry, blood glucose, ovarian cycle monitoring (e.g. www.ladytechnologies.com))</li> <li>• robot assisted physiotherapy and rehabilitation</li> <li>• replacement of administrative staff (e.g. automated hospital coding replacing human coders)</li> <li>• automatic/robotic medication dispensing systems</li> <li>• artificial intelligence supported decision making</li> </ul>
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Source: Authors' compilation

It is beyond the scope of this opinion to review in detail the evidence for all of these. Instead, the following sections summarise some key issues.

Autonomous embodied agents are being used increasingly with voice recognition technology to interact with humans in a number of consumer facing areas, such as mobile banking. The rapid growth of smart phones and other handheld devices has encouraged developers to create apps that might be used to support people with mental or physical health problems. A systematic review of mental health mobile apps for preadolescents and adolescents, published in 2017, identified 24 relevant publications covering 15 different apps.(78) Two small RCTs and one case study found no evidence of benefit and six apps aimed at children and adolescents had never been evaluated. The authors concluded that the evidence base was inadequate to support the use of any of these products. Another systematic review, also published in 2017, included 27 studies of mobile apps and SMS messaging for physical and mental health problems.(79) Primary outcome measures included weight management, smoking cessation in pregnancy, medication adherence, and reduction in depression, anxiety, and stress. The authors concluded that mobile apps and SMS messaging showed promising evidence of efficacy. However, a more recent review criticised the methodology of many evaluations of apps, noting the use of diverse, and frequently non-standardised or validated outcome measures.(80)

Autonomous monitoring and alert systems would seem to have considerable potential to detect episodic problems such as arrhythmias. One evaluation, in which 102 hospitalised patients were assessed using both continuous ECG monitoring and a variety of wearables found a high level of agreement for heart rate estimation in sinus rhythm and atrial flutter but underestimation of heart rate in atrial fibrillation.(81) However, this provides no information on the accuracy of these devices when used by healthy active individuals in the community. The Apple Watch is, however, being evaluated in a large scale study that will examine the predictive value of arrhythmias detected in wearers.(82) However, this has raised concern about the risk of false positives, leading to significant over diagnosis, with additional workload for health systems and potentially increased levels of undue patient anxiety.(83)

There are important questions about these devices and apps. Thus, one recent study, looking at apps that could be used by patients with chronic kidney disease, described how they were difficult to find and to assess and, like wearable technology, gave rise to substantial concerns about security of the data generated.(84) These concerns reflect growing awareness of the way in which information captured by social media have been used to target individuals for marketing purposes, or in some cases to discriminate

against those with particular characteristics.(85) Thus, the business models of some of the companies involved are extremely opaque, attracting vast sums from investors despite failing to generate significant returns so far.(86) This has raised fears that they will seek to exploit the health data they harvest from users for other purposes, as was done in the United Kingdom EU referendum campaign when what appeared to be a football competition on social media was actually an exercise to facilitate targeting individuals with anti-EU messages.(87)

There is also growing use of robots in a number of areas of clinical care. Most attention has focused on robotic surgery, with a journal dedicated to the subject established in 2008. A review of robotic techniques in reproductive surgery found them to be associated with decreased blood loss, less post-operative pain, shorter hospital stay, and faster convalescence, while achieving similar outcomes for the primary objective of the procedure.(88) Another, in the treatment of rectal cancer, found a lower rate of conversion from laparoscopic to open surgery, but longer operating time,(89) with similar findings in a systematic review of their use in pancreatic surgery.(90) However, a systematic review of robotic knee arthroplasty found no difference in operating times and better mechanical alignment.(91) Overall, it seems that robotic surgery does offer certain benefits but each case should be assessed on its merits as the outcomes are not invariably better than with conventional surgery. A caveat is, however, required. A recent study found that the probability that trials of robotic surgery would generate positive results was correlated with the scale of financial conflict of interest.(92)

In the area of physiotherapy and rehabilitation, a systematic review of robot-assisted interventions for patients with spinal cord injuries identified 11 RCTs, finding their use associated with greater walking independence and endurance.(93) The authors concluded that robot-assisted training has potential as an adjunct to existing rehabilitation programmes.

Robotic medication dispensing has the potential to reduce dispensing errors. One before-and-after study found substantial reductions in dispensing errors and stockouts, with increased staff satisfaction.(94)

Finally, the potential use of artificial intelligence to facilitate diagnosis has attracted considerable attention.(95, 96) Once again, there are both opportunities and concerns. These concerns include a growing number of unintended consequences, such as what has been termed "e-iatrogenesis", defined as "patient harm caused at least in part by the application of health information technology".(97) A recent review of these unintended consequences described a series of problems,(98) such as where skilled human observers presented with images already annotated by computers had reduced accuracy and where algorithms developed in one setting gave misleading results in another. Use of

such algorithms may be more suitable for environments where continuous monitoring provides access to timely and precise data, with clear cut-off points for decision-making (e.g. ICU). However, where decisions rely more on clinical judgment and patient-centred dialogue, as in primary care, their use may not be appropriate. One app, now being promoted within the English National Health Service has come under particular criticism for its accuracy, leading to complaints to the medical device regulator,(99) with users circulating examples of highly implausible diagnoses on social media. Further concerns relate to the scope for attacks on the software, manipulating algorithms for a variety of reasons, with potentially dangerous consequences and privacy, following revelations about widespread abuses of data collected on social media,(100) especially given the intimate nature of some of the information collected.(101)

A related issue is the use of advances in information technology to facilitate task shifting between different groups of health professionals. A systematic review that included 13 studies, 11 RCTs, identified a number of applications of information technology to support patients with chronic diseases.(132) These included electronic decision support tools, electronic platforms linked to a call centre, electronic health records, and electronic communication applications. The authors concluded that the inclusion of information technology in shared care can improve some outcomes, such as confidence and satisfaction, especially where this involves electronic communication systems. Other outcomes were mixed. Overall, the evidence was quite limited.

Adoption of electronic health records forms a key element of many approaches to task shifting, enabling the exchange of information among different professional groups. However, there are concerns that existing systems can be cumbersome, requiring complex data entry processes. A systematic review found significant increases in the amount of time that physicians and nurses spent documenting patients' records although the authors suggested that there was some evidence of the time required reducing as staff became more familiar with the new systems.(133)

As with self-management, there is a growing interest in the use of mobile technology within hospitals. A systematic review of the impact of mobile technology on teamwork and communications within hospitals found that few of the studies were of high quality.(134) However, the authors did suggest that the available evidence pointed to the potential, if not yet the realisation, of improvements in workflow, the quality and efficiency of communication, and enhanced accessibility and improved relationships within teams.

A Cochrane review of computerised advice on drug dosage to improve prescribing practice, now rather outdated as it included studies only up to January 2012, found a number of benefits.(135) These included an increase in the number of patients receiving aminoglycoside antibiotics with levels inside the therapeutic range, better control of

circulating levels of oral anticoagulants and insulin, a reduction in the time taken to achieve stabilisation with oral anticoagulants, a reduction in unwanted effects from antirejection drugs, and reduction in thromboembolism events with anticoagulants. The authors noted that many studies had a high risk of bias and urged caution in interpreting the results. Furthermore, they found no evidence of an impact on mortality or other adverse events.

A systematic review of electronic clinical decision-making tools identified five studies, four of which were RCTs.(136) All but one found a significant reduction in prescribing of potentially inappropriate medicines, with a meta-analysis of two trials providing a summary relative risk of 0.82 (95% CI 0.76-0.88)

### **3.4.4. Task shifting between different types of health workers**

We have sought to identify the scope for task shifting within the health system by conducting an umbrella review, as it is far beyond the scope of this opinion to conduct a series of new systematic reviews. The search strategy is reported in Annex 2. A formal review, including assessment of quality of studies, was also beyond the scope of this opinion, while the heterogeneity of studies precluded a meta-analysis. The initial search yielded 631 publications. There was considerable duplication, for example where a Cochrane review was also published in an academic journal or a major review superseded several earlier smaller ones. Thus, only those which contributed something that was substantially new were retained, with 44 reviews summarised in the following sections.

From the outset, it is necessary to recognise that this approach has certain limitations. First, as will be discussed later, much task shifting takes place informally and is never evaluated. Second, those changes that are evaluated tend to be within larger innovations, such as the development of new models of care. Hence, relatively few examine straightforward substitution of one role for another. Third, as with all health services research, evaluations are distributed very unevenly geographically, with most taking place in a small number of countries, which in Europe include the United Kingdom, the Netherlands, and Scandinavia predominantly. We also have not included a search of the “grey” literature.

The findings could be presented in various ways, such as by the type of task shifting (enhancement/ substitution/ innovation) or the professional group involved. However, the variety of topics defies simple classification so, instead, we present them according to a list of topics that, while lacking a theoretical basis, offers a pragmatic solution to the challenges involved and was informed by consideration of the dominant topics covered in the selected reviews.

### 3.4.5. Substitution of nurses for doctors

A Cochrane review identified 16 studies in which nurses were substituted for doctors in primary care.(102) In seven, the nurse assumed responsibility for first contact and ongoing care for all presenting patients. There was considerable heterogeneity in the outcomes investigated, precluding data synthesis. In general, however, there were no appreciable differences in the studies between doctors and nurses and health outcomes, process of care, resource utilisation, or costs. In five studies, nurses assumed responsibility for first contact care for patients requiring urgent consultations during routine office hours. Again, patient outcomes were similar, but patient satisfaction was higher with nurse led care. The nurses tended to provide longer consultations, give more information to patients, but also recalled patients more frequently than did doctors. In four studies, the nurse took responsibility for the ongoing management of patients with specified chronic conditions. Again, the outcomes investigated varied, but overall there were no appreciable differences in health outcomes, process of care resource utilisation, or cost. The authors expressed caution because only one study was adequately powered to assess equivalence of care and many of the studies have methodological limitations but they concluded that, overall, appropriately trained nurses can produce as high-quality care as primary care doctors, with good health outcomes in certain settings. They also noted that the impact on workload may be limited because nurses are addressing previously unmet needs or are generating demand for care that previously was unavailable.

A Cochrane review identified five studies comparing nurse led and physician led care of patients with asthma.(103) There was no significant difference between the two models of care, and the one study that examined costs also found no difference. Three trials reported quality of life, again finding no significant difference.

