

# 6 *Chronic conditions and multimorbidity: skill-mix innovations for enhanced quality and coordination of care*

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## 6.1 Introduction

The prevalence of chronic diseases and multimorbidity is rising across Europe, triggered by increasing life expectancy and changing lifestyles. Chronic conditions are now the leading causes of premature death and disability in high-income countries (IHME, 2018; Jakab et al., 2018). In European countries, the number of people with multimorbidity, defined as the co-existence of two or more chronic conditions, is growing and may be an even greater challenge (Rijken et al., 2017, 2018).

The resulting pressures on health systems to address chronic and multimorbid conditions have become a major concern for policy-makers and providers. Traditional care delivery models are insufficient to respond to the complexity of such health conditions, with some patients experiencing disrupted care pathways. Continuous, coordinated, person-centred care is essential. Yet, many health service delivery models remain fragmented and focused on a single disease. As a result, a variety of new care models responding to chronic conditions and multimorbidity have been developed over the last decades, including disease management programmes, integrated care and multiprofessional team collaboration (Nolte & Knai, 2015). However, implementation remains patchy, limited to stand-alone programmes or projects, certain regions or single health conditions. These new health care models require new professional skills from individual providers and new competencies. Skill gaps include coordination and communication among providers, digital health know-how, coordination and transition between care levels (home, community, ambulatory, hospital), and developing patients' self-management through self-care and independent decision-making.

The aim of this chapter is to investigate the impact of skill-mix interventions in the care of patients with chronic and multimorbid conditions on health outcomes and health-system-related outcomes. Findings are based on the overview of systematic reviews, of which the methods are described in Chapter 1. Next, it presents the main skill-mix innovations and reforms for care of chronic conditions and multimorbidity that have emerged across Europe. The identification of these trends and reforms is based on the overview of systematic reviews on outcomes; on country case studies; and on an analysis of policies and grey literature.

This chapter focuses on trends in skill-mix changes for people with chronic conditions and multimorbidity. Across Europe, extensive research points to general positive effects of several skill-mix changes such as multiprofessional teams and expanded roles of certain professions (for example, nurses, pharmacists) to strengthen the coordination of care and patient self-management. Simultaneously, numerous other reforms and smaller-scale programmes have been adopted across Europe. In countries with a tradition of multiprofessional teamwork within the health and social care sectors, such as England, Italy and the Netherlands, nurses are more involved in care delivery and coordination of chronic care, such as in nurse-led clinics and nurse-delivered case management, and use of multiprofessional teams is more widespread (Nolte & Knai, 2015). In other countries with a traditionally physician-centred service delivery model in primarily solo practice, skill-mix changes have been less extensive. Germany for example introduced community nurses and “care assistants in family practice” to strengthen the role of nurses in providing patient self-management support or the delivery of selected medical tasks in anticipation of future shortages of family physicians. However, most often these tasks have remained under the supervision of the GP.

The chapter is structured as follows: Section 6.2 summarizes the main results from the overview of systematic reviews on the impact of skill-mix innovation on individual health outcomes and health-system-related outcomes. Within health-system-related outcomes, a focus was given on resource use and other outcome measures, including outcomes on the health workforce itself (profession-specific outcomes), as available. Section 6.3 outlines skill-mix reforms and trends in skill-mix interventions taking a cross-country perspective, identified in the literature and grey material. It also presents four case studies informed by the literature, country experts’ feedback and national policy documents. These were selected based on the extent of their integration with routine care, the

innovation potential for other geographies and the representation of the variety of skill-mix innovation and areas of intervention. Section 6.4 concludes the chapter and discusses implications for practice, research and policy.

## 6.2 Evidence on outcomes of skill-mix interventions for chronic conditions and multimorbidity

### *Overview of the systematic reviews included*

A total of 78 systematic reviews on skill-mix interventions for chronic conditions and multimorbidity were identified and synthesized for this chapter (Box 6.1).

Included reviews evaluated skill-mix innovations aiming to improve care for a variety of chronic diseases. Single chronic conditions were assessed in 69 reviews, covering the following conditions: diabetes and chronic kidney disease (25 reviews<sup>1</sup>), mental health (16 reviews), cardiovascular disease (10 reviews), cancer (six reviews), chronic respiratory diseases (five reviews), HIV infection (three reviews), musculoskeletal disorders (one review) and various chronic conditions (three reviews).

#### **Box 6.1 Overview of the evidence**

- A total of 78 reviews were identified and synthesized for this chapter:
  - 69 reviews focused on single chronic conditions (diabetes mellitus and chronic kidney disease, cardiovascular disease, cancer, mental health, chronic respiratory diseases, HIV infection and musculoskeletal disorders)
  - nine reviews focused on multimorbidity, with one of them focusing on both single chronic conditions and multimorbidity.
- The majority of original studies were conducted in the USA, the United Kingdom, Australia and Canada. The Netherlands and Spain were the most represented European countries after the United Kingdom in terms of original studies, with a small number from Sweden, Belgium, Denmark, France, Ireland, Austria and Switzerland. There were no studies from Eastern European countries.
- The quality of reviews was moderate overall, there were 10 Cochrane reviews and 43 reviews including a meta-analysis.

<sup>1</sup> Some of these reviews also focus on cardiovascular disease and/or hypertension. However, reviews are only counted once, under one condition.

Nine reviews focused solely on multimorbidity with four of them evaluating some aspect of multiprofessional teamwork, three studies focused on nurse-led clinics, nurse prescribing and nurse-led collaborative care, and one study focused on collaborative goal setting between patients and primary health professionals. One review evaluated both single chronic conditions and multimorbidity, focusing on nurse-delivered education to improve self-management. Details on the main skill-mix innovations covered are described in Box 6.2 and in subsequent boxes (Boxes 6.3–6.6) in the respective subsections. Almost all reviews reported on health outcomes, but few studies assessed other outcome measures such as cost-effectiveness, health care utilization or patient and staff satisfaction. There was little consideration of the education or qualifications of health professionals involved in skill-mix innovations, so it was not possible to draw conclusions on different outcomes regarding the training.

In the following section we synthesize the evidence from the included systematic reviews according to the professional groups primarily involved in skill-mix innovations: pharmacists, nurses, other single professions (for example, community health workers) and multiprofessional teams.

### **Box 6.2 Major skill-mix innovations in the care for patients with chronic conditions and multimorbidity**

The majority of skill-mix interventions for the management of single chronic conditions (mainly diabetes, cardiovascular disease and hypertension) involved a pharmacist or nurse taking on new tasks (for example, patient education) or being re-allocated tasks from another health profession (most frequently a physician). In contrast, the management of mental health diseases and multimorbidity often involved collaborative care and interprofessional teamwork between primary care physicians, specialists, nurses, pharmacists and other health and social care professionals. New skill-mix innovations involved care coordinating roles such as case managers (for example, nurse or social worker) or patient navigators for example, lay persons) overseeing the care process and providing social and psychological patient support or patient education. Many skill-mix innovations, however, were multifactorial interventions using a collaborative care approach that included a case manager (nurse or pharmacist) that may support primary care teams, set up care planning, collaborative goal setting, patient education and follow up.

## *Pharmacist-delivered interventions*

### **Key messages**

- Skill-mix interventions involving pharmacists are effective at improving blood glucose levels and blood pressure control and have comparable results on health-related quality of life.
- Pharmacist-delivered care can improve medication adherence for patients with a variety of chronic conditions.
- There is some, albeit limited, evidence showing that skill-mix interventions involving pharmacists may be cost-effective and reduce the risk of hospital admissions.

### **Chronic conditions**

#### **Evidence on health and profession-specific outcomes**

With respect to diabetes, included reviews provide strong evidence that pharmacist-involved interventions (for example, more advanced roles in patient education, medication and disease management) compared with usual care can significantly improve glycated haemoglobin (HbA1c) levels, irrespective of whether pharmacists work as part of

#### **Box 6.3 Skill-mix interventions involving pharmacists**

- Pharmacist interventions were evaluated in 18 systematic reviews on single chronic conditions (Table 6.1)
- In the majority of reviews pharmacists were allocated tasks traditionally performed by physicians or nurses
- New tasks commonly undertaken included: health screenings, immunizations, monitoring of drug interactions and medication adherence, providing therapeutic recommendations to patient's physician and education and guidance to patients on healthy behaviours and disease management
- One review additionally assessed pharmacist-delivered education of physicians to improve adherence to prescribing guidelines for diabetes care
- One review evaluated pharmacists providing direct care to diabetes patients within a multiprofessional primary health care team
- Two reviews on COPD and multiple single chronic conditions evaluated pharmacist-collaborative care with primary health practitioners to improve medication adherence, prescribing and patient outcomes

**Table 6.1** *Skill-mix interventions involving pharmacists for single chronic conditions*

Skill-mix interventions		Outcomes				
Content of interventions and skill-mix changes	Source(s)	Chronic condition [Sources]	Profession(s) in comparator group [Sources]	Patient-related outcomes [Sources]	Health system-related/resource use outcomes [Sources]	Profession-specific outcomes [Sources]
Pharmacist-involved care to improve patients' self-management including: health education, consultation, collaborative drug therapy management, initiation or titration of drug therapy, collaborative practice model, direct care under clinical guidelines, multidisciplinary diabetes management, home visitations, patient self-management training programmes	[1–9]	Diabetes [1–5]; Various chronic conditions (COPD, depression, diabetes, CVD) [6, 7]; CVD/hypertension [8, 9]	<ul style="list-style-type: none"> <li>• Usual care, professions not defined [1, 3, 5, 6, 9]</li> <li>• Pharmacists, primary care physicians or nurses [2]</li> <li>• Usual care generally from physician [8], but also nurses and pharmacists [4]</li> <li>• Primary health care professionals or no comparable service [7]</li> </ul>	<ul style="list-style-type: none"> <li>• Reduced HbA1c levels* [2–4, 6, 7]</li> <li>• Reduced SBP and DBP* [6–9]</li> <li>• Reduced LDL-C* [4]</li> <li>• Improved medication adherence* [3, 8, 9]</li> <li>• Increased attainment of goals for HbA1c [6]</li> <li>• Improved quality of life* [3, 5]</li> <li>• Some evidence of improvements in quality of life for patients with asthma, heart failure and high risk of medications related problems (three of eight studies) [7]</li> <li>• Improved modifiable lifestyle risk factors and improvements in HbA1c levels [1]</li> <li>• No difference in all-cause mortality [6]</li> <li>• No significant improvements in COPD and depression outcomes [7]</li> <li>• Decrease in number of medications prescribed, an improvement in testing and statin prescribing for patients with hyperlipidaemia [7]</li> </ul>	<ul style="list-style-type: none"> <li>• Some evidence of reduced costs for collaborative care models and when pharmacists provide pro-active consultation for high-risk patients and new/changed prescriptions [1]</li> <li>• Intervention dominant (cost-effective) [5]</li> <li>• Improvements in eliminating therapeutic duplication [7]</li> <li>• Similar rates of office visits, emergency department visits and hospitalizations compared with usual care [6]</li> </ul>	<ul style="list-style-type: none"> <li>• Increased adherence to American Diabetes Association standards of care for most care types [1]</li> <li>• Improvements in guideline adherence for prescribing (compared with no intervention) [7]</li> </ul>

**Table 6.1** (*cont.*)

Skill-mix interventions		Outcomes				
Content of interventions and skill-mix changes	Source(s)	Chronic condition [Sources]	Profession(s) in comparator group [Sources]	Patient-related outcomes [Sources]	Health system-related/resource use outcomes [Sources]	Profession-specific outcomes [Sources]
Pharmacists providing direct patient care within an interprofessional team	[10]	Diabetes	<ul style="list-style-type: none"> <li>Usual care without pharmacist interventions and/or diabetes education provided by health care professionals other than pharmacists</li> </ul>	<ul style="list-style-type: none"> <li>Reduced HbA1c levels, SPB and LDL-C*</li> </ul>		<ul style="list-style-type: none"> <li>Improvements in prescribing guideline adherence by physicians</li> </ul>
Pharmacist managed warfarin services including medication adherence, screening for side effects and monitoring drug interactions	[11, 12]	CVD/hypertension	<ul style="list-style-type: none"> <li>Physician or nurse [11, 12]</li> </ul>	<ul style="list-style-type: none"> <li>Comparable effects (usual care) on anticoagulation control, major bleeding, thromboembolic events [11]</li> <li>Lower or comparable (usual care) risk of major bleeding and thromboembolic events [12]</li> </ul>	<ul style="list-style-type: none"> <li>Cost savings* [11, 12]</li> <li>Reduced emergency department visits, hospitalization rates* [11, 12]</li> </ul>	
Pharmacist provided education counselling,	[13]	Cancer	<ul style="list-style-type: none"> <li>Nurses</li> </ul>	<ul style="list-style-type: none"> <li>Improved nausea and vomiting control</li> <li>Improved medication adherence</li> </ul>	<ul style="list-style-type: none"> <li>Improvement for anti-emesis drug costs</li> </ul>	

health screening and monitoring medication adherence and side effects for adult outpatients with cancer using antineoplastic drugs