Weaning patients off mechanical ventilation can be very difficult and, historically, it has been undertaken by anaesthetists or intensive care physicians. A systematic review identified three studies comparing nurse and physician led weaning.(104) Nurse led weaning was associated with a non-significant reduction in the duration of mechanical ventilation (mean difference = -1.69 days, 95% CI -3.23 to 0.16), and significant reductions in length of stay in the intensive care unit (mean difference = -2.04 days, 95% CI -2.57 to -1.52) and in hospital (mean difference = -2.9 days, 95% CI -4.24-1.56). This evidence supports an enhanced role for appropriately trained nurses in intensive care units.

Four studies comparing nurse and physician led management of obstructive sleep apnoea found no differences in outcomes.(105)

It should be noted however, that while many of the studies demonstrated the positive impacts of nurse led care for health systems and patient outcomes, particularly in the context of well-defined and protocol driven care pathways, further research is needed to explore this model of care with complex patients who have multi-morbidity.

### **3.4.6. Enhancing the role of pharmacists**

Historically, hospital pharmacists stayed in the pharmacy, with their role limited to preparing and dispensing medicines prescribed by physicians. Their manufacturing role has long since gone, with modern medicines prepared in industrial processes subject to tight regulation and distributed in carefully designed packages accompanied by detailed information sheets. At the same time, an increasing number of patients are taking multiple medications, creating a risk of interaction and, in an increasingly frail elderly population, in dosages that need to be tailored to the individual's renal or hepatic function. Getting this right requires specialised knowledge of pharmacokinetics, in some cases beyond what can be expected from the generalist physician or the physician caring for a patient who has additional health problems beyond their normal scope of practice. As a result, pharmacists are increasingly present on wards and in outpatient clinics in a number of countries. A systematic review and meta-analysis of the role of pharmacists on hospital wards identified 18 RCTs and 7 economic evaluations.(106) It concluded that the regular involvement of pharmacist was cost-effective, with an Incremental Cost-Effectiveness Ratio of £632/ QALY gained, and was associated with a reduction in mean length of stay of 1.74 days (95% CI 2.76-0.74) and an increase in the probability that patients or carers would report satisfaction (relative risk = 1.49, 95% CI 1.09 to 2.03).

Another meta-analysis reviewed 13 RCTs that had examined enhancement of the role of pharmacists, giving them a role in supporting the discharge of patients from hospital.(107) 10 of the RCTs used medication errors as an outcome, finding that pharmacist involvement was associated with a significant reduction of over 50% (odds ratio 0.44, 95% CI 0.31 to 0.63). Four examined the incidence of subsequent emergency room visits, finding a significant reduction of almost 60% (OR 0.42, 95% CI 0.22-0.78). Similar findings were obtained in a systematic review and meta-analysis of pharmacist led medication reconciliation programs during discharge from hospital, with a marked reduction in re-attendance for adverse drug events (relative risk= 0.33, 95% CI 0.20-0.53), and in emergency department visits (RR 0.72, 95% CI 0.57-0.92).(108) Another systematic review reached a similar conclusion.(109) Many of these studies involved adult patients. However, one systematic review looked specifically at the use of clinical pharmacists on paediatric wards, finding improved understanding of medication and adherence, improved patient satisfaction, and better control of chronic conditions.(110)

Another systematic review looked at the impact of multifaceted pharmacist-led interventions in hospital settings.(111) 28 studies were identified, of which six were multicentre and 16 were RCTs. In each of them, usual care was the comparator. 11 found improved quality of medication use, although one found it was worse. 4 reported either a reduction in length of stay or a postponement of revisits, with one finding an adverse effect. All studies examining mortality, patient reported outcomes, and cost effectiveness found no significant results. The authors concluded that greater involvement of pharmacists could improve medication use and reduce utilisation of services, but with no evidence of benefit for patient outcomes.

Another systematic review looked at the role of pharmacists, working in multiple settings in hospitals, ambulatory care facilities and community settings, to support patients with stroke.(112) Although the evidence was limited, it pointed to a potential contribution in addressing problems with medication, including greater use of evidence-based therapies, adherence to treatment, and reduction in risk factors. Not all reviews were, however, so positive and a systematic review of 17 studies in which a pharmacist participated in the medication reviews with patients following acute coronary syndrome found mixed evidence of improved adherence.(113)

A systematic review that included 25 studies of pharmacist managed services for people with diabetes included a wide range of services, from general therapeutic monitoring to targeted education and immunisation services.(114) Thus, it was difficult to combine the studies but, consistently, they found cost savings compared with usual practice, which in most cases involved delivery by physicians.

### **3.4.7. Pre-operative assessment of patients**

Historically, preoperative assessment of patients undergoing surgery was undertaken by doctors. A Cochrane review examined nurse led preoperative assessment, finding one randomised and one nonrandomised study, both looking at the accuracy of the assessment.(115) One included an economic evaluation. There was no evidence of any difference in performance or in cost.

### **3.4.8. Prescribing by non-physicians**

A Cochrane review of prescribing by non-doctors in primary and secondary care found 46 studies.(22) 26 examined prescribing by nurses and 20 by pharmacists. 45 compared non-medical prescribing with the usual medical prescribing, while one compared nurse prescribing supported by guidelines with what was the usual nurse prescribing care. There was considerable variety among countries in the training required for non-medical prescribing. A meta-analysis found that non-medical prescribing was associated with reduction of risk factors, including blood pressure, lipids, and glycosylated haemoglobin.

Although there was considerable heterogeneity among studies, there was also evidence associating non-medical prescribing with improved medicines adherence. There was little evidence on patient-related adverse effects. Patients generally reported satisfaction with non-medical prescribers. Importantly, non-medical prescribers tend to prescribe more drugs, intensified drug doses, and used a greater variety of drugs than medical prescribers. There was little difference in subsequent hospitalisations, emergency department visits, or outpatient visits. The authors concluded that non-medical prescribers, practising with varying but high levels of prescribing autonomy, in specific settings, often within protocols, were as effective as usual care medical prescribers. Another systematic review, which included three RCTs in different settings reached similar conclusions.(116)

A systematic review of pharmacist prescribing in hospital settings included 15 studies.(117) Many of the studies were underpowered, and there was considerable heterogeneity in outcomes. However, in general, pharmacists were found to be better at adhering to warfarin dosing nomograms than doctors, were more likely to maintain patients within the therapeutic range for anticoagulation, made fewer prescribing errors and omissions, and achieved similar levels of satisfaction from patients.

### **3.4.9. Enhanced roles of nurses**

A Cochrane review of hospital nurse staffing models identified 15 studies suitable for inclusion.(118) However, the authors concluded that the evidence they provided was limited. There was no evidence that the addition of specialist nurses to nursing staff reduced mortality, emergency department attendances, or readmission rates, but did seem to be associated with shorter length of stay and reductions in pressure ulcers. The addition of specialist support staff, such as those providing dietary advice, did seem to be associated with improved patient outcomes.

A growing body of evidence supports a model of care for cancer survivors that is patient centred, based on long-term relationships with trusted health workers. A systematic review of nurse-led case management identified nine experimental studies.(119) The authors concluded that nurse led case management improved patient's quality of life and significantly reduced hospital readmission rates, but there was mixed evidence on whether this model could reduce healthcare costs.

A meta-analysis of five studies comparing nurse coordinated care with usual care for chronic renal disease found that the former was associated with reduced risk of death and slowed progression to end-stage renal failure, although there was a small increase in the incidence of cardiovascular complications, demonstrating the need to consider both the strengths and limitations or undesired impacts of nurse led care.(120)



The emergence of palliative care has created opportunities for new ways of doing things. In many countries, nurses have played a key role in developing services. A systematic review of clinical nurse specialist led interventions with patients who have palliative care needs found 37 RCTs, 13 economic evaluations, and a number of studies using other methods.(121) The authors concluded that clinical nurse specialist interventions can be effective in reducing hospitalisations, length of stay, and costs of care, but the evidence on their cost effectiveness was mixed.

The importance of rehabilitation following cardiac surgery is now well-established. One systematic review examined the effectiveness of nurse led rehabilitation programs compared to usual care.(121) The authors concluded that there was not enough evidence to support or discourage nurse led rehabilitation programs based on changes in health-related quality of life, although the sparse data was suggestive of the benefit. A similar concept has been applied to patients needing intensive care units, reflecting recognition of what has been termed the post intensive care syndrome (PICS). However, a systematic review of interventions to support patients following discharge, which identified four RCTs and one nonrandomised study, 4 led by nurses and one by a multidisciplinary team, concluded that the evidence was insufficient to determine whether this approach was effective, with the findings allowing them to say with reasonable certainty that there was no impact on mortality or health-related quality of life.(122)

A Cochrane review of the organisation of clinical services for heart failure found good evidence that case management led by a nurse specialising in heart failure reduced readmissions, for both all causes and heart failure specifically, as well as all-cause mortality.(123) The authors were not able to identify which particular elements of the interventions were most important, but found that telephone follow-up by the nurse was common to many of those that were successful. These findings are consistent with another systematic review, finding access to a specialist heart failure team reduced readmissions and mortality.(124) They also found that a collaborative model of care in the community, where a primary care physician shared care with the cardiologist, improved patient outcomes. Another Cochrane review examined the role of nurse led management of patients with heart failure, where the nurses titrated the dosage of medication to the condition of the patient.(125) It concluded that nurse led teams were associated with significantly improved outcomes, in terms of hospital admissions and mortality. They concluded that the use of nurse led teams could prevent the deaths of 27 in every 1,000 patients receiving that model of care.

Another group that may benefit from post discharge care by health workers adopting new roles are those with chronic respiratory disease. A systematic review and meta-analysis examined the use of a trained nurse educator in discharge planning of children with

asthma.(126) The authors found a significant reduction in re-hospitalisation for exacerbations (Odds ratio 0.29, 95% CI 0.16 to 0.50 ). However, there was no significant difference in emergency department or general practitioner attendances. Nor was there any evidence on cost effectiveness, length of stay of subsequent hospitalisations, or adherence to medications.

A systematic review of the use of specialist nurses in the care of women with gynaecological cancer included seven qualitative studies.(127) The evidence synthesis concluded that specialist nurses could play a role in understanding and meeting the individual needs of women affected, they could guide women along the continuum of care, and were trusted by their patients.

The term nurse champion has been used to designate senior nurses who can increase awareness of a condition among other nurses, providing training and mentorship. A systematic review of the use of nurse champions in diabetes identified three RCTs and several other studies using a range of methodologies.(128) The authors concluded that implementation of a nurse champion model improved knowledge of diabetes among nurses and patient outcomes, including control of blood glucose, quality of life, and reduced diabetic emergencies.

In contrast to many of the other studies of enhanced nursing roles, a systematic review of nine studies, seven of which were RCTs, examining geriatric focused nursing assessment in emergency departments found no overall benefit, and in fact there was some evidence of an increase in subsequent emergency visits in the intervention group.(129) Finally, there are few studies of the cost effectiveness of clinical nurse specialists and nurse practitioners and inpatient roles, and overall the quality of the economic analyses was described as poor in one systematic review.(130)

Alongside this body of research on effectiveness and impact, a recent Cochrane review of 66 qualitative studies (11 from low- or middle-income countries and 55 from high-income countries), explored the factors that influence implementation of interventions to substitute doctors with nurses in the primary care setting, as well as patient acceptance and views of such interventions.(131) All those involved, patients, doctors and nurses, were found to welcome new models of care that involved shifting of tasks to nurses. Importantly, however, certain features of the tasks, for example how “medical” they were perceived to be and how health promotion/prevention in nature they were, were of importance to patients and nurses, respectively, in shaping their acceptance of the task shift. Nurses valued adequate training, a close doctor-nurse relationship as well as expressions of value and respect from doctors, and felt that tasking shifting allowed them to gain new skills and develop personally. Both doctors and nurses highlighted the need for adequate resources to undertake task shifting effectively and efficiently, and also

noted the considerable amount of paperwork that accompanied shifting a task from one professional group to another. These issues have important implications for designing, implementing and evaluating future task shifting interventions as well as the creation of professional groups and environments conducive to adopting such initiatives.

### **3.4.10. Innovative models of care**

Several reviews examined innovations in delivery of care that included some element of task shifting. Most involve the creation of multidisciplinary teams and, while it is beyond the scope of this opinion to examine team working specifically, they are included here because they provide some information about collaborative working across professional boundaries.

Given the complex needs of patients with cancer, there has been growing use of multidisciplinary teams. A systematic review sought to identify what characteristics of multidisciplinary cancer clinics were most effective.(137) There was some evidence supporting a reduced interval between diagnosis and treatment, and some very limited evidence pointing to improvements in patient satisfaction, increased collaboration within the clinical team, and better communication. However, overall, the authors noted that there was a marked paucity of evidence on which to base decisions.

In a meta-analysis of the use of fracture liaison services, designed to support patients who have experienced an osteoporotic fracture,(138) the authors identified 57 high quality RCTs. The meta-analysis found that the use of liaison services was associated with a 27% increase in the probability that the patient would have bone mineral density testing. Components associated with success included multidisciplinary involvement, with a dedicated case manager, regular assessment and follow-up, and multifaceted interventions.

Advances in medical care have greatly increased the need for vascular access. It has been suggested that that Vascular Access Specialist Teams (VAST) can improve clinical outcomes and patient experience. However, a systematic review found no evidence to support this argument, although as the authors noted, this could change when an ongoing study reports.(139)

A Cochrane review of interventions to promote collaboration between doctors and nurses found two trials.(140) In one, the intervention was the implementation of structured daily team ward rounds in which nurses, doctors, and other professionals make decisions jointly. It found a reduced length of stay and a reduction in hospital charges. There were no differences in mortality rates or the destination on discharge. The second trial examined a similar intervention, although undertaken four times per week. In this case, there were no significant differences.

### 3.4.11. Other forms of task shifting

A systematic review of care provided by mid-level and higher-level health workers found little difference between the effectiveness of care in areas such as maternal and child health and communicable and non-communicable diseases.(141) In obstetric care, rates of episiotomy and analgesia use were significantly lower in women cared for by midwives compared to doctors (likely driven by multiple factors), and the satisfaction of the woman giving birth was higher.

The HIV epidemic was an important stimulus to interest in task shifting, given the shortage of trained health workers in many of the countries most affected. A Cochrane review identified 10 studies, all in Africa.(142) Four were RCTs and the remainder cohort studies. There was good evidence from the RCTs that initiation and maintenance of antiretroviral therapy by nurses was associated with no difference in mortality but reduced loss to follow up. The cohort studies suggest a small increase in the risk of death in the group where care was provided by non-physicians and no difference in loss to follow up, although in this case the confidence intervals were very wide. Care initiated by doctors, with nurses undertaking follow-up, was not associated with any differences in survival or follow-up.

An initiative in Scotland, which is facing a severe shortage of general practitioners, compared the conventional model, where patients with musculoskeletal problems are seen first by doctors, with one in which extended scope physiotherapists managed patients independently, referring for orthopaedic opinions where necessary. Using a range of measures, including patient satisfaction and appropriateness of referrals, it found that the two models achieved comparable results.(143)

### 3.4.12. Summary

Task shifting can take many forms. Tasks can be shifted from health workers to patients and their carers, to technology, and to other health workers.

There are many theoretical arguments for greater self-management of long-term conditions, placing the patient in control. Of course, for many conditions, such as diabetes, this already happens to a considerable extent, increasingly aided by the introduction of new technology, such as continuous glucose monitoring. It is arguable that, because the benefits are so obvious compared to the alternative, this model of care has not been subject to evaluation. Following from this, those models of self-management that have been evaluated are ones that involve an enhanced role for the patient. The evidence reviewed here is, of necessity, incomplete, as it was far beyond the scope of this opinion to undertake the very large number of systematic reviews that

would be required. However, by examining in detail the existing Cochrane reviews, it is possible to obtain a broad overview of the available evidence.

This evidence can be summarised, broadly, as showing that most of the self-management interventions do not improve outcomes for patients but neither do they do any harm. Some do give patients a greater sense of control, although this should be interpreted in the light of differences within the population in the extent to which individuals actually want to take responsibility for their conditions. Thus, in a recent study in which patients in hospital were asked if they wished to self-administer their medication, a relatively simple act, while 84% were willing to do so, the remainder were not.(144) One factor that seems to be important is the extent to which the patient views the particular condition as able to be controlled, with greater enthusiasm for self-management of diabetes and asthma than migraine.(145)

The conditions where self-management does seem to be most effective are those characterised by frequent changes in physiological parameters, such as blood glucose or blood clotting in those on anticoagulants. In these cases, the patient is aided by technology. However, each situation should be judged on its own merits, with no reliable evidence that pulse oximetry helps patients experiencing exacerbations of asthma.

On balance, it seems that decisions about self-management should be taken by the individual patient, advised by their health professionals and the available evidence. This approach cannot be considered a universal panacea, but does seem to offer benefits for patients who seek greater autonomy and feel able to assume it and should be integrated as part of a wider goal-oriented care approach.

The evidence on task shifting to community workers, whether paid or volunteers, is mixed. They are capable of undertaking many basic tasks, as well as or in some cases better than trained health workers, but only if they are well-defined and clearly structured. They do, however, require adequate training, appropriate support, and supervision.

Advances in technology are offering many new possibilities for shifting tasks from humans to technology . However, the evidence for their effectiveness seems relatively limited, with several of the reviews identified noting how many had not been subject to evaluation. This is a serious gap because there is considerable potential for unintended consequences, including unconscious bias being introduced into algorithms and breaches of privacy leading to unauthorised uses of data.

As with self-management, it seems that much task shifting among health workers happens informally, and is not subject to any rigorous evaluation. Those evaluations that have been undertaken focus on a relatively limited number of areas, and in particular

enhancement of roles of particular groups such as pharmacists and nurses and the introduction of new models of care, with limited evidence on substitution of nurses for doctors and even less on task shifting to other groups. In many cases, the examples that have been studied are concerned with enhancement of roles, such as pharmacist taking on medication reviews on the wards or new roles for nurses. These involve people doing things that were not being done previously, and in general, they seem to be associated with improvements in patient care. In general, when nurses take on some defined tasks once reserved for doctors, generally in the context of a single-condition with a clear protocol based on explicit cut-off points, they can achieve outcomes that are at least as good, and in some cases better. Examples include the management of chronic disease, preoperative assessment, and prescribing for people with long-term conditions.

To summarise, there is little evidence for the rigid demarcation is between different health professionals, such as doctors and nurses, that exists in many countries. It is clear that groups other than physicians, and especially nurses and pharmacists, can undertake substantially expanded roles compared to what has traditionally been the case. However, they must be adequately trained and supported and function in integrated teams with information-sharing. There is also a need to better understand the optimal combination or “package” of changes and additions that can act synergistically to improve the quality and safety of healthcare as well as patient experience. While it is not necessary to evaluate every change, there is a strong argument for doing so where major changes are taking place, as there is scope for unintended consequences. This should not, however, be an argument for doing nothing. Understanding of the drivers of implementation and trialling of task shifting as well as the enablers and barriers to successful design and implementation of such initiatives and complementary policy and working environments is critical to the adoption of effective and safe changes. The drivers of change may be diverse, for example the above review of the literature identified desire to improve patient experiences and clinical outcomes, resource use and availability, rising and changing patient need, and optimising cost effectiveness, among others, as potential incentives to task shifting. Multiple drivers are likely to co-exist and change depending on policy and health system environments as well as population and service contexts. The following section outlines country-specific examples of enablers and barriers to task shifting and some of the drivers that stimulate change.

### **3.5. Enablers and barriers**

Barriers and facilitators to task shifting have been identified primarily from a recent publication of country case studies of policies on skill mix across the EU undertaken by the European Observatory on Health Systems and Policies.(146)

### **3.5.1. Staff shortages**

Shortages of staff, overall or in particular sectors or geographical regions, have been an important driver of changes in clinical responsibilities. The economic recession experienced in Finland in the 1990s, which led to severe shortages of doctors in many rural areas, was an important stimulus to innovation, with nurses taking on a number of roles that had been traditionally reserved for doctors. Similarly, a shortage of doctors in rural France, as noted previously, has been an important driver of innovation. Recognition of the problems ahead, in 2003, led to the development of a new policy that included changes to regulatory processes for non-medical professionals, enhancement of nurse training with the introduction of Masters degrees, and the creation of new roles such as nurse practitioners. This also allowed for experiments to be undertaken.