- Increased knowledge–attitude–practice for chemotherapy and blood pressure management
- Increased patient satisfaction and quality of life

Pharmacist provided education and counselling to improve medication adherence and symptoms [14]

Depression

- Usual care, professions not defined
- No improvement in depression symptom severity
- Improved medication adherence\*

Pharmacist-delivered patient care services in the community pharmacy setting for disease or medication management, re-fill reminders, pharmacist-administration of influenza immunization [15, 16], and pharmacist-collaborative care with primary health practitioners [16]

Various including asthma, diabetes, hypertension, CVD, HIV, COPD and multimorbidity

- Usual care, professions not defined [15, 16]
- Improved medication adherence, appropriate medication use and immunization rates [15]
- Improved blood pressure control but limited evidence of other improved health outcomes [15]
- No evidence of improved safety outcomes or quality of life [15]
- Some limited evidence of improved patient satisfaction [15]
- Improvements in diet and diabetes self-care but no change in exercise rates [15]
- Reductions in SBP, DBP, LDL-cholesterol, HbA1c and 10-year Framingham risk score\* [16]
- Increased average number of inpatient and outpatient claims for patients with diabetes [15]
- Higher percentage of asthma patients with breathing-related emergency department visits or hospitalization [15]



**Table 6.1** (cont.)

Skill-mix interventions		Outcomes				
Content of interventions and skill-mix changes	Source(s)	Chronic condition [Sources]	Profession(s) in comparator group [Sources]	Patient-related outcomes [Sources]	Health system-related/resource use outcomes [Sources]	Profession-specific outcomes [Sources]
Pharmacist-delivered care in the management of adults with pre-dialysis CKD in addition to usual care	[17] <sup>b</sup>	CKD	<ul style="list-style-type: none"> <li>Usual care, GP</li> </ul>	<ul style="list-style-type: none"> <li>No effect on quality of life, renal outcomes and blood pressure outcomes</li> </ul>		<ul style="list-style-type: none"> <li>Higher rate of prescribing for vitamin D and bicarbonate*</li> </ul>
Pharmacist-delivered care and pharmacist-collaborative care providing education, medication management, patient-reminder, smoking cessation	[18]	COPD	<ul style="list-style-type: none"> <li>Usual care, pharmacists, medical staff and nursing staff</li> </ul>	<ul style="list-style-type: none"> <li>Improved medication compliance of patients*</li> <li>No significant effect on lung function</li> </ul>	<ul style="list-style-type: none"> <li>Cost savings*</li> <li>Reduction in risk of hospital admission*</li> <li>No significant effect on emergency department visits</li> </ul>	

*Abbreviations:* BP: blood pressure; CKD: chronic kidney disease; COPD: chronic obstructive pulmonary disease; CVD: cardiovascular disease; DBP: diastolic blood pressure; GP: general practitioner; HbA1c: glycated haemoglobin; HIV: human immunodeficiency virus; LDL-C: low-density lipoprotein cholesterol; SBP: systolic blood pressure.

*Notes:* <sup>a</sup> Studies included in this review also covered patients with multiple chronic conditions (patients receiving polypharmacy, patients prescribed at least one medication, and any general practice patients and patients at risk of adverse health problems); <sup>b</sup> Review is also covered in Tables 6.2 and 6.4. \* Statistically significant results.

*Sources:* [1] Armor et al. (2010); [2] Aguiar et al. (2016); [3] Deters et al. (2018); [4] van Eikenhorst et al. (2017); [5] Wang, Yeo & Ko (2016); [6] Greer et al. (2016); [7] Nkansah et al. (2010); [8] Morgado et al. (2011); [9] Cheema, Sutcliffe & Singer (2014); [10] Fazel et al. (2017); [11] Entezari-Maleki et al. (2016); [12] Manzoor et al. (2017); [13] Colombo et al. (2017); [14] Readdean, Heuer & Scott Parrott (2018); [15] Blalock et al. (2013); [16] Tan et al. (2014); [17] Nicoll et al. (2018); [18] Zhong et al. (2014).

a multiprofessional team or autonomously (Table 6.1) (Aguiar et al., 2016; Armor et al., 2010; Deters et al., 2018; Fazel et al., 2017; Greer et al., 2016; Nkansah et al., 2010; van Eikenhorst et al., 2017).

The evidence also suggests that pharmacist-delivered care improves cardiovascular disease outcomes, with studies reporting improvements in systolic and diastolic blood pressure measures versus usual care (Blalock et al., 2013; Cheema, Sutcliffe & Singer, 2014; Fazel et al., 2017; Greer et al., 2016; Morgado et al., 2011; Nkansah et al., 2010; van Eikenhorst et al., 2017). Pharmacist-delivered care had comparable effects on health-related quality of life and mortality risk for patients on warfarin compared with usual physician-delivered care (Entezari-Maleki et al., 2016). Some evidence suggested pharmacist interventions improved quality of life for patients with asthma, heart failure and those at high risk of medications related problems (Nkansah et al., 2010). Evidence also indicated a lower risk of major bleeding and thromboembolic events for participants engaged in pharmacist-delivered interventions, albeit with significance only found in non-RCT studies (Entezari-Maleki et al., 2016; Manzoor et al., 2017).

Pharmacist-delivered care for patients living with cancer led to improved control of nausea and vomiting, patient satisfaction, medication adherence and increased knowledge of blood pressure management. It was also shown to improve quality of life and patient satisfaction for adults on antineoplastic medication (Colombo et al., 2017). However, no significant effect of pharmacist-delivered care was reported in one study on patients with chronic kidney disease for quality of life, renal outcomes and blood pressure (Nicoll et al., 2018), nor in one study on COPD care for lung function (Zhong et al., 2014). In addition, one review concluded that pharmacist-delivered care did not improve depression symptoms (Readdean, Heuer & Scott Parrott, 2018).

Compared with usual care, pharmacist-delivered interventions were able to significantly improve medication adherence for patients with hypertension (Blalock et al., 2013; Cheema, Sutcliffe & Singer, 2014; Morgado et al., 2011), diabetes (Blalock et al., 2013; Fazel et al., 2017; van Eikenhorst et al., 2017; Wang, Yeo & Ko, 2016), depression (Readdean, Heuer & Scott Parrott, 2018) and COPD (Zhong et al., 2014). One review on pharmacist-delivered patient care services in the community for people with various chronic conditions or multimorbidity concluded that it improved patient satisfaction but did not reduce safety outcomes or quality of life (Blalock et al., 2013).

With respect to profession-specific outcomes, limited evidence also suggests that pharmacist interventions can improve adherence to prescribing guidelines for physicians, resulting in a reduction in therapeutic duplication and the number of medications prescribed (Nkansah et al., 2010). Two studies also reported that pharmacist-involved care increased adherence to American Diabetes Association standards of care for most care types (Armor et al., 2010) and led to a higher rate of prescribing of vitamin D and bicarbonate for patients with chronic kidney disease (Nicoll et al., 2018).

### **Evidence on health-system-related outcomes**

Five studies reported economic outcomes on pharmacist-involved interventions. According to one review (Wang, Yeo & Ko, 2016), pharmacist-managed care resulted in higher quality-adjusted life-years with lower costs than usual care (so the intervention was dominant). Pharmacist-managed warfarin services were shown to significantly lower emergency department visits and hospitalization rates and to be cost saving over usual physician-delivered care (Entezari-Maleki et al., 2016; Manzoor et al., 2017). Pharmacist-delivered care was also shown to lower anti-emetic drug costs for cancer care (Colombo et al., 2017), while lower costs were reported for collaborative care models involving pharmacists and pharmacist-provided consultations for high-risk diabetes patients (Armor et al., 2010) and for COPD patients (Zhong et al., 2014).

Pharmacist-directed care and pharmacist-collaborative care were also found to significantly reduce risk of hospital admissions for patients with COPD, but had no effect on emergency department visits (Zhong et al., 2014). One review also found similar rates of emergency department visits, office visits and hospitalizations compared with usual care for people with chronic conditions (Greer et al., 2016). There was, however, some evidence of pharmacist-delivered care leading to a higher percentage of asthma patients with breathing-related emergency department visits or hospitalizations (Blalock et al., 2013).

### **Multimorbidity**

The one review evaluating care for multimorbidity involving pharmacists, focused on pharmacist-directed care and pharmacist-collaborative care with primary health practitioners. This review found evidence that multiprofessional teamwork significantly improved systolic and diastolic

blood pressure, low-density lipoprotein cholesterol (but not high-density lipoprotein cholesterol), HbA1c levels and 10-year Framingham risk score versus usual care (Tan et al., 2014).

### *Nurse-delivered skill-mix interventions*

#### **Key messages**

- Nurse-delivered care leads to equivalent or better health outcomes compared with the usual care, in particular titration of medication by nurses and nurse-led clinics.
- There is insufficient evidence on the impact of skill-mix interventions involving nurses in expanded roles on health system outcomes and cost effectiveness, but some studies show a positive impact on hospital (re)admissions, physician visits and costs.
- Evidence on the impact of skill-mix innovations involving nurses on health outcomes for people with multimorbidity is inconclusive.

#### **Chronic conditions**

##### **Evidence on health and profession-specific outcomes**

The included reviews focusing on diabetes found a comparable effect on HbA1c levels for independent nurse prescribing compared with physician-led prescribing (Health Quality Ontario, 2013;

#### **Box 6.4 Skill-mix interventions involving nurses**

- 20 systematic reviews assessed nurse-delivered skill-mix interventions for single chronic conditions (Table 6.2), with four reviews focused on multimorbidity (Table 6.5)
- In the majority of reviews nurses were allocated tasks traditionally undertaken by physicians
- New tasks undertaken by nurses range from prescribing, lifestyle education for improved self-management, management of medication adherence and prescribing, that are delivered either independently (as a physician substitute) or within a multiprofessional team
- Three reviews assessed nurse-led clinics in cardiac and asthma care
- Two reviews focused on care delivered either autonomously or within a multiprofessional team by nurse practitioners or specialist nurses for people with various chronic conditions
- One review evaluated titration of medicines by nurses for diabetes care

**Table 6.2** *Nurse-delivered skill-mix interventions for single chronic conditions*

Skill-mix interventions			Outcomes			
Content of interventions and skill-mix changes	Source(s)	Chronic condition [Sources]	Profession(s) in comparator group [Sources]	Patient-related outcomes [Sources]	Health system-related/resource use outcomes [Sources]	Profession-specific outcomes [Sources]
Brief psychosocial intervention delivered by nurses, psychotherapists or social workers to support families living in the community affected by cancer	[19]	Cancer	<ul style="list-style-type: none"> <li>Usual care, professions not defined</li> </ul>	<ul style="list-style-type: none"> <li>Improvements in depression and anxiety</li> <li>Improved QoL</li> <li>Improved patient–carer relationship</li> <li>Reduced carer burden</li> <li>Mixed evidence on physical symptoms, with some reviews reporting adverse consequences</li> <li>Increased depression in those receiving CBT</li> <li>Worse psychosocial status in carers taught to give direct care</li> </ul>		
Nurse titration of medications following a protocol	[20]	Diabetes/CVD	<ul style="list-style-type: none"> <li>Usual care, professions not defined</li> </ul>	<ul style="list-style-type: none"> <li>Reduced HbA1c levels, SBP and DBP*</li> <li>Improved medication adherence*</li> </ul>	<ul style="list-style-type: none"> <li>Lower inpatient costs*</li> <li>No significant differences in outpatient costs</li> </ul>	

Nurse-delivered education to improve patient self-management	[21]	Diabetes	<ul style="list-style-type: none"><li>• Usual care, GP or nurse or other health care professional under GP supervision</li></ul>	<ul style="list-style-type: none"><li>• No significant difference in HbA1c levels</li><li>• Reduced SBP and DBP*</li></ul>		
Nurse practitioners and specialized nurses providing clinical care (e.g. prescribing) and lifestyle education, either independently or as part of a multiprofessional team	[22, 23]	Various chronic diseases (COPD, CVD, CAD, diabetes, chronic wounds) [22]; diabetes [23]	<ul style="list-style-type: none"><li>• Usual care from physicians</li></ul>	<ul style="list-style-type: none"><li>• Comparable effect to physician-delivered care on HbA1c levels working autonomously [22, 23]</li><li>• Reduction in HbA1c levels with nurse-led multiprofessional team* [22]</li><li>• Improved BP and cholesterol control for teamwork [22]</li><li>• Improved patient satisfaction for teamwork; no differences autonomous care [22]</li><li>• Increase in the proportion of individuals appropriately receiving influenza or pneumovax vaccinations, patient education related to smoking, exercise, diet, and medication side-effects* [22]</li><li>• Specialized nurses more likely to intensify glucose-lowering therapy, intensify blood pressure medications [22]</li></ul>	<ul style="list-style-type: none"><li>• Reduced hospitalizations for the CAD population for teamwork*; no differences for nurses providing autonomous care [22]</li><li>• Increase in number of referrals for echocardiographs among patients with presumed CHF, assessment of blood pressure, smoking status, and body mass index/weight among CAD patients (1 of 1 study) [22]</li><li>• Specialized nurses more likely to refer to an internist for starting insulin therapy [22]</li></ul>	<ul style="list-style-type: none"><li>• No significant difference in job satisfaction, or inappropriate demands for teamwork [22]</li></ul>

Table 6.2 (cont.)