Also in France, it was previously necessary for spectacles or contact lenses to be prescribed by an ophthalmologist if they were to be reimbursed by the insurance funds. However, a new generation of ophthalmologists focused their attention on ophthalmic surgery. The resulting shortage was a stimulus for an acceptance that visual aids could be prescribed by orthoptists, as is the case in many other countries. There was, however, considerable opposition from the older ophthalmologists, who expressed concern about the risk of other diseases being missed. In practice, these nonsurgical ophthalmologists are diminishing in number, with most now close to retirement.

### **3.5.2. Increasing complexity of care**

Changes in the characteristics of patients and in the opportunities to intervene have been an important driver of change in several countries. Thus, in Denmark, community nurses have had to take responsibility for patients with conditions that would previously have been managed in hospital, including dialysis, administration of intravenous chemotherapy, and complex palliative care. Similarly, those looking after frail elderly residents in care homes are providing care that would once have been administered in hospital. Their representatives recognise the need for additional skills.

### **3.5.3. Legal factors**

Free movement of persons is one of the four fundamental freedoms that underpins the European Union. For nationals of the Member States, this includes, in particular, the right to pursue a profession, in a self-employed or employed capacity, in a Member State other than the one in which they have obtained their professional qualifications. In order to promote the free movement of professionals, while ensuring that those moving have the necessary skills, certain professional associations and organisations or Member States are able to propose common platforms at European level. A common platform is a set of criteria which encompass the range of differences that have been identified in

training requirements in at least two thirds of Member States including all Member States that regulate the profession in question. These criteria may, for example, include requirements such as additional training, an adaptation period under supervised practice, an aptitude test, or a prescribed minimum level of professional practice, or combinations thereof.

The recognition of professional qualifications laid down in Directive 2005/36/EC enables the free movement of professionals such as doctors or nurses within the EU. The general system of recognition enables workers to have their professional qualification recognised in another EU country. Article 24 of the directive requires that basic medical training shall comprise a total of at least six years of study or 5,500 hours of theoretical and practical training provided by, or under the supervision of, a university. Article 25 sets out the requirements for specialist medical training

There is a system of automatic recognition of professional qualifications for seven so-called sectoral professions that includes nurses, midwives, doctors, dentists and pharmacists (as well as architects and veterinary surgeons). Directive 2005/36 adopts the principle of automatic recognition for medical and dental specialisations that were already common to at least two Member States when the directive was promulgated, but restricts new medical specialisations eligible for automatic recognition to those that are common to at least two fifths of the Member States.

The general system for recognition does not prevent a Member State from making any person pursuing a profession on its territory subject to specific requirements due to the application of professional rules justified by the general public interest. Rules of this kind relate, for example, to organisation of the profession, professional standards, including those concerning ethics, and supervision and liability. However, directive 2005/36 contains a provision aimed at preventing the circumvention of national requirements by having qualifications recognised in another Member State and then asking the country of origin to recognise them.

While the revised directive, replacing one initially promulgated in 1974, is a major advance on what went before, it is important to note that it says almost nothing about the scope of practice of the professionals, as this is a matter reserved for Member States. Hence, health professionals moving across borders must be aware that there may be differences enshrined in law or regulations, that either assume that they will have skills not used in their country of origin or find that they are constrained in doing what they have previously done.

Within member states, laws regulating professional barriers can, if poorly drafted, act as a major barrier to task shifting, as was found in a review of task shifting from doctors to nurses in Europe, North America, and Australasia.<sup>(147)</sup> The Belgian 1967 Royal Decree



on health professions set out in great detail the interventions that could be undertaken by different professional groups, as well as those that a member of one profession could delegate to another. A key objective was the protection of patients from charlatans, who could be prosecuted for malpractice if they undertook something they were not permitted to do. However, the legislation struggled to keep pace with the changing roles of professions, and especially the emergence of new categories of health workers, while there was no fundamental change to the legislation. It also had many unintended consequences. Thus, a medical secretary who assisted the general practitioner by measuring blood pressure or taking a urine sample was at risk of prosecution. An informal caregiver was prevented from providing basic care to their relative, for example by administering medication or dressing a wound, unless they had received a certificate from a qualified nurse. A patient could take their own medicine but a family member who gave it to them was, at least in theory, at risk unless they had been authorised to do so by a qualified health professional.

A new Belgian law, enacted in 2016, takes a different approach. It comprises two components, one relating to the framework for regulating health professionals, and the second regulating professional practice. The professions are described in terms of competences rather than the previous list of interventions that can be undertaken by different health professionals. It is envisaged that there will be a short list of activities that are exclusively preserved for specific professionals while many others can be undertaken by those who can be shown to have the necessary skills and competencies. Each professional group will be required to hold a licence to practice that will be valid for a period of five years, with renewal based on a portfolio of activities, experience, and continuing education, and which can include details of the additional tasks they are able to undertake. While legal uncertainty can facilitate changing roles, as in Portugal or Denmark, for example by making pilot studies easier, this was identified as a barrier to scaling up nurse prescribing in Finland.

### **3.5.4. Professional associations**

There are many examples where professional associations and trade unions have opposed changes in responsibilities. The 2017 legislation in Austria was opposed by the medical profession, who argued that it would threaten the quality of care that patients receive if they were treated by other professional groups, it would undermine the relationship of trust between the doctor and the patient, reduce the right to a free choice of doctors, and weaken the position of the profession when negotiating with the social insurance funds.

The 2003 proposals on skill mix in France faced considerable opposition from both the medical profession and trade unions representing other health workers. Multiple

compromises were needed and the law introduced in 2009 was considerably less ambitious than what have been proposed in 2003. Terms such as “task transfer” and “task delegation” gave way to “cooperation”. The process was, however, facilitated by medical leadership within the Ministry of Health, where the Minister was a highly regarded professor of medicine. The process was taken forward by another respected medical leader, who had been the president of a university hospital in Marseille. His tenure as the president of the National Observatory of Health Professions for 13 years provided a degree of stability that facilitated the implementation and embedding of change.

In a few countries, such as Malta, patient advocacy organisations have been important in promoting the development of new roles by non-medical professionals.

### **3.5.5. Financial incentives**

Financial incentives can either stimulate or discourage task shifting. Task shifting in general involves two parties: one party handing over a task and one party taking on a new task. Financial incentives are relevant for both these parties. Handing over tasks for example will be less likely when this implies a reduction in income. Whether this is the case depends on many factors and circumstances, including whether the freed time will be filled with other (income generating) activities, whether financial arrangements are made to avoid income reductions, and whether income was based on activity (rather than being a fixed salary). Moreover, it depends on who takes over the tasks and whether that person is part of the same organisation (e.g. dentists hiring oral hygienists in their own practice to perform certain activities). Financial motives in that sense can also stimulate task shifting, e.g. when task shifting leads to income gains, for example because replacing activities increase income or when the people now performing the task are working for the party handing over the tasks. Both encouraging and discouraging financial incentives can contribute to optimal outcomes, since task shifting can be desirable or undesirable.

The party taking on the new role also faces financial incentives. Health professionals may be reluctant to develop and use new skills if their investment in training and acceptance of additional responsibility is not rewarded. In England, the development of a career development process, Agenda for Change, has been identified as facilitating changing skill mix. All non-medical health professionals are on a commonplace deal, which includes a “skills escalator”, whereby the acquisition of new skills relevant to the job is recognised and rewarded. In Finland however, pay differentials between prescribing and non-prescribing nurses was reported as being divisive and causing resentment by the latter.

In Poland, introduction of nurse prescribing has had very limited success. Nurses seeking to prescribe must complete a specialised course but were not rewarded financially for their investment in training or their additional responsibilities. This has meant that there has been very little uptake and, in some cases, threats of industrial action.

In several countries, including Germany and Switzerland, payment of physicians by fee-for-service provides a strong incentive not to encourage task shifting to other health professionals. Similarly, in Finland, the provision of additional payments for home visits meant that physicians were reluctant to support enhanced roles for nurses and other health workers. Conversely, while capitation or “bundled” payments may encourage task shifting, there is a risk of this being inappropriate or leading to reduced quality of care if not accompanied by regulatory oversight, and adequate documentation and accountability.

Moreover, if task shifting results in cost reductions, for instance because lower skilled and lower paid personnel takes over tasks, it is important to recognise this does not automatically lead to lower expenditures. Payment systems should not only enable of not promote desirable task shifting, but also lead to a fair division of cost savings between providers of care and payers/society.

### **3.5.6. Changing professional attitudes**

In many countries the traditional model of primary care, based on an often male doctor in sole practice, often supported by family members, is disappearing. There are several reasons. One is the feminisation of the medical workforce. Another is the desire among younger doctors for an improved work life balance, coupled with the impact of the European Working Time Directive. A third is a recognition among the younger generation of doctors of the many benefits of multidisciplinary teamwork, especially with an ageing population with multi-morbidity.

Cross-sectional research in 9 countries of the self-reported motivators and barriers to changes in professional roles, reveals that, in the context of major skills mix reforms, nurses were more likely to be motivated to undertake a new role (66.5%) and to have opportunities to do so (52.4%), when compared to nurses working in countries where such reforms had not been implemented (39.2%; 24.8%;  $p < .001$  each).(148) Intrinsic motivators, such as personal satisfaction and use of qualifications, were identified by physicians and nurses as being of greater influence to adopt role changes than extrinsic factors (e.g. salary or career opportunities). Professional and management support were seen to facilitate role changes, while workforce shortages were reported as hindering such change.

### **3.5.7. Pilot projects and experiments**

One barrier to the adoption of new models of task shifting is a concern that, once implemented, they cannot be reversed. Several countries have adopted mechanisms that allow for pilot projects to be undertaken, with continuations subject to a positive evaluation. The new law on healthcare professions in the Netherlands makes explicit provision for experiments whereby designated healthcare professionals can carry out new procedures for up to 5 years and, if the new model is positively evaluated, it can then be incorporated into law. This link to evaluation has made it easier for otherwise controversial changes to be accepted. Thus, a provision for nurses with basic qualifications to prescribe a very restricted list of low-risk medicines was accepted with little controversy but another proposal, to allow nurses with additional training to prescribe a wider range of medicines was only accepted within the framework of an experiment.