Skill-mix interventions		Outcomes				
Content of interventions and skill-mix changes	Source(s)	Chronic condition [Sources]	Profession(s) in comparator group [Sources]	Patient-related outcomes [Sources]	Health system-related/resource use outcomes [Sources]	Profession-specific outcomes [Sources]
Nurse-delivered autonomous care involving a variety of activities, ranging from nurse prescribing to nurse-delivered lifestyle education	[24]	Various chronic diseases (asthma, COPD, hypertension, diabetes, CVD, gastritis, Parkinson's)	<ul style="list-style-type: none"> <li>Physicians, including family physicians, paediatricians, geriatricians</li> </ul>	<ul style="list-style-type: none"> <li>Comparable effect to physician-delivered care on HbA1c levels</li> <li>Reduction in patients with feet-at-risk</li> <li>Reduction in total mortality</li> <li>No long-term differences in blood pressure, BMI, weight, smoking</li> <li>Improved intake of aspirin, low-fat diets and moderate physical activity</li> <li>No long-term differences in correct inhalation technique and well-controlled asthma</li> <li>Improvements in best hand score for Parkinson's patients*</li> </ul>		<ul style="list-style-type: none"> <li>No difference in adherence to practical guidelines</li> <li>Nurses provided more information than physicians on the causes of health problems or illness (2 of 3 trials), relief of symptoms, duration of illness, how to reduce recurrences and what to do if problems persisted (1 of 2 trials)</li> </ul>

Nurse-delivered education to improve self-monitoring and disease management	[25] <sup>a</sup>	Various chronic diseases (COPD, hypertension, diabetes, CVD)	<ul style="list-style-type: none"><li>• Usual care, primary care physician</li></ul>	<ul style="list-style-type: none"><li>• Reduction in DBP, LDL-C and HbA1c*</li><li>• No conclusive evidence on total mortality, quality of life, fasting serum glucose levels, triglycerides</li></ul>	
Nurse-led cardiac clinics	[26, 27]	CVD	<ul style="list-style-type: none"><li>• Usual care, professions not defined [26, 27]</li></ul>	<ul style="list-style-type: none"><li>• No long-term differences in blood pressure, self-perceived physical or mental health compared with other clinics [26]</li><li>• Decreased risk of myocardial infarction* [27]</li><li>• No significantly lower risk of major adverse cardiac event [27]</li><li>• Improved medication adherence* [27]</li></ul>	<ul style="list-style-type: none"><li>• No significant differences in hospitalizations [26]</li></ul>
Nurse-delivered counselling, education and motivation to increase medication adherence delivered autonomously or within multiprofessional team	[28]	CVD/ hypertension	<ul style="list-style-type: none"><li>• Usual care, professions not defined</li></ul>	<ul style="list-style-type: none"><li>• Improved medication adherence for motivation and follow-up interventions but not education and counselling*</li></ul>	



Table 6.2 (cont.)

Skill-mix interventions		Outcomes				
Content of interventions and skill-mix changes	Source(s)	Chronic condition [Sources]	Profession(s) in comparator group [Sources]	Patient-related outcomes [Sources]	Health system-related/resource use outcomes [Sources]	Profession-specific outcomes [Sources]
Nurses or pharmacists providing care in the home to improve disease self-management and lifestyle	[29]	CVD/hyper-tension	<ul style="list-style-type: none"> <li>Usual care, professions not defined</li> </ul>	<ul style="list-style-type: none"> <li>Reduced all-cause mortality*</li> <li>Improved quality of life for nurse-delivered interventions but not for pharmacist-delivered interventions*</li> </ul>	<ul style="list-style-type: none"> <li>Average savings of \$10 665 per patient</li> <li>Reduced hospitalizations*</li> </ul>	
Use of nurses as managers of antidepressant medication adherence programmes, either as case managers or as part of collaborative team	[30]	Depression	<ul style="list-style-type: none"> <li>Usual care, professions not defined</li> </ul>	<ul style="list-style-type: none"> <li>Improved depression symptom severity</li> <li>No improvements in medication adherence</li> </ul>		
Self-management skills education by nurses, peers or health assistant	[31]	Mental health	<ul style="list-style-type: none"> <li>Usual care or within person pre- and post-intervention, professions not defined</li> </ul>	<ul style="list-style-type: none"> <li>Improved self-management skills and small improvements in physical health</li> </ul>	<ul style="list-style-type: none"> <li>Small reduction in use of crisis and emergency services</li> </ul>	

Transition manager (mostly nurse-delivered) providing education, follow up, needs assessment and inpatient/outpatient provider communication	[32]	Mental health	<ul style="list-style-type: none"><li>• Not defined</li></ul>		<ul style="list-style-type: none"><li>• Reduction of readmission rates for pre- and post-discharge interventions: patient psycho-education, needs assessment, telephone follow up, home visits, use of transition manager and inpatient/outpatient provider communication*</li><li>• No significant reduction for bridging interventions</li></ul>	
Nurse-delivered disease management programmes to improve quality of life for patients with pre-dialysis chronic kidney disease	[33]	CKD	<ul style="list-style-type: none"><li>• Usual non-nurse led disease management care</li></ul>	<ul style="list-style-type: none"><li>• Improvement of symptoms and sleep*</li><li>• No significant improvement of patient satisfaction</li></ul>		<ul style="list-style-type: none"><li>• Improvement of staff encouragement*</li></ul>
Nurse-delivered care (involving nurses, specialist nurses, NPs) in the management of adults with pre-dialysis CKD	[34] <sup>b</sup>	CKD	<ul style="list-style-type: none"><li>• Usual care, nephrologists, GPs</li></ul>	<ul style="list-style-type: none"><li>• No significant effect on mortality, renal outcomes, composite ischaemic heart disease end-point</li></ul>	<ul style="list-style-type: none"><li>• Higher mean number of total visits (including nurse visits), and lower mean number of physician visits (per year)*</li></ul>	<ul style="list-style-type: none"><li>• Increase in prescribing of relevant drugs*</li></ul>

Table 6.2 (cont.)

Skill-mix interventions		Outcomes				
Content of interventions and skill-mix changes	Source(s)	Chronic condition [Sources]	Profession(s) in comparator group [Sources]	Patient-related outcomes [Sources]	Health system-related/resource use outcomes [Sources]	Profession-specific outcomes [Sources]
Nurse-delivered self-management intervention	[35]	COPD	<ul style="list-style-type: none"> <li>• Usual care, GP, specialist, respiratory nursing service</li> </ul>	<ul style="list-style-type: none"> <li>• Reduction of anxiety symptoms*</li> <li>• No significant difference in exacerbation frequency and patient satisfaction</li> </ul>		
Nurse-led asthma clinics with varying degree of doctor participation [36] and nurse-delivered asthma management (specialized asthma nurse, NP, physician assistant supervised by physician) [37]	[36, 37]	Asthma	<ul style="list-style-type: none"> <li>• Usual care, GPs, [36]; physician-delivered asthma care, physician, paediatrician, respiratory specialist [37]</li> </ul>	<ul style="list-style-type: none"> <li>• Reduced nocturnal awakenings* [36]</li> <li>• No significant difference in use of preventer medication [36]</li> <li>• No significant improvement of quality of life [36, 37]</li> <li>• No significant improvement of asthma severity and symptoms [37]</li> <li>• No significant difference in number of exacerbations [37]</li> </ul>	<ul style="list-style-type: none"> <li>• No significant difference in accident and emergency department attendance [36]</li> <li>• No significant difference in hospital admission [36, 37]</li> <li>• Lower costs for nurse-delivered outpatient visits* [37]</li> </ul>	

Nurse-delivered home care and education for patients with obstructive sleep apnoea	[38]	Obstructive sleep apnoea	• Physician-delivered care	• No significant difference in continuous-positive airway pressure, Epworth Sleepiness Scale and physical functioning
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*Abbreviations:* BMI: body mass index; BP: blood pressure; CVD: cardiovascular disease; CAD: coronary artery disease; CBT: cognitive behavioural therapy; CKD: chronic kidney disease; COPD: chronic obstructive pulmonary disease; CHF: coronary heart failure; DBP: diastolic blood pressure; HbA1c: glycated haemoglobin; HIV: human immunodeficiency virus; LDL-C: low-density lipoprotein cholesterol; NP: nurse practitioner; SBP: systolic blood pressure.

*Notes:* \* Statistically significant results; <sup>a</sup> 16 of 23 studies in this review cover single chronic conditions, only their results are reported. Results on multimorbidity are reported in Table 6.5; <sup>b</sup> Review is also covered in Tables 6.1 and 6.4.

*Sources:* [19] Hopkinson et al. (2012); [20] Shaw et al. (2013); [21] Parker et al. (2016); [22] Health Quality Ontario (2013); [23] Tabesh et al. (2018); [24] Martínez-González et al. (2015); [25] Massimi et al. (2017); [26] Schadeewaldt & Schultz (2010); [27] Al-Mallah et al. (2016); [28] Al-Ganmi et al. (2016); [29] Fergenbaum et al. (2015); [30] Heise et al. (2014); [31] Kelly et al. (2014); [32] Vigod et al. (2013); [33] Chen et al. (2016); [34] Nicoll et al. (2018); [35] Baker & Fatoye (2017); [36] Baishnab & Karner (2012); [37] Kuethe et al. (2013); [38] Gong et al. (2018).

Martínez-González et al., 2015; Tabesh et al., 2018). Moreover, titration of medication by nurses significantly reduced HbA1c levels and improved health behaviours and medication adherence (Shaw et al., 2013). Self-management education by nurses was nevertheless shown to have no significant impact on HbA1c levels (Parker et al., 2016), total mortality, quality of life or cholesterol levels (Massimi et al., 2017).

With respect to cardiovascular disease, nurse-titration of medication was reported to significantly reduce both systolic and diastolic blood pressure (Parker et al., 2016; Shaw et al., 2013). In addition, nurse-led cardiac clinics were found to provide equivalent or better care than clinics run by other health professionals or usual care of cardiovascular disease. Compared with usual care, studies reported significant reductions in total mortality and equivalent outcomes for self-reported mental or physical health compared with non-nurse led clinics (Schadewaldt and Schultz, 2010). Nurse-delivered motivational interviewing was shown to increase medication adherence for patients with cardiovascular disease (Al-Ganmi et al., 2016).

Moderate evidence also suggests that nurse-management of anti-depressant medication adherence programmes, with nurses working independently or as part of a multiprofessional team, helps to lower depression symptom severity and significantly improved patient satisfaction, but may not improve medication adherence (Heise & van Servellen, 2014). Limited evidence indicates that self-management education delivered by nurses, peers or health assistants can lead to small improvements in physical health and increased use of primary care services for people with a severe mental health condition (Kelly et al., 2014).

One review assessed psychosocial interventions for cancer patients and their families delivered predominantly by nurses (or psychotherapists and social worker) (Hopkinson et al., 2012). The review found some evidence of improved depression and anxiety symptoms and improved quality of life for cancer patients and improved patient–carer relationships. Nevertheless, there was also some evidence of worse psychosocial status in carers taught to give direct care and adverse consequences for the health status of cancer patients, including increased depression in those receiving cognitive behavioural therapy (Hopkinson et al., 2012).

Nurse-delivered care was found to lead to equivalent or better outcomes than usual care for patients with chronic kidney disease. Reviews reported significant improvement of symptoms and sleep, equivalent outcomes for patient satisfaction, mortality and renal outcomes (Chen et al., 2016; Nicoll et al., 2018).

Four reviews assessed nurse-delivered interventions for patients with respiratory diseases. Nurse-delivered self-management for patients with COPD was shown to significantly reduce anxiety symptoms (Baishnab et al., 2012) and nurse-led asthma clinics had a significant effect on nocturnal awakenings (Baker et al., 2017). For asthma patients, there was comparable effect on number of exacerbations (Baker et al., 2017; Kuethe et al., 2013), quality of life, disease severity and symptoms as well as use of preventer medication (Baishnab et al., 2012; Kuethe et al., 2013) and levels of correct inhalation technique and well-controlled asthma (Martínez-González et al., 2015). Nurse-delivered home care and education for patients with obstructive sleep apnoea was shown to have no significant effect on continuous positive airway pressure and physical functioning compared with physician-delivered care (Gong et al., 2018).

For patients with Parkinson's disease, nurse-delivered autonomous care was shown to significantly improve best hand score compared with usual care (Martínez-González et al., 2015), while nurse practitioner- and specialist nurse-delivered care within a team significantly increased the proportion of individuals with a chronic disease appropriately receiving influenza or pneumovax vaccinations as well as patient education related to smoking, exercise, diet, and medication side effects (Health Quality Ontario, 2013).

Four studies reported on professional-specific outcomes. For patients with various chronic conditions, nurse practitioner- or specialist nurse-delivered clinical care within a multiprofessional team was shown to lead to no significant difference in job satisfaction, or inappropriate demands for teamwork (Health Quality Ontario, 2013), while no difference in adherence to practical guidelines was found for nurse-delivered autonomous care (Martínez-González et al., 2015). However, nurse-led care for patients with chronic kidney disease was shown to lead to improvements in staff encouragement and an increase in prescribing of relevant drugs (Chen et al., 2016; Nicoll et al., 2018). Limited evidence also suggests that nurse practitioner- or specialist nurse-delivered clinical

care increased the number of referrals for echocardiographs among patients with presumed coronary heart failure and the assessment of blood pressure, smoking status and body mass index/weight among coronary artery disease patients (Health Quality Ontario, 2013). Nurse practitioners and specialist nurses were also more likely to intensify glucose-lowering therapy, intensify blood pressure medications or refer patients with diabetes to an internist for the start of insulin therapy (Health Quality Ontario, 2013).

### **Evidence on health-system-related outcomes**

Ten reviews reported on health-system-related outcomes of which most outcome measures covered the use of health resources. There is some evidence that nurse-led collaborative care can reduce hospitalizations for patients with coronary artery disease (Health Quality Ontario, 2013). Nurses providing interventions to improve the transition from inpatient to outpatient care were found to reduce readmission among adults with mental illness (Vigod et al., 2013). Nurse-delivered care in general was reported to improve secondary prevention of heart disease by appropriately increasing aspirin intake and adoption of low-fat diets and physically activity (Martínez-González et al., 2015). Furthermore, nurse-delivered care for patients with chronic kidney disease significantly reduced the number of physician visits, associated with an increased number of nurse visits (Nicoll et al., 2018). However, no significant difference was reported on accident and emergency department attendance and hospital admissions for patients attending nurse-led asthma and cardiac clinics (Baishnab et al., 2012; Kuethe et al., 2013; Schadewaldt and Schultz, 2010).

In terms of economic outcomes, nurse or pharmacist-delivered care in the home was shown to improve self-management of cardiovascular disease, reduce all-cause mortality and hospitalizations, resulting in average cost savings over usual care of \$10 665 per patient (Fergenbaum et al., 2015). Nurse-delivered asthma management also led to significantly lower costs for outpatient visits (Kuethe et al., 2013), and nurse titration of medicines following a protocol led to lower inpatient costs but not significant differences in outpatient costs for patients at risk of cardiovascular disease (Shaw et al., 2013). Limited evidence suggests that titration of medication by nurses lowers inpatient costs as well as salary costs compared with usual care (Shaw et al., 2013).

### Multimorbidity

Of the nine reviews on multimorbidity, four reviews analysed the expansion of roles for nurses and found improved or equivalent patient outcomes compared with usual care or physician-delivered care models (Table 6.5). Nurse-prescribing and community monitoring moderately reduced systolic but not diastolic blood pressure compared with physician-delivered care, while nurse-led clinics provided equivalent care to other clinics (Clark et al., 2011). All care models had a comparable effect on medication adherence compared with physician-delivered care (Clark et al., 2011). Nurse-delivered education to improve self-monitoring and disease management was shown to significantly reduce systolic and diastolic blood pressure and HbA1c levels, with a weak trend towards lower mortality (Massimi et al., 2017). Nurse-led collaborative care of patients significantly reduced depression severity for patients with depression and a physical health condition (Ekers et al., 2013), with limited evidence for improvements on patient, caregiver and health care staff satisfaction. No impact was observed on emergency admissions and bed days (Lupari et al., 2011).

### *Skill-mix interventions delivered by professions other than pharmacists and nurses for single chronic conditions*

#### Key messages

- Peer educators and community health workers – if involving regular contact with patients – were shown to improve several health outcomes and peer-related outcomes and/or to have comparable effects.
- The evidence is mixed as to whether transition coordinators (by various health professions or multiprofessional teams) can improve certain health outcomes.
- Disease management delivered by different professions or multiprofessional teams was shown to improve HbA1c levels, self-reported health status and patient satisfaction.
- Skill-mix interventions involving patient navigators, transition coordinators or peers reported a positive impact on resource use for cancer and diabetes patients and patients with mental illness. However, evidence on impact of skill-mix interventions on resource use overall is mixed and remains insufficient.



**Box 6.5 Skill mix interventions involving professions other than pharmacists and nurses**

- Thirteen reviews evaluated skill-mix interventions involving professions other than pharmacists or nurses for single chronic conditions (Table 6.3)
- Five reviews assessed care delivered by non-health professionals (peers, parents) involved in patient navigation for breast cancer or case management, including for diabetes and mental health
- Two reviews evaluated interventions by community health workers providing education and chronic care management for diabetes and hypertension care
- Four reviews assessed interventions involving various professionals (GPs, dietitians, transition coordinators, specialists, social workers) in chronic disease management
- One review evaluated training for primary care physicians to provide depression care; one review assessed management of musculoskeletal disorders by physiotherapists acting as substitute for physicians and specialists

**Evidence on health and profession-specific outcomes**

Diabetes disease management delivered by different professions or multiprofessional teams significantly reduced HbA1c levels but had no impact on mortality risk (Pimouguet et al., 2011). The transition coordinator model did not lead to overall improvements in HbA1c levels (Chu et al., 2015).

Peer support (generally lay persons with experience of the same disease(s) or community health workers) was found to significantly reduce HbA1c levels compared with usual care, provided that there was a moderate to high frequency of contact with patients (Qi et al., 2015). Peer support was also shown to significantly improve blood pressure control, cholesterol, body mass index, physical activity levels, self-efficacy, depression and perceived social support (Dale, Williams & Bowyer, 2012). However, peers involved in case management for adults with severe mental illness had no significant effect on symptoms, patient satisfaction and quality of life (Wright-Berryman, McGuire & Salyers, 2011).

With respect to depression, training for primary care practitioners failed to improve clinical symptoms unless implemented alongside provision of specific care guidelines (Sikorski et al., 2012). Training for parents to better manage children with autism spectrum disorder had no impact on comprehension, child initiation, expression and joint

**Table 6.3** *Skill-mix interventions delivered by professions other than pharmacists and nurses for single chronic conditions*

Skill-mix interventions			Outcomes			
Content of interventions and skill-mix changes	Source(s)	Chronic condition	Profession(s) in comparator group	Patient-related outcomes	Health system-related/resource use outcomes	Profession-specific outcomes
Patient navigation in breast cancer care involving non-health professionals (breast cancer survivors, lay community health workers, nurse navigator in cooperation with lay navigator and social worker, laypersons)	[39]	Breast cancer	<ul style="list-style-type: none"> <li>• Usual care, professions not defined</li> </ul>	<ul style="list-style-type: none"> <li>• Improved adherence to breast screening and diagnostic follow up due to navigation (follow up after abnormal radiographic screening, attending genetic counselling)</li> </ul>	<ul style="list-style-type: none"> <li>• Reduced waiting time for biopsy/diagnostic intervals</li> <li>• Decreased time to appointment with genetic counsellor</li> </ul>	
GP-led follow-up care for child cancer survivors. Model 1: “GP only” model: GP solely responsible for follow up; Model 2: shared care follow up	[40]	Cancer	<ul style="list-style-type: none"> <li>• Non-GP-led follow up (professions not described)</li> </ul>	<ul style="list-style-type: none"> <li>• Both models: Less patient travel, geographically convenient and “portable”</li> </ul>	Both models: <ul style="list-style-type: none"> <li>• Less attrition to follow-up appointments</li> <li>• Some evidence that more cost effective than follow-up in LTFU clinic</li> <li>• Reduced access to complex diagnostic testing</li> </ul>	

Table 6.3 (cont.)

Skill-mix interventions			Outcomes			
Content of interventions and skill-mix changes	Source(s)	Chronic condition	Profession(s) in comparator group	Patient-related outcomes	Health system-related/resource use outcomes	Profession-specific outcomes
with close collaboration between the GP and paediatric cancer centre, primary cancer treatment team, or late effects clinic					GP only model: <ul style="list-style-type: none"> <li>• Greater potential for discontinuity of care</li> <li>• May lose contact with original diagnosis centre</li> </ul>	
Transition of coordination from paediatric to adult diabetes care by specialist physician, paediatric nurse, trained transition coordinator	[41]	Diabetes or sickle cell anaemia	<ul style="list-style-type: none"> <li>• Usual care or no intervention, professions not defined</li> </ul>	<ul style="list-style-type: none"> <li>• No improvement in HbA1c levels (three of four studies)</li> </ul>	<ul style="list-style-type: none"> <li>• Higher rates of successful transfer and higher rates of attendance in adult clinics (three of five studies)</li> </ul>	
Structured education sessions delivered by community health workers or peers with diabetes	[42]	Diabetes	<ul style="list-style-type: none"> <li>• Usual care, professions not defined</li> </ul>	<ul style="list-style-type: none"> <li>• Reduction in HbA1c levels*</li> </ul>		

Peer support models for adults living with diabetes including: face-to-face management programmes, peer coaching, telephone-based peer support and web- and email-based support	[43]	Diabetes	<ul style="list-style-type: none"><li>• Usual care and nurse care management</li></ul>	<ul style="list-style-type: none"><li>• Improvements* in glycaemic control, blood pressure, cholesterol, BMI, physical activity, self-efficacy, depression and perceived social support</li></ul>
Disease management defined as ongoing and proactive patient follow-up by various professionals or peer counsellors including at least two of the five activities: (i) patient education (dietary, exercise, self-monitoring, knowledge of disease and medication), (ii) coaching, (iii) treatment adjustment, (iv) monitoring, (v) care coordination	[44]	Diabetes	<ul style="list-style-type: none"><li>• Nurses, dieticians, primary care physicians</li></ul>	<ul style="list-style-type: none"><li>• Reduction in HbA1c levels*</li><li>• No significant difference in mortality risk</li></ul>

**Table 6.3** (cont.)

Skill-mix interventions		Outcomes				
Content of interventions and skill-mix changes	Source(s)	Chronic condition	Profession(s) in comparator group	Patient-related outcomes	Health system-related/resource use outcomes	Profession-specific outcomes
Community health workers providing chronic care management including: health coaching, health education, home visiting, environmental modification, advocacy, care coordination, connecting with health/social services	[45]	Various chronic conditions (Type 2 diabetes, asthma, HIV, hypertension, CVD)	<ul style="list-style-type: none"> <li>• Professions not defined</li> </ul>		<ul style="list-style-type: none"> <li>• Significant decrease in preventable medication use</li> <li>• Evidence of cost savings and reduced per-patient annual costs</li> <li>• Significant decrease in emergency room visits, urgent care visits, and hospitalizations in 42% of RCTs</li> </ul>	
Training for primary care physicians to provide depression care	[46]	Depression	<ul style="list-style-type: none"> <li>• Usual care, professions not defined</li> </ul>	<ul style="list-style-type: none"> <li>• No improvement to symptom severity, unless implemented alongside care guidelines</li> </ul>		
Substitution of doctors with physiotherapists	[47]	Musculoskeletal disorders	<ul style="list-style-type: none"> <li>• Usual care, physicians and specialists</li> </ul>	<ul style="list-style-type: none"> <li>• No significant difference in health outcomes</li> <li>• Improved patient satisfaction*</li> </ul>	<ul style="list-style-type: none"> <li>• No difference in diagnostic and management decisions</li> <li>• Inconsistent results on resource utilization</li> </ul>	

Parent education in improving management, communication and interaction of/with children's autism spectrum disorder problems	[48]	Mental health/ autism spectrum disorder	<ul style="list-style-type: none"><li>• Usual care/ no treatment, student therapist, teacher, parents, professionals</li></ul>	<ul style="list-style-type: none"><li>• Improvement of autism characteristics' severity, shared attention in parent-child interaction*</li><li>• No significant effect on comprehension, child initiation, expression, joint language</li></ul>		<ul style="list-style-type: none"><li>• Improved parent's satisfaction and confidence with therapy</li><li>• Significant improvement of parents' synchrony</li></ul>
Consumer providers (peers) as practitioners on case management or assertive community treatment teams	[49]	Mental health	<ul style="list-style-type: none"><li>• Usual care</li></ul>	<ul style="list-style-type: none"><li>• No significant effect on symptoms, patient satisfaction and quality of life</li></ul>	<ul style="list-style-type: none"><li>• Better engagement in treatment and social relationships (i.e. staff, services)</li><li>• Limited evidence on reduced use of services (emergency rooms, hospitalization, mental health services)</li></ul>	
Self-management education provided in home to children, adolescents and/or caregivers by various health professionals	[50]	Asthma	<ul style="list-style-type: none"><li>• Usual care, less intensive education programme, professions not defined</li></ul>	<ul style="list-style-type: none"><li>• No significant effect on asthma symptoms, quality of life scores, number of school days missed</li></ul>	<ul style="list-style-type: none"><li>• No significant effect on emergency department visits</li><li>• Mixed results on hospital admissions</li></ul>	

**Table 6.3** (cont.)

Skill-mix interventions		Outcomes				
Content of interventions and skill-mix changes	Source(s)	Chronic condition	Profession(s) in comparator group	Patient-related outcomes	Health system-related/resource use outcomes	Profession-specific outcomes
Case management carried out by single case manager (various professions: e.g. social worker, geriatrician, occupational therapists, psychologist) or multidisciplinary team	[51] <sup>a</sup>	Various chronic conditions, frail elderly, frequent users of health services	<ul style="list-style-type: none"> <li>• Usual care or no-case management</li> </ul>	<ul style="list-style-type: none"> <li>• Significant effect on self-reported health status in the short-term, patient satisfaction in the long-term*</li> <li>• No significant effect for mortality</li> </ul>	<ul style="list-style-type: none"> <li>• No significant effect for total cost of services, utilization of primary and non-specialist care or secondary care</li> </ul>	

*Abbreviations:* ASD: autism spectrum disorder; BMI: body mass index; CVD: cardiovascular disease; GP: general practitioner; HbA1c: glycated haemoglobin; HIV: human immunodeficiency virus; LTFU; loss to follow up; RCT: randomized controlled trial.