Provision of additional funding for these projects also facilitates their introduction, as in Austria, where 75 primary healthcare projects have been implemented, many involving some reallocation of tasks, a process linked to a new system of nurse training. Additional funding for pilot projects has also been provided in Norway.

The ease with which pilot projects can be undertaken depends on the extent to which the prevailing legislation specifies professional roles. Thus, it was relatively straightforward in Portugal where the legislation contained few details. Similarly, in Denmark and Finland, there has been considerable experimentation at local level, some of which have involved considerable innovation, such as the creation of multidisciplinary teams that will visit patients experiencing exacerbations of COPD in their homes.

The 2009 law in France, which provided a legal basis for experimentation, with proposals tested against two criteria, scientific validity and clinical relevance. However, the pace of change has been slow. One report describes how 31 draft protocols were submitted in the Ile-de-France region but only 12 were implemented.

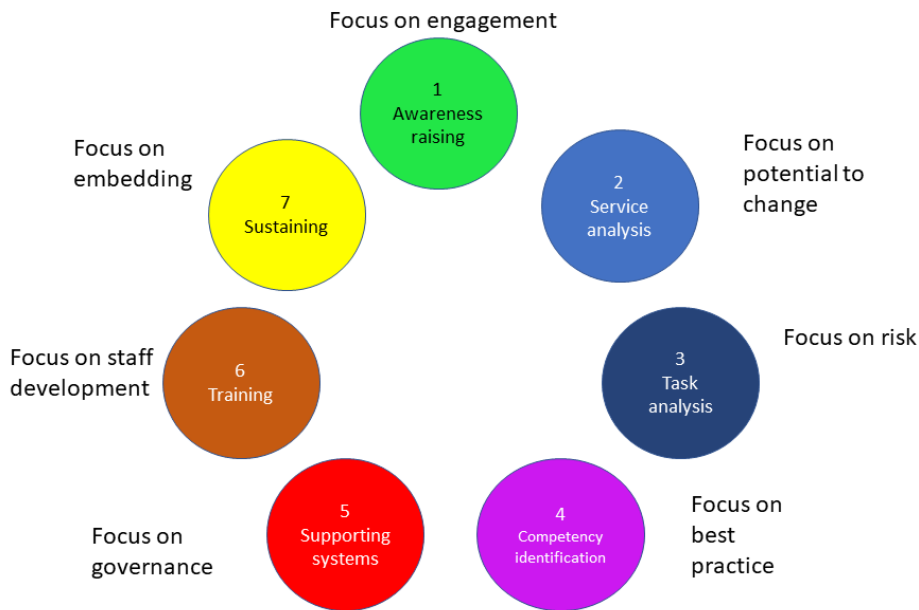
### **3.5.8. Capacity to implement change**

The implementation of new models of care, including task shifting, requires considerable clinical and managerial investment. For example, a report from Denmark suggested that general practitioners were feeling overwhelmed with their workload and unable to devote the necessary time to implement new arrangements for task shifting, even when they accepted the case for doing so.

In England, a national non-profit organisation, Skills for Health, provides support on a consultancy basis to healthcare employers seeking to transform their workforce. A number of healthcare providers have used what is termed the Calderdale

Framework,(149) an evidence based approach named after the location in which it was developed, whose developers provide training, materials, and ongoing support for those seeking to implement extended roles (Figure 2).(149) This stresses the importance of taking a system-wide approach in which those seeking change engage fully with those affected, identify, draw on existing best practice, address issues of governance, develop staff, and follow through to ensure sustainability.

Figure 2 The Calderdale Framework



Source: [www.calderdaleframework.com](http://www.calderdaleframework.com)

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Task shifting in England has also been supported by extending the roles of certain professionals through the shifting of specific tasks. This has been accompanied by adequate training, certification and regulation. For example, radiographers may receive training to develop skills to perform tasks typically performed by radiologists, such as x-ray interpretation as well as administration of intravenous injections and barium enemas.(129)

In some countries, such as France, a useful starting point was to identify substitution practices that were already happening, even if informal or even illegal. This was coupled with identification of local medical champions who were willing to engage in the experiments made possible by the new law.

### **3.5.9. Regularisation of informal practices**

Considerable task shifting already takes place in some countries on an informal basis. For example, in Austria, much long-term care was provided informally, often by migrant workers with uncertain employment status. The new law, enacted in 2017, seeks to formalise these processes, requiring care workers to possess a minimum set of

qualifications. In France, doctors were reluctant to give official recognition to the many tasks being undertaken by non-medical workers informally, as this would require that the staff concerned be paid commensurate with their responsibilities.

For completeness, it should be noted that there are examples of health professionals who obtain inappropriate employment in the health sector. Examples include doctors working in nursing roles and nurses working as health care assistants. This may be because they are paid higher salaries than if they were performing the role for which they are qualified in their countries of origin but are unable to obtain those posts in the country to which they migrate or because their qualifications are not recognised in their countries of origin.

### **3.5.10. Legal indemnity**

Since the late 19th century, state legislatures and professional medical organizations have developed mechanisms to license physicians and other non-physician providers, establish standards of practice, and protect patients by establishing standardized credentials as markers of competence. These may or may not specify what each group is permitted to do and, specifically, whether they have legal authority to do it. The absence of specific provisions to provide legal indemnity for health professionals assuming new responsibilities has been identified as a barrier to change in a number of countries. This may require legislative change. Although we are unaware of any systematic attempt to track the scale and pace of change in Europe, a review of regulations in US states between 2001 and 2010 found a progressive relaxation of existing restrictions on nurse practitioners and physicians' assistants.(150)

One area that requires particular attention is complementary and alternative medical (CAM) therapy. Complementary and alternative medicine (CAM) are difficult to define but can be considered to include medical products and practices that are not part of standard medical care. While some qualified and licenced health professionals do practice CAM, much is undertaken by those without a recognised qualification. For example, a "diet therapist" may use a special diet to treat cancer instead of anticancer drugs prescribed by an oncologist. While much CAM, such as homeopathy, is harmless (except where it deters a patient from seeking effective treatment, such as the use of homeopathic "antimalarial prophylaxis"), it creates many opportunities for fraudulent practices, misleading information, incorrect diagnosis, improper treatment, and severe patient's injuries.

The number of CAM-trained practitioners is growing. In Europe, CAM is practiced by approximately 145,000 physicians (trained in both conventional medicine and CAM

therapies), as well as more than 160.000 non-medical practitioners.(151) Social media has increased the popularity of CAM.

Thus, a comprehensive assessment of task shifting cannot ignore the extent to which some task-shifting is taking place from those practicing evidence-based therapies to ineffective or possibly dangerous CAM. Although it is beyond the scope of this opinion to propose solutions to this problem, it is important to recognise its existence.

Returning to conventional treatment, a change to the law on roles of nurse practitioners and physicians' assistants in The Netherlands in 2011 made it lawful for them to conduct a range of procedures that had previously been reserved for physicians, such as cardioversion/defibrillation, catheterisation, endoscopy, injections, some prescribing, and minor surgical procedures, although in practice, they had long been undertaking some of them informally. An evaluation found that this change led to an increase in both groups undertaking these roles although in some cases they were held back by opposition from physicians and inadequate budgets for training.(152) As noted earlier, a study comparing progress in task shifting in The Netherlands, England, and Scotland, all of which introduced legislative or regulatory change between 2010 and 2015, found that progress in shifting tasks from doctors to nurses was greater than in six other countries where no such change occurred.(43)

### **3.5.11. New areas of work**

Traditionally, nursing has had relatively low status in Germany, while the medical profession has been very strong. There has been considerable opposition to nurses taking on extended roles that are common elsewhere. One of the few areas where this has been possible has been in the new long-term care sector, which has been created in response to the ageing population and facilitated by the system of long-term care insurance. Nurses working in this sector have been able to adopt extended roles beyond that in other parts of the health system.

The development of palliative care in Switzerland, occupying what had been a gap in the care pathway, provided an opportunity for enhancement of the nursing role.

A related factor in some countries has been the shift from hospital to ambulatory care. Thus, in Ireland, a move to manage the care of patients with epilepsy in the community stimulated the development of a new professional group, epilepsy specialist nurses. They work in a multidisciplinary team, but with substantially enhanced roles. Thus, they have their own patient caseloads, and can train to become registered advanced nurse practitioners, running community clinics, providing outreach services, and admitting and treating patients autonomously. A similar program, with enhanced roles for nurses, has been developed for diabetes, with the clinical nurse specialists undertaking advanced



training programs. Another scheme has been developed in Dublin where management of patients with COPD is led by a physiotherapist.

### **3.5.12. Summary**

Although the preceding sections examine individual factors, many accounts show that they often act in combination. A systematic review of barriers to non-medical prescribing identified 17 themes.(153) The first three related to the prescriber. These were attitude, with some welcoming the additional responsibility and others frightened by it, area of competence, with reluctance to prescribe for patients with additional or complex problems, and clarity about the professional's role and responsibilities in the organisation. The second four relate to human factors, including patients, especially where they welcome the holistic care from non-medical providers, managers, especially where they are supportive, medical professionals, where they are supportive and offer advice when needed, and peers, especially where there are trusting relationships. The third category, of organisational factors, is sub-divided into four broad groups. The first is related to administration (presence of a formulary, a clear and permissive policy, and appropriate remuneration for the additional skills and responsibilities). The second relates to development (support following initial training, selection of appropriate individuals for training). The third covers service delivery (providing more timely care for patients, as long as the prescribers do not have excessive workloads, infrastructure, specifically access to patient records, and a sense of greater patient satisfaction). The fourth group relates to the types of patients, especially those with long term needs with whom the professionals can develop a relationship, and the setting, for example where non-medical prescribing allows patients to remain in their own homes.

## **3.6. Implementing task shifting**

### **3.6.1. A conceptual framework**

The preceding sections highlight the complexity of task shifting in health care. Implementing new practices in an organisation requires changes in both individual and collective behaviour. In this section we draw on a study in a Norwegian hospital in which nurses successfully assumed responsibility for bone marrow aspiration, a task previously undertaken solely by doctors.(154) This process was informed by a qualitative study that included interviews with those involved.

It drew on two theories, the Capability, Opportunity and Motivation behavioural model(155) and the Theoretical Domains Framework.(156) It identified ten factors that were perceived to influence implementation. Three were related to capability: knowledge and acceptability of the rationale for task shifting; dynamic role boundaries; and

technical skills to perform the task. Five were related to motivation: beliefs about task shifting consequences, such as efficiency, quality and patient satisfaction; beliefs about capabilities, such as technical, communicative and emotional skills; job satisfaction and esteem; organisational culture, such as team optimism; and emotions, such as fear of informal nurse hierarchy and envy. The last two related to opportunity: project planning and leadership, and voluntariness; and patient preferences.

Turning first to those related to capability, it was important that all those involved fully understood the rationale for behaviour change and were provided with the evidence base for task shifting. Training should also address perceptions about the roles of different professional groups, recognising that some of those involved could see change as a threat. This was not just those whose traditional roles were being replaced but also those whose roles were expanding. Thus, some nurses worried that the adoption of new technical tasks could erode their general nursing skills. Finally, training in the technical aspects of the new tasks was essential.

Training also features strongly in the factors related to motivation. Thus, it was important that those involved could understand the benefits from task shifting. These included giving doctors more time to spend on more advanced cases. However, this needed to be balanced with the risk of fragmentation of responsibility within the team. Task shifting was also seen as a means of demonstrating trust in those health workers whose roles were being expanded, as it was accompanied by investment in their continuing professional development.

Finally, under opportunity, the importance of planning the process of task shifting, with effective leadership, but taking account of the need for adoption of new roles to be voluntary, was stressed. So was the need to take account of patient preferences, although in this case it was believed that what mattered to patients was the competence of the individual rather than the professional title.

Two main issues emerged from this study, education and environmental restructuring. Environmental restructuring related primarily to the structure of teams and hierarchies. It involved addressing uncertainty about roles, the building of trust, and the creation of mutual respect. In the next section, we examine the issue of education training, and continuing professional development in more detail.

### **3.6.2. Education, training and continuing professional development**

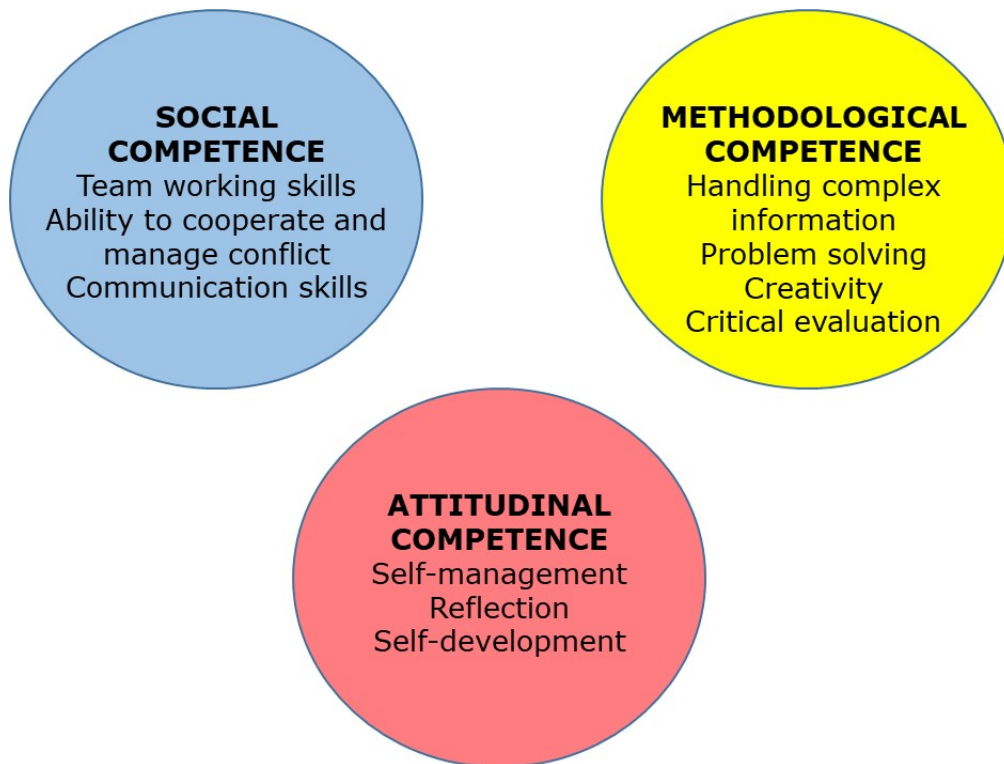
Lifelong learning, whereby health workers continuously develop new skills and expertise to allow them to respond to changing circumstances, is fundamental to everything that has been written in the previous sections of this opinion. It underpins the flexibility required in the health care workforce if it is to have the necessary capacity to respond to

a changing world. It gives health workers the skills they need, conveys an understanding of the need for, and benefits of change, and the confidence to make that change. It is beyond the scope of this opinion to examine in detail the type of training required as it will vary according to the tasks being shifted, the new roles being adopted, and the health system and wider contexts. However, it is important that it includes not just training in the technical aspects of the tasks to be shifted but also the "soft skills" that act as enablers for teamwork, creativity, decision-making, communication, and collaboration, conveying an understanding of the rationale for change, the benefits of doing things differently, and a means of discussing fears and anxieties.

It seems intuitive that an environment in which different professional groups are trained together will foster mutual respect, support collaborative working, and help break down traditional hierarchies. Yet training of health professionals often persists in promoting many of the characteristics associated with an old-fashioned, individual, craft-based system that is incompatible with the teamwork that is recognised to be essential for safe and effective care.(157) Simply put, curricula and training produce specialists capable performing their respective tasks but they then work together as a group and not as a team. Yet, as one Cochrane review has noted, key factors influencing care "include the existence of teamwork and of trust, collaboration, and communication between health workers".(158) By not capitalizing on the benefits of distributed, decentralized efficient team working (TEAM "Together Each Achieves More") services fail to improve despite having the specialists for key tasks.(159-161)

These issues are beginning to be addressed in more recent documents on medical curricula, also reflecting a realisation that much of the knowledge traditionally taught is not retained unless directly relevant and should more appropriately be included in subsequent specialist training.(162) Hence, medical training in some, but not all countries, is moving towards a model (Figure 3) that takes account of the need for a range of competences.

**Figure 3**      **Generic competencies for health professionals**



Source: Bourek A, 2019

A scoping review found that, while there was limited research on interprofessional education, and what existed was of mixed quality, in general, it was associated with positive changes in student perceptions and attitudes,(163) although there are exceptions, as in a study of graduate entry medical students(164) exposed to an interprofessional learning experience who demonstrated a decline in scores on the Readiness for Interprofessional Learning Scale (RIPLS), which measures attitudes to team work and collaboration, professional identity, roles and responsibilities, and patient-centeredness and has been used in a number of studies to evaluate interprofessional learning(165). Another recent study, based on a 24-month intervention period, provided further evidence to suggest that combining interprofessional practice and education in the ambulatory care setting delivers beneficial outcomes for both students and patients.(166) A systematic review of 16 articles, concluded that, based on objective measures, interprofessional education leads to improvements in collaborative skills, knowledge and behaviours. Learning material complexity, programme design and its appropriateness, as well as use of explicit standards of competence were identified as contributing to the effectiveness of interprofessional education.(167)

### 3.7. Measuring the impact of task shifting

It is beyond the scope of this opinion to examine in detail the impact of particular forms of task shifting. Rather, we note that such policies should be evaluated, but in ways that take account of the complexity that characterises them. Thus, a change in responsibilities of one professional group will have consequences for others and, potentially, for the wider health system. There is also the need to conceptualise the changes/interventions being measured when designing and undertaking evaluations. For example, there are theoretically two types of impact that may be the desired outcome: (a) changes in the way health care providers meet health system goals, with the impacts being measured by improvements goal attainment, and/or (b) changes in the way providers achieve a pre-determined outcome, that is, the establishment of resilience and flexibility that allows a provider to achieve goals using combinations of resources available.

Future evaluation studies must embrace this complexity, seeing it as a system-wide intervention. Thus, they must endeavour to capture the wider effects that can result from a health system perspective. There are few studies that focus on the wider impact of task shifting. Such studies should recognise explicitly that task shifting has implications across the health system, extending beyond the specific tasks and actors directly involved, with potential impacts on health system planning, workforce capacity development and decision-making. As a result evaluation systems need to capture the system-wide effects of task shifting, including both intended and unintended consequences on the healthcare system and ultimately on health outcomes. Studies evaluating task shifting interventions for mental health have done this, highlighting the importance of barriers, enablers and effects that fall outside the specific scope of the task shifting process.(168, 169) Such evaluations will require a more systematic approach to determining the influence of wider health system elements and how these in turn are impacted by task shifting.

One important omission from much of the material reviewed for this opinion was the inclusion of considerations of equity, as noted in a systematic review of research on task shifting in high income countries.(170)

Further considerations include *who* benefits from task shifting, what *form* this benefit takes and at what cost or *impact* (financial or otherwise) on others does this incur. This can be illustrated by considering potential impacts of financial incentives. When the payment system is based on activity (and perhaps responsibility) rather than who performs the activity, task shifting may lower costs but need not lower total expenditures. An example is when dentists employ oral hygienists to deliver particular services (which may be performed under their supervision). This may lower costs of providing the service but not necessarily payments by patients or third party payers as the cost savings can translate into private gains rather than health care or societal

benefits. This creates strong financial incentives for task shifting but has undesirable effects on the division of profits and sustainability. A balance that incorporates the interests of the professional and the service user needs to be found.

Second, the impact on informal carers is important and deserves attention. In terms of sustainability it must be noted that the burden placed on these carers can be high. Shifting tasks to them may be a solution from the perspective of the formal care system, but not from a broader societal perspective, given the high costs on the carer, with health and wellbeing losses, private costs and reduced productivity and labour force participation. This is especially important as the demand for long term care is expected to grow further while supply of formal care may increasingly be constrained. Accurate measurement of the costs and benefits of task shifting then also requires considering factors that transcend the health care sector, such as policies on paid leave from work, as well as further consideration of what is feasible in relation to maintaining and perhaps expanding the tasks of caregivers.