*Notes:* \* Statistically significant results; <sup>a</sup> Review also includes studies covering patients with multiple chronic conditions (but not explicitly indicated).

*Sources:* [39] Robinson-White et al. (2010); [40] Singer et al. (2013); [41] Chu et al. (2015); [42] Qi et al. (2015); [43] Dale, Williams & Bowyer (2012); [44] Pimouguet et al. (2011); [45] Jack et al. (2016); [46] Sikorski et al. (2012); [47] Marks et al. (2017); [48] Oono, Honey & McConachie (2013); [49] Wright-Berryman, McGuire & Salyers (2011); [50] Welsh, Hasan & Li (2011); [51] Stokes et al. (2015).

language but showed significant improvement of severity of autism characteristics, shared attention in parent–child interaction as well as parent satisfaction (Oono, Honey & McConachie, 2013).

Physiotherapists providing management of musculoskeletal disorders were shown to improve patient satisfaction compared with physician care, and had comparable effects on general health outcomes (Marks et al., 2017). Self-management education provided by various health professionals for asthma patients was shown to have comparable effects on asthma symptoms, quality of life scores and number of school days missed (Welsh, Hasan & Li, 2011). One review looked at case management carried out by various professionals either independently or within multiprofessional teams for patients with various chronic conditions (mostly frail elderly); the review found significant improvements of self-reported health status in the short-term and patient satisfaction in the long-term and comparable effects on mortality (Stokes et al., 2015).

### **Evidence on health-system-related outcomes**

For cancer care, GP-led follow-up care for child cancer survivors delivered autonomously or collaboratively with paediatric cancer specialists was reported to reduce patient travel and attrition for follow-up appointments, with some evidence of improved cost-effectiveness compared with follow up in long-term follow-up clinics (Singer et al., 2013). Nevertheless, there was also evidence of reduced access to complex diagnostic testing compared with follow up in specialist care settings (Singer et al., 2013). Patient navigation for breast cancer care involving lay workers and peers was reported to improve adherence to screening and diagnostic follow up after abnormal radiographic screening and to reduce waiting times for appointments with genetic counsellors and for biopsy/diagnostic intervals (Robinson-White et al., 2010).

With respect to diabetes care, the transition coordinator and community health worker model produced higher rates of successful transfer and attendance in adult clinics compared with usual care (Chu et al., 2015) and a decrease of medication use and patient costs (Jack et al., 2016).

For musculoskeletal disorders, physiotherapists made similar diagnostic and management decisions to specialists. However, results on resource utilization are inconsistent and evidence on costs is lacking (Marks et al., 2017). Consumer–provider models in which mental health services are provided by peers improved patient engagement in treatment and social relationships but studies showed limited support for reduced hospitalizations (Wright-Berryman, McGuire & Salyers, 2011). For



self-management education provided by various health professionals for asthma patients mixed evidence was found on hospital admissions and no effect on emergency department visits (Welsh, Hasan & Li, 2011).

### **Skill-mix interventions delivered by multiprofessional teams**

#### **Key messages**

- Collaborative care and interdisciplinary care were shown to have a moderate impact on physical health (HbA1c levels, blood pressure, progression of chronic kidney disease, physical functioning), medication adherence and patient satisfaction, and may improve mental health symptoms and quality of life.
- Other multiprofessional care models (for example, primary care networks, multiprofessional clinics) led to few improvements in physical or mental health (of which included reduction in all-cause mortality) but reduced utilization of inpatient care and other health care services.
- Specialty-based shared multiprofessional care for HIV patients saw positive effects on health outcomes and treatment adherence, though it is limited around whether it is cost-effective.

Collaborative care models for people with comorbidities improved adherence to medication and some health outcomes (depression, Quality-Adjusted Life-Years), but showed limited evidence on cost savings.

#### **Box 6.6 Skill-mix interventions involving multiprofessional teams**

- 21 reviews evaluated skill-mix interventions involving multiprofessional teams for single chronic conditions (Table 6.4), with four reviews assessing multimorbidity (Table 6.5)
- The majority of reviews assessed chronic care interventions provided within a multiprofessional approach instead of usual care generally provided by primary care practitioners and physicians
- Most reviews evaluated consultation liaison, care coordination, shared care or case management involving various professionals (primary care physicians, specialists, nurse care coordinators, social workers, pharmacists, psychologists)
- One review assessed multiprofessional cardiac clinics; another evaluated the introduction of family medicine groups and primary care networks

**Table 6.4** *Multiprofessional team skill-mix interventions for single chronic conditions*

Skill-mix interventions		Outcomes				
Content of interventions and skill-mix changes	Source(s)	Chronic condition [Sources]	Profession(s) in comparator group [Sources]	Patient-related outcomes [Sources]	Health system-related/resource use outcomes [Sources]	Profession-specific outcomes [Sources]
Collaborative care involving primary care physicians and secondary care specialists	[52–54]	Various chronic diseases (cancer, CKD, diabetes, COPD, heart failure, dermatology, complex conditions, mental health) [52, 54]; diabetes, psychiatric conditions or cancer [53]	<ul style="list-style-type: none"> <li>• Usual care, generally by primary care physician [52]</li> <li>• Usual care, professions not defined [53, 54]</li> </ul>	<ul style="list-style-type: none"> <li>• Limited impact on blood pressure control [52]</li> <li>• Reduction in HbA1c levels and depression symptoms* [53]</li> <li>• Increased patient satisfaction [52]</li> <li>• Improvements in physical functioning for people with heart failure [52]</li> <li>• No significant differences in clinical outcomes for physical health conditions [54]</li> <li>• Improvements in mental health outcomes and depression* [54]</li> </ul>	<ul style="list-style-type: none"> <li>• Moderately increased costs for intervention compared with usual care [52]</li> <li>• Increased clinical attendance rates [52]</li> <li>• No significant differences in health care utilization [52]</li> </ul>	

**Table 6.4** (cont.)

Skill-mix interventions		Outcomes				
Content of interventions and skill-mix changes	Source(s)	Chronic condition [Sources]	Profession(s) in comparator group [Sources]	Patient-related outcomes [Sources]	Health system-related/resource use outcomes [Sources]	Profession-specific outcomes [Sources]
Multiprofessional family medicine groups and primary care networks	[55]	Diabetes	<ul style="list-style-type: none"> <li>• Usual care, professions not defined</li> </ul>	<ul style="list-style-type: none"> <li>• No significant differences in self-reported physical and mental health</li> </ul>	<ul style="list-style-type: none"> <li>• Reduced emergency department and hospital visits</li> </ul>	
Multiprofessional cardiac clinics	[56]	CVD and/or hypertension	<ul style="list-style-type: none"> <li>• Nurses, physicians</li> </ul>	<ul style="list-style-type: none"> <li>• Reduction in all-cause mortality *</li> </ul>	<ul style="list-style-type: none"> <li>• Reduction in hospitalization for those with non-stable heart failure*</li> </ul>	
(i) Case management, (ii) shared care and (iii) interdisciplinary teams	[57]	Cancer	<ul style="list-style-type: none"> <li>• Usual care, professions not defined</li> </ul>	<ul style="list-style-type: none"> <li>• No significant improvements in functional status, physical or mental health or quality of life</li> </ul>	<ul style="list-style-type: none"> <li>• No evidence of increased continuity of care</li> </ul>	
Cancer care coordination from primary prevention, screening, detection, diagnosis, treatment, and survivorship to end-of-life care	[58]	Cancer	<ul style="list-style-type: none"> <li>• Usual care, professions not defined</li> </ul>	<ul style="list-style-type: none"> <li>• No significant improvements in mental health or quality of life</li> <li>• Improved patient experience with care, and quality of end-of-life care</li> </ul>	<ul style="list-style-type: none"> <li>• Improved appropriate health care utilization in primary, acute and hospice care settings, emergency departments and ICU</li> </ul>	
Collaborative care between mental health specialist and at least one other primary care provider (usually physician)	[59–62]	Depression	<ul style="list-style-type: none"> <li>• Usual care, professions not defined [59, 61]</li> <li>• Primary care physicians [60, 62]</li> </ul>	<ul style="list-style-type: none"> <li>• Improved depression symptoms* [59–62]</li> <li>• Improved quality of life* [59, 61]</li> <li>• Improved patient satisfaction* [59, 61]</li> <li>• Improved medication adherence* [59, 61, 62]</li> </ul>		

Consultation liaison between primary care provider (mostly GP) and mental health specialist for the delivery of mental health care	[63]	Mental health	<ul style="list-style-type: none"><li>• Mental health specialist and primary care practitioners working alone</li></ul>	<ul style="list-style-type: none"><li>• Improved mental health up to 3 months following the start of treatment, but not from 3 to 12 months</li><li>• Improved adherence to treatment guidelines</li><li>• Improved consumer satisfaction</li><li>• Improved adequate treatment from primary care practitioners</li></ul>	<ul style="list-style-type: none"><li>• Mean costs higher for intervention</li><li>• More likely to be prescribing pharmacological treatment up to 12 months</li><li>• No difference in number of health care visits up to 12 months</li></ul>
Intensive case management (Assertive Community Treatment and Case Management) for adults with severe mental illness	[64]	Mental health	<ul style="list-style-type: none"><li>• Usual care (non-intensive case management), community psychiatric nurse, clinician</li></ul>	<ul style="list-style-type: none"><li>• No improvements in mental health, mortality risk, social functioning or quality of life</li></ul>	<ul style="list-style-type: none"><li>• Reduced length of hospital stay</li></ul>
Multiprofessional community mental health teams for older people	[65]	Mental health	<ul style="list-style-type: none"><li>• Usual care, psychiatrist</li></ul>	<ul style="list-style-type: none"><li>• Improved quality of life, social contact, reduction in distress behaviour and caregiver burden for dementia patients</li></ul>	
Consumer-provider roles as managers, facilitators, advocates or mentors	[66]	Mental health	<ul style="list-style-type: none"><li>• Usual care, professions not defined</li></ul>	<ul style="list-style-type: none"><li>• No differences in psychosocial, mental health and client satisfaction</li></ul>	<ul style="list-style-type: none"><li>• Increased use of primary care services</li></ul>

**Table 6.4** (cont.)

Skill-mix interventions		Outcomes				
Content of interventions and skill-mix changes	Source(s)	Chronic condition [Sources]	Profession(s) in comparator group [Sources]	Patient-related outcomes [Sources]	Health system-related/resource use outcomes [Sources]	Profession-specific outcomes [Sources]
Collaborative care intervention requiring a designated psychiatrist (0.25 FTE) and nurse care coordinator (0.5 FTE)	[67]	Mental health	<ul style="list-style-type: none"> <li>Usual care, psychiatrist</li> </ul>	<ul style="list-style-type: none"> <li>Improvement of MHC of quality of life*</li> <li>No significant effect on physical health component of the quality of life</li> </ul>	<ul style="list-style-type: none"> <li>Lower proportion of participants psychiatrically hospitalized for year two of the 3-year follow up*</li> <li>No significant difference of direct intervention costs</li> </ul>	
Multidisciplinary care for patients with pre-dialysis CKD	[68]	CKD	<ul style="list-style-type: none"> <li>Usual care</li> </ul>	<ul style="list-style-type: none"> <li>Delayed progression of CKD*</li> <li>Improved cholesterol and anaemia control</li> </ul>		
Multidisciplinary specialist care involving diabetologist, endocrine trainees, diabetic nurses, dietician, nephrologist, renal nurse, social worker	[69] <sup>a</sup>	CKD	<ul style="list-style-type: none"> <li>Usual care, diabetologist, GP</li> </ul>	<ul style="list-style-type: none"> <li>No effect on renal outcomes</li> <li>No difference between groups for their composite cardiovascular end-point</li> <li>Increase of proportion of patients without hypertension*</li> </ul>	<ul style="list-style-type: none"> <li>Higher mean total number of outpatient clinic visits*</li> <li>No difference in the number of hospitalizations or emergency department visits</li> </ul>	

Shared care models with primary care clinicians working with specialist	[70, 71]	HIV	<ul style="list-style-type: none"> <li>• Specialty care, HIV specialists/experts, university clinic fellows [70]</li> <li>• Usual care, GPs [71]</li> </ul>	<ul style="list-style-type: none"> <li>• No significant adverse clinical outcomes [70, 71]</li> <li>• Reduction of perinatal infection and transmission rate [70]</li> <li>• Positive effect on treatment adherence [70]</li> </ul>	<ul style="list-style-type: none"> <li>• Higher cost-effectiveness for HIV screening [70]</li> </ul>
Specialty-based care provided by physician, advanced practitioner-based care, team-based care and shared care co-management by multidisciplinary team in different locations	[72]	HIV	<ul style="list-style-type: none"> <li>• Physicians (with less experience working with HIV); general medical practice</li> </ul>	<ul style="list-style-type: none"> <li>• Specialty-based care shows better clinical outcomes and reduced mortality</li> <li>• Increased antiretroviral use with more experienced or specialist HIV clinicians, but no significant effect among more experienced practices</li> </ul>	<ul style="list-style-type: none"> <li>• No significant differences in referral for or use of mental health services and hepatitis C screening</li> </ul>

*Abbreviations:* CKD: chronic kidney disease; COPD: chronic obstructive pulmonary disease; FTE: full-time equivalent; GP: general practitioner; HbA1c: glycated haemoglobin; HIV: human immunodeficiency virus; ICU: intensive care unit; LDL-C: low-density lipoprotein cholesterol; MHC: Mental Health Component; SBP: systolic blood pressure.

*Notes:* \* Statistically significant results; <sup>a</sup> Review is also covered in Tables 6.1 and 6.2.

*Sources:* [52] Mitchell et al. (2015); [53] Foy et al. (2010); [54] Smith et al. (2017); [55] Carter et al. (2016); [56] Gandhi et al. (2017); [57] Aubin et al. (2012); [58] Gorin et al. (2017); [59] Archer et al. (2012); [60] Sighinolfi et al. (2014); [61] Thota et al. (2012); [62] Coventry et al. (2014); [63] Gillies et al. (2015); [64] Dieterich et al. (2010); [65] Abendstern et al. (2012); [66] Pitt et al. (2013); [67] Reilly et al. (2013); [68] Strand & Parker (2012); [69] Nicoll et al. (2018); [70] Wong, Luk & Kidd (2012); [71] Mapp, Hutchinson & Estcourt (2015); [72] Kimmel et al. (2017).

**Table 6.5** *Skill-mix interventions for patients with multimorbidity*

Skill-mix interventions			Outcomes			
Profession involved in skill-mix	Content of interventions and skill-mix changes	Source(s)	Profession(s) in comparator group [Sources]	Patient-related outcomes [Sources]	Health-system-related/resource use outcomes [Sources]	Profession-specific outcomes [Sources]
Nurses	Nurse prescribing, nurse-led clinics and community monitoring for people with comorbid diabetes and hypertension	[73]	Physicians	<ul style="list-style-type: none"> <li>Reduction in SBP but not DBP for community monitoring and nurse prescribing; no differences for nurse-led clinics*</li> <li>No significant improvement in medication adherence</li> <li>Reduction in SBP* but not DBP</li> <li>Community monitoring comparable effects to physician-delivered care on achievement of blood pressure targets</li> </ul>		
Nurses	Nurse-delivered education to improve self-monitoring and disease management	[74] <sup>a</sup>	Physicians	<ul style="list-style-type: none"> <li>Reduction in HbA1c levels (one of two studies)*</li> <li>No significant reduction in DBP and triglycerides</li> <li>Mixed evidence for reduction of total cholesterol, LDL cholesterol and fasting serum glucose (one of three studies*)</li> </ul>		

Nurses	Nurse-delivered case management for collaborative care	[75, 76]	Usual care, professions not reported	<ul style="list-style-type: none"><li>• Improvements in depression severity for patients with comorbid depression and a physical health condition* [75]</li><li>• Improvements in patient and carer satisfaction* [76]</li></ul>	<ul style="list-style-type: none"><li>• No significant difference in costs [75]</li><li>• No significant difference in emergency admissions or bed days (76)</li></ul>	<ul style="list-style-type: none"><li>• Improvements in health care staff satisfaction* [76]</li></ul>
Primary health care practitioners	Collaborative goals setting between older patients with multimorbidity and primary health care practitioners	[77] <sup>b</sup>	Usual care, professions generally not reported	<ul style="list-style-type: none"><li>• Interventions improved the application of goal setting, and the inclusion of goals in care plans</li></ul>		
Multiprofessional teams	Multiprofessional collaborative care models for comorbid diabetes or CVD and depression involving trained/specialist nurses, registered nurses, primary care physicians, non-physician mental health workers, psychologists	[78–80]	Usual care, professions not reported [78–80]	<ul style="list-style-type: none"><li>• Improvement in depression outcomes and HbA1c levels* [78]</li><li>• Increased depression-free days and quality-adjusted life-years [79]</li><li>• Improvement in depression remission at 6 months* but not 12 months [80]</li><li>• No significant reduction in HbA1c levels [80]</li></ul>	<ul style="list-style-type: none"><li>• Higher rates of adherence to antidepressant medication and to oral hypoglycaemic agent* [80]</li></ul>	



**Table 6.5** (cont.)

Skill-mix interventions			Outcomes			
Profession involved in skill-mix	Content of interventions and skill-mix changes	Source(s)	Profession(s) in comparator group [Sources]	Patient-related outcomes [Sources]	Health-system-related/resource use outcomes [Sources]	Profession-specific outcomes [Sources]
Multiprofessional teams	Multiprofessional collaborative care models involving nurses, pharmacist and social workers for adults with multimorbidity	[81]	Usual care, professions not reported	<ul style="list-style-type: none"> <li>• No evidence of improved health outcomes</li> <li>• Some evidence of improved medication adherence</li> </ul>	<ul style="list-style-type: none"> <li>• Evidence of improved prescribing</li> </ul>	

*Abbreviations:* CVD: cardiovascular disease; DBP: diastolic blood pressure; HbA1c: glycated haemoglobin; SBP: systolic blood pressure.

*Notes:* \* Statistically significant results; <sup>a</sup> Seven of 23 studies in this review cover multimorbidity, only their results are reported. Results on single chronic conditions are reported in Table 6.2; <sup>b</sup> Seven of eight studies included in this review cover multimorbidity (Bartels et al., 2014 does not cover multimorbidity, it covers mental illness).

*Sources:* [73] Clark et al. (2011); [74] Massimi et al. (2017); [75] Ekers et al. 2013; [76] Lupari et al. (2011); [77] Vermunt et al. (2017); [78] Atlantis, Fahey & Foster (2014); [79] Jeeva et al. (2013); [80] Huang et al. (2013); [81] Smith et al. (2012)

## **Chronic conditions**

### **Collaborative care models and consultation liaison**

Collaborative care between primary care physicians and specialists had a modest impact on reducing HbA1c levels, blood pressure outcomes and medication adherence compared with usual care in two studies (Foy et al., 2010a; Mitchell et al., 2015), although one study found no significant impact (Smith et al., 2017). Collaborative care did, however, significantly improve physical functioning, patient satisfaction and clinical attendance rates at a moderately increased cost compared with usual care for treatment of heart failure (Mitchell et al., 2015). Multiprofessional care models involving various health professionals were shown to have a significant effect in delaying progression of chronic kidney disease (Strand & Parker, 2012) and on the number of patients with hypertension, with no difference reported in renal outcomes and composite cardiovascular end-points (Nicoll et al., 2018).

Strong evidence suggests that collaborative care involving a mental health specialist and primary care physicians/providers significantly improved depressive symptoms (Archer et al., 2012; Coventry et al., 2014; Foy et al., 2010; Sighinolfi et al., 2014; Smith et al., 2017; Thota et al., 2012), patient satisfaction, quality of life and medication adherence versus usual care (Archer et al., 2012; Coventry et al., 2014; Thota et al., 2012). Similarly, consultation liaison between primary care providers (mostly GPs) and mental health specialists was shown to improve adherence to treatment guidelines, consumer satisfaction and delivery of adequate treatment from primary care practitioners (Gillies et al., 2015). Consultation liaison was also found to improve mental health in the short-term and to be similar to usual care at 12 months follow up, with no differences reported in the number of health care visits. There was, however, some limited evidence of higher costs over usual care (Gillies et al., 2015).

### **Multiprofessional care coordination and intensive case management**

There is equivocal evidence on the impact of multiprofessional care coordination. Reviews on cancer care suggest that coordination of care failed to significantly improve functional status, physical or mental health or quality of life (Aubin et al., 2012; Gorin et al., 2017) or continuity of care (Aubin et al., 2012). It may nevertheless enhance

patient satisfaction, quality of end-of-life care and the odds of appropriate health care utilization in primary, acute and hospice care settings (Gorin et al., 2017).

Findings from one review suggest that intensive case management does not lead to significant improvements for mental health conditions, mortality risk, social functioning or quality of life, although it did lead to a slight reduction in length of hospital stay for adults with severe mental illness (Dieterich et al., 2010). Another review reported that intensive case management did improve quality of life and social contact and reduce distress behaviour and caregiver burden in older adults with dementia (Abendstern et al., 2012).

### **Other multiprofessional care models**

Primary care networks and family medicine groups for diabetes care did not improve self-reported physical and mental health, but were shown to reduce emergency department and hospital visits (Carter et al., 2016). Multiprofessional cardiac clinics led to fewer hospitalizations and a significant reduction in all-cause mortality (Gandhi et al., 2017).

Studies on mental health reported that consumer–provider models where mental health service users worked in partnership with mental health professionals did not improve mental health or client satisfaction outcomes, but led to small reductions in the use of crisis and emergency services (Pitt et al., 2013). Collaborative care interventions in which a designated psychiatrist and a nurse care coordinator worked together to address physical and mental health needs of people with severe mental illness demonstrated significantly lower hospitalization rates for patients, but only for the second year of the 3-year follow-up period. In comparison to the standard care group, the intervention significantly improved the Mental Health Component of quality of life but not the Physical Health Component of this measure (Reilly et al., 2013).

Shared care models and other specialty-based multiprofessional care for HIV-positive individuals showed positive effects on treatment adherence, infection and transmission rates and mortality (Wong, Luk & Kidd, 2012; Kimmel et al., 2017). Shared care models with primary care clinicians seem also to be more cost-effective for HIV screening compared with specialist care (Wong, Luk & Kidd, 2012). However, evidence is limited to determine whether HIV shared care is cost-effective (Mapp, Hutchinson & Estcourt, 2015).

**Multimorbidity**

Collaborative care models for people with comorbid depression and diabetes or cardiovascular disease were shown to improve depression outcomes (Atlantis, Fahey & Foster, 2014; Huang et al., 2013; Jeeva et al., 2013), reduce HbA1c levels (Atlantis, Fahey & Foster, 2014; Huang et al., 2013) and improve quality-adjusted life-years (Huang et al., 2013; Jeeva et al., 2013) and also to lead to higher rates of adherence to antidepressant medication and to oral hypoglycaemic agent (Huang et al., 2013). No statistically significant cost savings between intervention and usual care groups were identified (Jeeva et al., 2013).

Patient-focused education and collaborative care by nurses, pharmacists and social workers for people with multimorbidity improved prescribing and drug adherence, although there was little evidence of improved health outcomes, reduced health care utilization or cost savings (Smith et al., 2012).

Collaborative goal-setting between older patients with complex multimorbidity and a primary care physician within an integrated care strategy significantly improved goal-setting, the number of advance directives and the inclusion of goals in care plans for multifactorial, but not for single-factorial, interventions (Vermunt et al., 2017).

**Strengths and limitations of the evidence**

Evidence from the overview of reviews reveals that several skill-mix models (expanded roles for nurses and pharmacists and, based on weaker evidence, other professional roles and multiprofessional teams) have overall positive impacts on health outcomes for patients with chronic conditions, but uncertain effects on economic benefits and quality of care.

Allocating tasks such as patient education and health screenings to pharmacists was shown to effectively improve blood glucose levels, blood pressure control and medication adherence, with outcomes for chronic kidney disease, COPD and depression similar to those for usual care. There was also some evidence suggesting that pharmacist-involved care could improve professional-specific outcomes, most notably in terms of enhancing physician adherence to prescribing or other care guidelines. Included reviews also provided limited evidence that pharmacist-delivered care for diabetes, cardiovascular disease, hypertension and COPD could be cost saving compared with physician- and

nurse-delivered care, with mixed evidence showing pharmacist interventions either improved the rate, or led to a similar rate, of health care utilization compared with usual care.

Nurse-delivered autonomous care including prescribing, titration of medication and nurse-led clinics also provided equivalent or better care compared with that provided by physicians or other health professionals, although nurse-led collaborative care in general did not improve health outcomes. There is insufficient evidence to make any assessments on the cost-effectiveness of skill-mix interventions involving nurses or their impact on health care utilization.