### **3.8. CONCLUSIONS**

So far, much of the discussion of task shifting in the health policy arena has been concentrated on the situation in low income countries. Yet, paradoxically, much of the research that exists on this issue is from high income countries. Those discussions have concentrated on finding solutions to a specific problem, the shortage of health workers in low income settings. However, as the evidence reviewed for this opinion shows, the challenges are much more complex. Clearly it is necessary to confront current and future shortages of health workers in all countries, but it is difficult to see how this will be achieved by shifting roles and responsibilities from one type of health worker, doctors, that are already experiencing severe shortages in many countries, to another, nurses, where the shortages are often even greater. Furthermore, much of the evidence related to task shifting relates to the quest for solutions to another problem, the growing complexity of care, in terms of patients with multiple conditions, new opportunities to intervene, and new models of care. Thus, task shifting should often be seen as an enhancement that makes health care more appropriate to the changing needs of patients rather than a means to cut costs or a means to take advantage of innovations, in technology and models of care.

Given the pace of change, in patterns of disease, opportunities to intervene, and new ways to organise care. task shifting cannot be seen as optional. It is essential, simply to keep pace with these changes. Changing professional roles, and the associated tasks that are performed, are essential for the sustainability of health care. Financial sustainability requires that those with high levels of skills are not being deployed in roles and on tasks that do not require their expertise. Yet sustainability involves more than ensuring that

there are adequate financial resources for the health system. Money is of little use if there is nothing to buy with it. Many countries are experiencing high rates of dropout among health professionals, with a new generation less willing to accept the adverse work life balance that was taken for granted by their predecessors.

The evidence reviewed for this opinion shows that many tasks traditionally undertaken by certain types of health workers, and particularly doctors, are now being undertaken by others, including nurses and pharmacists. New professional groups are also emerging, such as nurse practitioners and physician assistants. But the pace and scale of change vary greatly.

The available evidence is much less than would be desired but it does show that many of the tasks once reserved for particular groups can be undertaken as effectively, or more so, by others, but each case should be assessed on its merits. Crucially, task shifting should not be viewed in isolation but seen in the wider context of the health system. A change in roles will often have wide ranging consequences, challenging traditional hierarchies and professional norms.

There are many barriers to change, including unsupportive and rigid attitudes, legislative and regulatory constraints, payment systems and others. Yet, if carefully managed, these can often be overcome. Sometimes, this simply involved formalising what already happens, albeit informally. In other cases, it requires wide system redesign.

### 4. RECOMMENDATIONS

Our recommendations stem from our clear opinion, based on the evidence that we have reviewed, that European health systems must embrace flexibility in professional roles, including task shifting, if they are to respond to changing circumstances and maximise health gain. We have explicitly not set out to provide a list of what tasks can or should be shifted from one type of health worker to another, or from health workers to patients and their carers or to technology because this would impose an inappropriate degree of rigidity. The evidence that we have reviewed shows that many tasks that have traditionally been done by one type of health worker can be done as well or even better by others, but we also show that because something works in one context does not mean that it will necessarily work in another, given the diversity in health systems, public and professional expectations, and regulation of professions.(171) Consequently, we do not impose any formal constraints on what tasks can be shifted but argue that whether they can or should be will depend on a range of circumstances. The first consideration is whether there is a case for shifting a task. Task shifting can be justified on various grounds, including clinical effectiveness, economic considerations, or a response to staff shortages, among others. We caution that task shifting should not be seen simplistically as a means of delegating tasks to cheaper, lower skilled workers or to patients and their unpaid carers or technology . In fact, many of the examples we have described involve enhancement of roles, allowing health workers to develop new skills and expertise. However, it is essential that the case for doing so is made explicit.

The second consideration is whether the individual taking on the new task has the skills and expertise necessary or can acquire them with appropriate training. This decision should be based on objective assessment rather than historical norms.

The third consideration is whether there are any legal or regulatory barriers to shifting the task. This will be highly context specific, given the substantial diversity in the regulation of professions among member states. Thus, in some, specific tasks are restricted to some types of health worker, especially physicians. In others, the law is framed in a more permissive way, so that health professionals can undertake a wide range of (unspecified) procedures as long as they can demonstrate the requisite skills (which may not necessarily be linked specifically to a particular professional qualification). Other, similar barriers may exist where there are rules about whether procedures can be reimbursed by payers if they are undertaken by other types of health workers. Where such barriers exist, then it is necessary to assess whether they should or can be changed.



A fourth consideration is that task shifting, especially where it involves substantial changes in roles, will almost inevitably have consequences for the working of the organisation, especially where this is based on hierarchies or command and control approaches. Consequently, task shifting will often have to be accompanied by new organisational models, including where necessary changes in status of the health workers involved. It is also critical to be aware of the potential impacts task shifting can have on attitudes (both public and professional) towards the professions concerned. That is, by altering the mix of skills and tasks associated with a particular qualification may change the interest/desire for that profession, for multiple reasons – career path, opportunities, income – and thereby demand for entry and training in that profession and ultimately the composition of the health care work force. This implies a need to consider the short and longer term impacts of task shifting on career choice and paths.

Our recommendations follow these considerations.

There are many reasons why certain tasks might be shifted, from health workers to patients and their carers, to technological devices, or to other health workers. **We recommend that, in all cases, the objective being pursued is clearly specified, the rationale for selecting task shifting as a means to achieve that objective is explained, and the evidence on which the decision is based is presented.**

We recognise, however, that although we have been able to review a large volume of evidence for this opinion, there are still many weaknesses in the evidence base and the evidence that exists is concentrated in a small number of countries. **We recommend that there should be increased investment in research on task shifting, with the goals of increasing the number of studies from settings that are inadequately represented and understanding the contextual factors that determine what works in what circumstances.**

Task shifting will only work if those involved understand the rationale for doing it. Health workers, overwhelmingly, are committed to providing high quality care. The available evidence shows that they are often willing to adopt new ways of doing things providing they are convinced that it will improve care, and of course, providing that the existing structures and incentives do not create major barriers. For this to happen, it is necessary to have appropriate training throughout the entire educational journey travelled by health workers to give them both the general skills and the specific technical skills necessary to undertake the new tasks, to provide convincing evidence that it will actually improve the quality of care, and to foster attitudes, from the undergraduate level onwards, that promote collaboration among professional groups and team working. Task shifting is facilitated by having dynamic role boundaries, whereby different health workers understand the importance of working as a team rather than as individuals with

rigid professional boundaries. There is some evidence that interprofessional learning experiences can foster positive attitudes. On the other hand, if those who provide education themselves promote rigid hierarchies, there is a danger that this could reinforce such outdated attitudes. **We recommend that those responsible for training health workers ensure that they:**

- a) **convey positive attitudes to interprofessional and team working and that those being trained have opportunities for interprofessional learning experiences**
- b) **provide the specific skills necessary for task shifting, in those cases where the evidence indicates that task shifting is likely to be effective.**

Task shifting is more likely to succeed where those involved are convinced that the consequences of implementing it will be positive. This means that it should not be seen as simply a form of cost-cutting. As the evidence reviewed in this opinion shows, in many cases, task shifting should be seen as a means of enhancing the quality of care. Given the importance of recruiting and retaining health workers at the time of shortage, it should also be seen as a means of enhancing job satisfaction. **We recommend that those responsible for implementing task shifting engage in dialogue to understand the expectations and fears of those who will be affected by it, including patients and their carers where appropriate.**

Success is more likely if there is a supportive organisational culture. There is now a wealth of evidence that an organisational culture characterised by flat hierarchies and mutual respect and trust is associated with better patient outcomes. It is also likely to promote models of task shifting that ensure that the most appropriate types of health worker are undertaking particular roles. **We recommend that those responsible for health services evaluate, and where necessary, intervene to improve the organisational culture of the facilities that are within their remit to ensure that they promote flexible approaches to working.**

Regulation of professions in the health sector should permit sufficient flexibility for them to assume different roles in certain settings, such as in areas where there are shortages of one sort of health professional. Yet, in practice, professional bodies have often seen their role as promoting restrictive practices. It is necessary to recognise that certain tasks can be performed equally well by different health care professionals with appropriate, and in some cases advanced specialised training. Professional bodies have a crucial role in promoting these new ways of working. **We recommend that legislative and regulatory authorities review the rules that exist in their jurisdiction to assess the extent to which they place unjustifiable barriers in the way of more**

**flexible ways of working, taking account of the growing body of evidence on the potential benefits of task shifting in particular contexts.**

There is considerable scope for task shifting from health professionals to patients, but the opportunities must be balanced with the risks. **We recommend that task shifting to patients and their carers should recognise the goals, expectations, and capacities of those adopting new roles, ensuring that they are empowered to engage fully with health workers to design their care packages and with the ongoing monitoring and evaluation of these packages.**

Task shifting involves careful planning. It will only succeed if there is a clearly defined objective. **We recommend that decisions to engage in task shifting should be planned carefully, taking full account of the implications both for the individuals concerned and for the wider health sector.** We have described one approach to doing this, the Calderdale Framework, and while we do not suggest this is the only way, we see the elements contained within it as being important.