Evidence does not strongly indicate that multiprofessional care models lead to better physical health outcomes. However, it suggests that interdisciplinary care coordination, especially between primary and secondary care, can significantly improve mental health outcomes for patients with severe mental health issues or multimorbidity and may increase patient satisfaction.

Overall, the evidence base was considerable, as shown by a large number of reviews. Moreover, 43 reviews conducted a meta-analysis and sufficiently accounted for biases and heterogeneity in original studies when interpreting results. Nonetheless, there are a number of limitations in the evidence base. First, there was limited evidence on skill-mix interventions for the management of multimorbidity care. Second, the description of comparison groups was often sparse, and the education/training of professionals was generally not described. Third, although there was good evidence on health outcomes, few reported on other relevant outcomes such as health care utilization, economic benefits or professional-related outcomes. Third, systematic reviews were dominated by studies from the USA, the United Kingdom, Australia and Canada. As the impact of skill-mix interventions is likely to differ depending on specific geographical and cultural contexts and health system models, the generalizability and transferability of results may be limited. Similarly, and lastly, the contexts in which skill-mix initiatives were implemented and in which studies were undertaken differ across the included reviews and generalized conclusions must be made cautiously.

Overall, more research is needed to assess a wider spectrum of outcomes in more countries to determine whether skill-mix interventions can cost-effectively improve patient outcomes and quality of care for patients with single chronic conditions or multimorbidity.

### **6.3 Country developments and trends in skill-mix innovation for chronic care and multimorbidity across Europe**

As reflected in the evidence synthesis, which evaluated a large variety of skill-mix models to improve the care of patients with chronic conditions and multimorbidity, a diversity of different skill-mix innovations and policies are being introduced across Europe. Yet, the extent to which they are integrated into routine care varies. Skill-mix changes have been implemented as either stand-alone tactics or embedded within broader strategies to improve quality of care and health outcomes. Three main types of skill-mix innovations implemented across Europe and other OECD countries can be identified in the management of chronic conditions and multimorbidity:

- The first is the expansion of existing roles of nonmedical primary care professionals (nurses, pharmacists, physiotherapists) through policies or programmes that facilitate the reallocation of tasks and responsibilities within primary care or by transferring care traditionally performed by medical specialists to primary care. As a result, health professionals, mostly specialized nurses, manage chronic conditions in primary care settings under varying levels of physician oversight.
- The second relates to collaboration and multiprofessional team-based care across primary and specialty/secondary care settings. These models introduced teamwork and collaborative care and have proliferated in integrated care networks and Disease Management Programmes (DMPs).
- Third is the introduction of new care coordinating roles for patients with chronic and multimorbid conditions. These roles, including care coordinators and patient navigators, having integration at their core, arrange care and develop single, shared care plans for patients' health and well-being. Depending on the country context and health conditions, these roles have been shown to be performed by health professionals or lay persons with training, for example, as peer educators (Gilburt, 2016).

These different approaches were often found in different combinations within new care models and strategies.

The following section provides an overview of skill-mix innovations involving nurses, pharmacists and other health professionals,

followed by sections on collaboration and multiprofessional team-based care and new care coordinating roles. Descriptions are based on evidence from policies, projects and programmes in different country contexts.

### **The expansion of existing roles of nurses, pharmacists and other health professionals**

#### **The role expansion of nurses and other health professionals for the management of patients with chronic conditions**

New forms of division of work and re-allocation of responsibilities have emerged across Europe, involving nurses in the management of patients with chronic conditions. The increases in patient volumes and complexity have led to changes in the division of work. In these models, physicians often take care of the more complex patients, whereas stable chronic patients are treated by nurses or other professions. Examples include task shifting and sharing between physicians and other professions, such as nurses, pharmacists, physician assistants or medical assistants, which is facilitated by expanding their scopes-of-practice. This follows a global trend to expand the role of nurses for specific, chronic conditions in primary care. For example, reforms have been introduced in Australia, Canada, Finland, Ireland, the Netherlands, New Zealand, the United Kingdom and the USA to widen the scope of practice of nurse practitioners and other advanced practice nurses<sup>2</sup> in the care of patients with chronic conditions (Maier, Aiken & Busse, 2017). Similarly, a new profession, physician assistants, has expanded globally, but they are numerically smaller and work less often in primary care than nurses or pharmacists (Hooker & Everett, 2012).

Nurses' roles are often broadened when medical shortages are anticipated. In France, skill-mix and professional cooperation initiatives were launched with support from key stakeholders in the face of such shortages between 2004 and 2008 (Mousquès et al., 2010). One was the ASALEE project (French acronym for Health Action by Teams of Self-employed Health Professionals) that was initiated in 2004 as a non-profit organization of several GP practices in a rural

<sup>2</sup> With usually a Master's degree in these countries

area of France to improve care, especially in the most remote or deprived areas, for patients with chronic conditions and multimorbidity. It employed nurses directly to collaborate closely with two to three independently practising GPs, after specific training. The nurses were delegated tasks in prevention and chronic disease management that were previously performed by GPs (such as therapeutic education consultations for diabetes and high blood pressure, cognition and cardiovascular risk factor screenings for individuals aged over 75 years and computerized management of patient data) (Supper et al., 2017; Bourgueil et al., forthcoming). The project has since expanded to all regions of France, involving about 2% of all practising GPs, 300 full-time equivalent nurses and 300 000 patients. Initially funded by innovation funds, ASALEE is now financed by national insurance, conditional upon economic evaluation since 2017 (Bourgueil et al., forthcoming). Evaluations of the management of type 2 diabetes showed improved glycaemic control and follow up of patients treated within ASALEE, without additional cost (Bourgueil et al., 2008).

An important, related reform trend is the introduction of laws on nonmedical prescribing. Between 2010 and 2016 alone, seven countries (Cyprus, Estonia, Finland, France, the Netherlands, Poland and Spain) adopted laws that grant specialized nurses (nurse specialists, clinical nurse specialists or professional nurses with additional education) the authority to prescribe medication (Maier, Aiken & Busse, 2017). Ireland, the United Kingdom, Denmark and Sweden had authorized limited nurse prescribing before 2010. Since 2012, nurse specialists in the Netherlands with a 2-year Master's degree in Advanced Nursing Practice can prescribe licensed medicines for medical conditions within their specialty area. Since 2014, registered nurses with a Bachelor's degree and a completed pharmacotherapy module in diabetes, lung and oncology care may prescribe a limited number of prescription-only medications after diagnosis by a physician (Kroezen, 2014). In Finland, where nurses are authorized to prescribe a limited set of medicines since 2010, the shifting of prescribing rights to nurses is less extensive than in the Netherlands, but with considerable change in the division of responsibility, in particular for patients with chronic conditions, as they can receive prescriptions and follow-up care from nurse prescribers in health centres (see Box 6.7, below).



**Box 6.7 Nurse prescribers in Finland take care of the routine management of patients with specific chronic conditions**

Since the adoption of a new law in 2010 and its implementation in 2011, Finnish nurses can work in considerably expanded roles in primary care centres, in collaboration with physicians. Nurses who complete postgraduate education (as nurse prescribers) are authorized to issue prescriptions for common minor illnesses and continued prescribing for three chronic conditions (hypertension, diabetes, asthma). In 2018, a total of 376 nurse prescribers were registered in Finland. The majority were employed to treat patients with the above chronic conditions in municipal health centres, often in rural or underserved areas. Requirements for nurses to take care of patients are: employment with a municipal health centre, 3 years previous working experience and postgraduate education of 45 credit points following the European Credit Transfer System on prescribing. Further, they need to be authorized by a physician, registered as a prescriber and have an identification number from the National Supervisory Authority for Welfare and Health (Heikkilä, 2018; Maier, Aiken & Busse, 2017; Savolahti, 2016).

Finnish nurse prescribers take over certain medical tasks previously performed by physicians (physical examinations, arrangements of clinical tests, initial or continued prescribing depending on the medicine and issuing of sickness certificates of <5 days), but also exercise extended tasks for the care of chronic patients. Examples include designing treatment plans, including prescribing of medication (in cooperation with physicians), discussing personal health targets on health promotion and (secondary) prevention and performing counselling on self-management. Though physicians maintain overall responsibility for treatment plans and decide on new prescriptions, nurse prescribers are able to relieve physicians in routine case treatment, particularly in underserved regions, and so fill in coverage gaps, for example, by contributing to extended opening hours.

Since the Law's implementation, the role of nurse prescribers has fundamentally changed the division of work between nurses and physicians (Maier, Köppen & Busse, 2017). However, it also showed that successful collaboration requires development of thorough care plans and guidelines, clear task allocation and organization of consultations as well as mutual trust between nurse prescribers and GPs (Hopia, Karhunen & Heikkilä, 2017; Savolahti, 2017; Sulkakoski, 2016). To enable nurse prescribing beyond the opening hours of health centres, the Law on Health Care Professionals is to be amended by expanding nurse prescribing to all outpatient services (home care, nurse appointment in specialized care) and to the private sector.

**Pharmacists are increasingly involved in the management of patients with chronic conditions**

The role of pharmacists working in community pharmacies has substantially expanded over the last 10 years. As community-based accessible health care providers, pharmacists are well positioned to provide low threshold clinical and counselling services and drug therapy expertise to local populations. Their role is not only promising regarding medication management but also for disease management, including measurement and testing of clinical parameters, support in self-care/management-related interventions (Pharmaceutical Group of The European Union, 2017), structured patient education and adherence improvement counselling.

Services and activities provided by pharmacists are mostly provided at national level and are defined either in law or specific government policy. Pharmacies led the management of common chronic diseases such as asthma/COPD, diabetes and hypertension in more than one third of 30 European countries in 2016. Also, the share of pharmacies offering measurement and testing services for chronic conditions (blood pressure, weighing, hypertension, cholesterol) has significantly increased over the last 5 years across Europe. In 2012, about half of 30 European countries' pharmacies offered blood pressure measurement and weighing; in 2016 these services were offered in about 90% of the countries (Pharmaceutical Group of The European Union, 2013, 2017). Case study 2 describes how the scope of pharmacists' tasks in Portugal has grown substantially in the last decade.

**Disease management as a single-disease integrated care model**

Around 2000, many European countries began implementing DMPs as a way to effectively and efficiently improve the management of chronic disease care. DMPs are designed to create a continuum of care for single chronic diseases (mostly diabetes, cardiovascular disease and COPD), provided by a multiprofessional team of health care professionals, and to encourage patient self-management (Rijken and Bekkema, 2011). Although in several countries, GPs direct the care processes within a DMP, care managers (usually nurses or allied health care professionals) are increasingly appointed to assume the coordinating tasks. Called nurse-delivered or nurse-led DMPs, these have added to the types and implementation of collaborative care models and care coordination (see also next section).

**Box 6.8 Expanding professional roles of pharmacists in Portugal**

In the last 30 years, pharmaceutical care in Portugal has been characterized by pharmacist commitment to holistic care and new ways of service delivery impacting on their roles. Pharmacy services began point-of-care tests and disposal of unwanted medicines in the 1980s and in 1999, a strategy to implement pharmacy-based DMPs was adopted, steered by the National Association of Pharmacies (ANF). Pilot projects of community pharmacies providing consultation services and management of chronic patients started 2 years later with positive patient health outcomes (Costa, Santos & Silveira, 2006). In particular, a diabetes management pilot programme (2003–2010), where certified pharmacists followed up with patients through scheduled visits in the pharmacy using a standardized assessment system (SOAP) and a Drug-Related Problem Classification system, achieved significant decreases in blood glucose levels, HbA1c, cholesterol levels and blood pressure. These positive outcomes supported the agreement with the Ministry of Health to provide continuity in national health system co-payment of advanced pharmacy-based services (Costa, Santos & Silveira, 2017; International Pharmaceutical Federation, 2017; Martins et al., 2008).

Since 2007, the range of services provided by pharmacies has been expanded by law and includes immunization, specific counselling campaigns, home care support, screening activities and pharmaceutical care programmes. For patients with chronic conditions (asthma/COPD, diabetes and hypertension), the latter also comprises disease management and monitoring, counselling, disease or therapy education, adherence promotion and campaigns to identify non-controlled patients (Costa, 2017; Félix et al., 2017; International Pharmaceutical Federation, 2017).

A new law in 2018 has enabled community pharmacies to provide complementary interventions with other health care professionals, including nursing services, prevention and treatment of diabetic foot, adherence and therapeutic management, automated dose dispensing and rapid screening tests. In 2017, the ANF and the Portuguese National Nursing Association also agreed to establish a regulatory framework for the provision of nursing care in pharmacies to further improve the integration into pharmacy-based services. In the same year, the ANF signed a memorandum with the Association of Family Health Units to define a framework for joint primary care activities and multidisciplinary cooperation among pharmacists, family doctors and nurses. Simultaneously, the Ministries of Health and Finance signed an agreement with the ANF on the intervention of pharmacies in areas such as diabetes, rational use of medicines particularly in adherence, and management of therapies (International Pharmaceutical Federation, 2019).

Moreover, several skill-mix changes implemented as part of integrated chronic care models demonstrate the interrelatedness of skill-mix interventions and organizational re-design as was shown by the EU-funded INTEGRATE project. The skill-mix innovations that are frequently implemented in combination include nurse involvement in care delivery, multiprofessional teams and protocols/pathways, continuous training of health professionals, involvement of a case manager/care coordinator role, regular team meetings to discuss a patient's treatment, and the creation of a new position, role or function specifically to deliver integrated chronic care (Busetto et al., 2017).

### *Collaboration and multiprofessional team-based care*

Many European countries have changed their chronic disease management strategies over the last decade as DMPs were increasingly criticized as inappropriate to meet the needs of the growing numbers of patients with multiple chronic conditions (Nolte, Knai & Saltman, 2014; Rijken et al., 2014; Starfield, 2008). Care for multimorbidity comprises specialized care, intersectoral coordination and collaboration between primary care and specialized care (Hujala, Taskinen & Rissanen, 2017; Rijken et al., 2018; Struckmann et al., 2017). To better respond to the needs of patients with multiple chronic conditions, countries are moving towards more comprehensive models of integrated care by looking beyond disease-specific interventions. Skill-mix innovation plays a major role in these care models. Three broad trends can be identified. They support the delivery of (i) integrated, multiprofessional care, (ii) improve collaboration of care outside integrated care paradigms and (iii) facilitate continuity and co-ordination of care across organizational boundaries through holistic care approaches.

First, the EU-funded ICARE4EU project identified 101 integrated multimorbidity care initiatives in 25 European countries. Of these, a quarter reported to be well-established care programmes and about 40% to be routine care. Skill-mix innovations were frequently reported among their main objectives, mostly improving multiprofessional collaboration (80%) and care coordination (71%). GPs were involved in most programmes (81%), followed by medical specialists (66%) and nurses (50%). Other occupations included physiotherapists (45%), social workers (40%), home help (37%) and psychologists (33%). Pharmacists and informal carers, who are considered important providers of multimorbidity care, were involved in only one third of the programmes (van der

Heide et al., 2015). In about half of the cases, integrated multimorbidity care initiatives were used to adapt or drive new multiprofessional care delivery structures. Case managers were introduced in about 40% of the initiatives; changes in job descriptions were introduced in a quarter of these initiatives (van der Heide et al., 2015).

New teamwork and collaborative care paradigms have also developed next to integrated care networks and disease management programmes with the goal of establishing closer working relationships between primary care (family doctors, GPs and practice nurses) and specialists. Primary care professionals increasingly work together in multiprofessional teams, in complex care hubs/networks and in new patient-centred care models. Most commonly, collaborative care models have been integrated into routine care for the treatment of mental health conditions. In ageing societies, mental illness is frequently comorbid with physical illness, requiring mental health specialists and primary care workers to collaborate closely. Several countries have explored such collaborative care models targeting the reduction in patient hospitalizations. For example, the United Kingdom, Ireland, Italy, the Netherlands, Denmark and Belgium have policies prioritizing community-based, multiprofessional care (Vitale, Mannix-McNamara & Cullinan, 2015). These care delivery approaches provide mental health and medical care in primary care settings at the community level, and coordinate with social care (see Case study 3). They have also been shown to be more effective than usual care for improving depression outcomes (see Section on Skill-mix interventions delivered by multiprofessional teams; Sighinolfi et al., 2014).

Multidisciplinary primary care teams have been set up in various countries (Belgium, Estonia, Finland, France, Italy, the Netherlands, Portugal, Spain and Sweden) to overcome the limitations of solo practices and benefit from interprofessional teamwork and multiprofessional competencies. The principal aim of multidisciplinary primary care teams is to offer a comprehensive set of services and to respond to the specific needs of patients with chronic and multimorbid conditions. There is large variation in team composition across countries; teams may include different social and health professionals besides family physicians and registered nurses (for example, psychologists, health promoters, nutritionists, clinical community pharmacists, physical activity counsellors, community health workers and front desk staff). In particular, the team-based model allows the provision of more complex services such as prevention and health promotion, patient education and

self-management support, patient and family caregiver empowerment, psychological counselling, social services, referral and care coordination, which can usually not be offered by single-handed practices (De Maesseneer et al., 2018).

### **Box 6.9 Collaborative care models in mental health care in the United Kingdom, Ireland and Belgium**

Community mental health teams (CMHTs) were established in the United Kingdom and Ireland in 1990 to provide continuity of care through a multiprofessional approach. Different types of mental health professionals from health and social care backgrounds (psychiatrists, community psychiatric nurses, psychologists, occupational therapists and social workers) provide and coordinate health and social care in the community for people with complex mental health problems. The multiprofessional perspectives and collaborative work through regular meetings and shared information enable joint mental health assessment, treatment and set-up of care plans that cover the needs and goals of an individual, and coordinate care. The CMHT may locally also include Assertive Outreach Teams, specialized community mental health teams focused on providing treatment and support to people who have complex needs and require more intensive support. However, experiences in both countries reveal difficulties in the implementation of this collaborative care model (Gilbert, 2016). In Ireland, the multiprofessional input from CMHTs was limited to psychiatrists, trainee doctors and nurses (Vitale, Mannix-McNamara & Cullinan, 2015). In the United Kingdom, blurred professional role boundaries, lack of training for role development, and models of decision-making and the adoption of generic working practices by staff within these teams became the main barriers to team continuity (Belling et al., 2011; Gilbert, 2016).

Conversely, more positive experiences with community-level mental health teams are found in Belgium, where they were introduced by a nationwide reform of mental health care delivery in 2008. Care networks established by psychiatric hospitals provide inpatient and outpatient mental health services, primary care, outreach, day care, vocational services, housing, and other social care services. Additionally, multiprofessional mobile outreach teams cooperate closely with primary health care workers, social workers and medical specialists in the treatment of chronic psychiatric patients (Lorant et al., 2016; Nicaise, Dubois & Laurant, 2014; World Health Organization, 2018). There were 22 active care networks in 2016 (Sermeus, 2019).

*New care coordinating roles to improve the care trajectory of patients with chronic and multimorbid conditions*

Reforms and programmes have introduced new professional roles working across organizational boundaries meant to provide coordinated, continuous and holistic care. These new roles range from case managers and social workers to care navigators, coordinators and community facilitators (Gilburt, 2016). Adapted to local health needs, they are especially useful to patients with long-term, multimorbid health conditions as well as people with low levels of literacy or cognitive deficits by helping navigate the fragmented sectors and services involved in covering their care needs (health, social care, housing, employment and education). Their main role is to support patients to plan, organize and access support by linking and coordinating resources and providers through a person-centred approach and provide social and psychological support. Case managers, for example, may also perform clinical needs assessment and clinical monitoring, provide patient and caregiver education and self-management support and establish care goals with the patients coupled with the development of their self-efficacy skills (De Maesseneer et al., 2018).

**Box 6.10 New nursing roles in integrated case management of patients with complex needs in Valencia, Spain**

An evaluation of home care in the Spanish region of Valencia in 2005–2006 showed that fragmentation of health care delivery and lack of care continuity were major obstacles for the quality of care of patients with advanced chronic diseases, multimorbidity or those in need of palliative care. As a result, a pilot initiative to increase cooperation between primary and hospital care was implemented between 2007 and 2010 and a Strategy for Chronic Care including an Integrated Care Model for Complex Cases was developed. The latter integrates hospital, primary and community-based health services under joint-case management to improve transitional care periods for highly complex home care patients, and to enable them to remain at home. This model introduced two new nursing roles: the community nurse case manager (CNCM) and the hospital nurse care manager (HNCM) to take care of the patient during critical stages in the care process. HNCMs are responsible for identifying highly complex chronic patients and for planning discharge to ensure continuity of care during and after hospital or hospital-at-home stay. CNCMs arrange care at home and mobilize the community-based collaborative care process.

**Box 6.10 (cont.)**

In this model, the care process starts with a comprehensive assessment of the patient, including living environment, family support and carers. An individualized care plan with medication reviews is then designed and implemented by multiprofessional primary care teams (GPs, nurses and social workers) with the support of the CNCM. Both the CNCM and HNCM remain jointly responsible for monitoring the patient, interacting with primary care teams and others and ensuring appropriateness and continuity of care. Innovative use of information and communication technologies supports the constant communication between and work of the CNCM and HNCM and the identification of high-risk patients. CNCMs and HNCMs are required to attend 100 hours of specific training and 1-month on-the-job training to start working as a case manager. Other professionals receive ongoing training related to care integration and care for complex cases.

The dual-case manager model has gradually expanded. In 2015, there were 79 nurse case managers for approximately 1.4 million people (30% of the population). The case management model has shown positive impact for patients and family carers in terms of proactive care and administrative and emotional support. Moreover, health professionals increasingly value enhanced cooperation, though some reluctance remains, especially among hospital doctors (Barbabella et al., 2015; Gallud, Soler & Cuevas, 2012).

With this broader perspective, these new roles can also facilitate the implementation of effective, integrated care packages (Ivbijaro et al., 2014). The nurse-delivered case management programme in Valencia (Spain) describes an integrated care model that introduced case managers to support patients with multiple chronic conditions, including through arranging care transitions and settings (Case study 4). While these coordinating roles are an emerging trend in many countries, evidence and experiences are still limited.

## 6.4 Conclusions

The majority of skill-mix innovations and reforms in Europe have focused on single chronic conditions and to a smaller extent on multimorbidity. This uneven distribution is also reflected in the evidence. Systematic reviews assessing skill-mix innovations suggest that skill-mix



innovations for the management of chronic diseases and multimorbidity reveal overall positive impacts on health outcomes. In particular, primary care teams with expanded roles for nurses or pharmacists are effective and show at least equivalent or better health outcomes. The effect of collaborative care and multiprofessional care models has shown some, albeit less strong, evidence of positive impacts on patient outcomes. As to the economic benefits and quality of care there was mixed and limited evidence.

The overview of systematic reviews revealed that there are gaps in the evidence base, which are critical to comprehensively capturing the efficacy and appropriateness of skill-mix reforms. On interventions targeting multimorbidity, in particular, the evidence base is weak, and more research is needed. Few reviews reported on non-health outcomes, including patient satisfaction, health care utilization or cost-effectiveness, which are important dimensions to understanding the potential impact of interventions. Moreover, many studies were undertaken in the USA, the United Kingdom, Australia and Canada and the findings may not be relevant to other health systems and countries. Finally, training of professionals in the skill-mix intervention and comparison groups was often not described. However, it is critical to ascertain the practical impact of skill-mix innovations and how this may differ across geographical contexts.

The overview of systematic reviews, review of country policies, and assessment of developments and trends of skill-mix innovations in Europe show that many new and promising skill-mix configurations targeting people with chronic conditions and multimorbidity exist in the region. The evidence and practice examples demonstrate that new and extended professional roles are promising solutions to fill gaps in primary care, improve the quality of care and alleviate provider shortages. In particular, pharmacists are well placed in the community to be involved in the care of patients with single chronic conditions and multimorbidity through, for example, providing medication management and education counselling, and also as part of multiprofessional teams. Also, nurses are well positioned to undertake titration, prescribing and management of medication and providing counselling around medical adherence as well as disease management, independently or as part of a multiprofessional team, and have a positive impact on patient health outcomes and cost. Evidence on the emerging care coordinating roles show a positive impact on health outcomes and resource use, although evidence and experiences are still very limited. Overall, multiprofessional

teams involving various professionals are increasingly used in primary care with positive impact, in particular on mental health and utilization of inpatient care.

The developments in skill-mix innovations reveal that interventions have been implemented in different ways throughout Europe. Often, the interventions involve several skill-mix changes, including enhanced care coordination roles, teamwork interventions, sometimes combined with outreach activities. However, skill-mix innovations often remain patchy and not always fully integrated into routine care. In some countries, skill-mix changes are part of a broader reorganization of care that include multiprofessional teamwork, integrated care and new models of care, developed through existing staff working in new and different ways. Lack of regulation of scope of practice, education/training and reimbursement schemes as well as traditional role definitions and opposition from the medical profession are the most important barriers for successful implementation of skill-mix changes. Official authorization of expanded scopes-of-practice, incentives for increased cooperation, adapted training programmes coupled with decent working conditions (respecting work–life balance) are key prerequisites (Dussault & Buchan, 2018) to ensure that innovative skill-mix solutions reach patients with chronic conditions and multimorbidity.

To date, only a few countries in Europe have formalized new professional roles in chronic care within legal frameworks, and set up training schemes and requirements (for nurse prescribers, nurse practitioners and advanced practice nurses in the United Kingdom, Finland and the Netherlands), while the number of professionals working in new roles remains small in several other countries. However, the positive impact that these skill-mix innovations have on patient outcomes and the use of health resources shows that there is opportunity and scope to scale up programmes and introduce supportive policies. Such reforms can also reduce pressure on specialist services and GPs and deliver even better outcomes for patients and benefits to health systems.

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