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**6. ANNEXES**

**6.1. Annex 1 Summary of conclusions from Cochrane reviews of self-management**

<b>Condition</b>	<b>Authors' conclusions</b>
Bronchiectasis(172)	There is insufficient evidence to determine whether self-management interventions benefit people with bronchiectasis. In the absence of high-quality evidence, it is advisable that practitioners adhere to current international guidelines that advocate self-management for people with bronchiectasis.
Cystic fibrosis(173)	The available evidence from this review is of insufficient quantity and quality to draw any firm conclusions about the effects of self-management education for cystic fibrosis. Further trials are needed to investigate the effects of self-management education on a range of clinical and behavioural outcomes in children, adolescents and adults with cystic fibrosis and their caregivers.
Osteoarthritis(174)	<p>Low to moderate quality evidence indicates that self-management education programmes result in no or small benefits in people with osteoarthritis but are unlikely to cause harm.</p> <p>Compared with attention control, these programmes probably do not improve self-management skills, pain, osteoarthritis symptoms, function or quality of life, and have unknown effects on positive and active engagement in life. Compared with usual care, they may slightly improve self-management skills, pain, function and symptoms, although these benefits are of unlikely clinical importance.</p>
Oral anti-coagulation(175)	Participants who self-monitor or self-manage can improve the quality of their oral anticoagulation therapy. Thromboembolic events were reduced, for both those self-monitoring or self-managing oral anticoagulation therapy. A reduction in all-cause mortality was observed in trials of self-management but not in self-monitoring, with no effects on major haemorrhage.
Chronic obstructive pulmonary disease(176)	Self-management interventions in patients with COPD are associated with improved health-related quality of life as measured by the SGRQ, a reduction in respiratory-related and all cause hospital admissions, and improvement in dyspnoea as measured by the (m)MRC. No statistically significant differences were found in other outcome parameters. However, heterogeneity among interventions, study populations, follow-up time and outcome measures makes it difficult to formulate clear recommendations regarding the most effective form and content of self-management in COPD.
Adults with epilepsy(177)	Two intervention types, the specialist epilepsy nurse and self-management education, have some evidence of benefit. However, we did not find clear evidence that other service models substantially improve outcomes for adults with epilepsy. It is also possible that benefits are situation specific and may not

	<p>apply to other settings. These studies included only a small number of service providers whose individual competence or expertise may have had a significant impact on outcomes. At present it is not possible to advocate any single model of service provision.</p>
Children with epilepsy	<p>While each of the programmes in this review showed some benefit to children with epilepsy, their impacts were extremely variable. No programme showed benefits across the full range of outcomes, and all studies had major methodological problems. At present there is insufficient evidence in favour of any single programme.</p>
Smartphone and tablet self-management apps for asthma(178)	<p>The current evidence base is not sufficient to advise clinical practitioners, policy-makers and the general public with regards to the use of smartphone and tablet computer apps for the delivery of asthma self-management programmes. In order to understand the efficacy of apps as standalone interventions, future research should attempt to minimise the differential clinical management of patients between control and intervention groups. Those studies evaluating apps as part of complex, multicomponent interventions, should attempt to tease out the relative contribution of each intervention component.</p>
Computer and mobile technology interventions in chronic obstructive pulmonary disease(179)	<p>Although our review suggests that interventions aimed at facilitating, supporting, and sustaining self-management in people with COPD and delivered via smart technology significantly improved Health Related Quality of Life (HRQoL) and levels of activity up to six months compared with interventions given through face-to-face/digital and/or written support, no firm conclusions can be drawn. This improvement may not be sustained over a long duration. The only included study that measured outcomes up to 12 months highlighted the need to ensure sustained engagement with the technology over time. Limited evidence suggests that using computer and mobile technology for self-management for people with COPD is not harmful and may be more beneficial for some people than for others, for example, those with an interest in using technology may derive greater benefit.</p> <p>The evidence, provided by three studies at high risk of bias, is of poor quality and is insufficient for advising healthcare professionals, service providers, and members of the public with COPD about the health benefits of using smart technology as an effective means of supporting, encouraging, and sustaining self-management. Further research that focuses on outcomes relevant to different stages of COPD is needed. Researchers should provide clear information on how self-management is assessed and should include longitudinal measures that allow comment on behavioural change.</p>
Quality of life in people with stroke(180)	<p>The current evidence indicates that self-management programmes may benefit people with stroke who are living in the community. The benefits of such programmes lie in improved quality of life and self-efficacy. These are all well-recognised goals for people after stroke. There is evidence for many modes of delivery and examples of tailoring content to the target group. Leaders were usually professionals but peers</p>

	(stroke survivors and carers) were also reported - the commonality is being trained and expert in stroke and its consequences. It would be beneficial for further research to be focused on identifying key features of effective self-management programmes and assessing their cost-effectiveness.
Type 2 diabetes in adult people with severe mental illness(181)	Evidence is insufficient to show whether type 2 diabetes self-management interventions for people with severe mental illness are effective in improving outcomes. Researchers must conduct additional trials to establish efficacy, and to identify the active ingredients in these interventions and the people most likely to benefit from them.
School-based interventions for asthma in children and adolescents(182)	School-based asthma self-management interventions probably reduce hospital admission and may slightly reduce ED attendance, although their impact on school attendance could not be measured reliably. They may also reduce the number of days where children experience asthma symptoms, and probably lead to small improvements in asthma-related quality of life. Many of the studies tested the intervention in younger children from socially disadvantaged populations. Interventions that had a theoretical framework, engaged parents and were run outside of children's free time were associated with successful implementation.
Exacerbations in patients with chronic obstructive pulmonary disease(57)	Self-management interventions that include a COPD exacerbation action plan are associated with improvements in HRQoL, as measured with the SGRQ, and lower probability of respiratory-related hospital admissions. No excess all-cause mortality risk was observed, but exploratory analysis showed a small, but significantly higher respiratory-related mortality rate for self-management compared to usual care.
Pulse oximeters in asthma(183)	<p>We found no reliable data to support or refute patient use of pulse oximeters to monitor oxygen saturation levels when experiencing an asthma attack. People should not use a pulse oximeter without seeking advice from a qualified healthcare professional.</p> <p>We identified no compelling rationale for home monitoring of oxygen levels in isolation for most people with asthma. Some people have a reduced perception of the severity of their own breathlessness when exposed to hypoxia. If trials on self-monitoring of oxygen levels in the blood by pulse oximeter at home by people with asthma are conducted, the pulse oximeter must be given as part of a personalised asthma action plan.</p>
Home telemonitoring and remote feedback between clinic visits for asthma(184)	Current evidence does not support the widespread implementation of telemonitoring with healthcare provider feedback between asthma clinic visits. Studies have not yet proven that additional telemonitoring strategies lead to better symptom control or reduced need for oral steroids over usual asthma care, nor have they ruled out unintended harms. Investigators noted small benefits for quality of life, but these are subject to risk of bias, as the studies were unblinded. Similarly, some benefits for lung function are uncertain owing to possible attrition bias.



Source: Extracted from the Cochrane Library

**6.2. Annex 2 Search strategy used to identify evidence on task shifting in the hospital sector**

1 (((Patient Care Team/ or case management/ or Delegation, Professional/ or ((skill\* adj3 mix) or ((chang\* or multidisciplin\* or multi-disciplin\* or interdisciplin\* or interdisciplin\*) adj3 (role\* or collaborat\* or cooperat\*)) or ((collaborat\* or cooperat\*) adj6 (doctor\* or physician\* or nurse\* or pharmacist\* or specialist\* or care or healthcare)) or new role\* or ((task\* or decision\*) adj3 (shift\* or reallocat\* or allocat\* or sharing or substit\*)) or teamwork or (team adj (work or approach or member\* or training or educat\* or interact\*)) or ((multidisciplin\* or multi-disciplin\* or interdisciplin\* or interdisciplin\*) adj3 (team\* or round\*)) or ((Shift\* or liaison\* or coordinat\*) adj3 (care or rore\*)) or ((change\* or extend\* or expand\* or transform\*) adj3 (responsib\* or skill\* or boundar\* or competenc\* or boundar\*)) or ((non-medical\* or nonmedical\* or nurse\* or pharmacist\* or nurse practitioner\* or nurse specialist\* or specialist nurse\* or physician assistant\* or medical assistant\* or PA) adj3 prescri\*) or ((case or discharge\* or nurse\* or care) adj manag\*) or ((service\* or skill\* or role\* or task\* or responsib\*) adj3 transfer\*) or ((nurse\* or pharmacist\* or physician-assistant\* or pa or medical-assistant\* or dentist\* or dentalassistant\* or physiotherapist\* or physicaltherapist\*) adj (led or intervention\* or managed or run or directed)) or (Substitut\* adj3 (doctor\* or physician\* or nurse\* or pharmacist\* or specialist\*)) or ((care or healthcare) adj coordinat\*) or delegation or (exten\* adj3 role\*) or (professional\* adj3 (autonom\* or boundar\*)) or (role\* adj6 (nurse practitioner\* or nurse specialist\* or specialist nurse\* or physician assistant\* or medical assistant\* or palliative care\* or end of life\* or informal care\* or family care\*)) or new role\* or chang\* role\* or shared care or joined consult\* or Patient navigat\* or ((additional or advanced or new or extended or changed or expanded or supplementary or joint or shared or sharing) adj6 (task\* or role\* or skill\* or competenc\* or responsib\*)) or (Replace\* adj3 (care or healthcare)) or ((new or expanded or enlarged or advanced) adj3 scope\*-of-practice) or (shar\* adj3 decision\*).ab,ti.) and (exp Health Personnel/ or exp Attitude of Health Personnel/ or caregivers/ or exp interprofessional relation/ or (((health care or healthcare) adj3 (personnel\* or staff\* or worker\* or workforce\*)) or nurse\* or doctor\* or ((clinical or health\* or care or medical or end-of-life) adj3 (manpower\* or workforce\* or humanresource\* or personnel\* or professional\* or staff\* or worker\* or visitor\* or provider\* or assistant\*)) or Physician\* or general-practitioner or doctor\* or consultant\* or nurse or specialist\* or clinician\* or ((Advanced or mid-level) adj3 (Pract\* or provider\*)) or physician-assistant\* or medical-assistant or physiotherapist\* or physi\*-therapist\* or occupational-therapist\* or midwif\* or midwiv\* or dentist\* or dental-staff or pharmacist\* or pharmac\*-technic\* or medical-assist\* or MD-extender\* or physician-extender\* or psychiatrist\* or psychologist\* or psychotherapist\* or Dietician\* or Dietitian\* or nutritionist\* or ((speech or language) adj3 (therapist\* or pathologist\*)) or logopaedist\* or logopedist\* or audiologist\* or ophthalmologist\* or optometrist\* or caregiver\* or carer\* or caretaker\* or (communit\* adj3 professional\*) or paramedic\* or gp or gps or ((practice\* or gp) adj3 receptionist\*).ab,ti.) and (Meta-Analysis/ or ((systematic\* adj3 review\*) or meta-analys\*).ab,ti.) not (case report/ or case report.ti.) not (letter or news or comment or editorial or congresses or abstracts).pt.) and english.la. (2678)

2 Hospitals/ (74192)

3 hospital.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms] (1141563)

4 secondary care.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism

supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms] (5907)

5 Secondary Care/ (463)

6 Tertiary Healthcare/ (823)

7 tertiary care.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms] (48428)

8 Hospital\*.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms] (1466192)

9 2 or 3 or 4 or 5 or 6 or 7 or 8 (1487336)

10 1 and 9 (631)

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