

4 *Keeping people healthy: skill-mix innovations for improved disease prevention and health promotion*

STEPHAN VAN DEN BROUCKE, KATARZYNA CZABANOWSKA, HANNAH BUDDE, LAURA PFIRTER, CLAUDIA B. MAIER

4.1 Introduction

Health services in most European countries were developed to meet the needs of demand-led health care. Although they still focus mostly on treatment, cure and care (Beaglehole & Dal Poz, 2003), the growing burden of noncommunicable diseases, along with newly emerging communicable diseases and increasing antimicrobial resistance, create strong and shifting demands on these services. At the same time, the growing prevalence of multimorbidity and the widening health inequalities pose additional threats to health systems that do not give enough attention to the factors that produce health. To address these challenges, it is necessary to reorient health services towards more preventive, people-centred and community-based approaches, with a more prominent role for disease prevention and health promotion, integrated within the wider health system.

Reorienting the health services is a key component of health promotion. The Ottawa Charter (World Health Organization, 1986) and the Astana declaration, which renewed the global policy commitment to public health and primary health care (World Health Organization/UNICEF, 2018), explicitly mention it as an action area, next to building healthy public policies, developing personal skills, creating supportive environments and strengthening community action. But compared with the other action areas of health promotion, reorienting the health services has so far received relatively limited attention. This may be because there is limited understanding of the specific capacities that are needed for a health system to be more health-enabling.

In recent years, however, interest in integrating prevention and health promotion in health systems and strengthening their capacities for that purpose is growing. For instance, prevention and health promotion are included in the 10 Essential Public Health Operations listed in the WHO Regional Office for Europe's European Action Plan for Strengthening Public Health Capacities and Services (World Health Organization, 2016). In 2012, the European Commission commissioned a mapping of the public health capacities in EU Member States, focusing on enabling factors such as knowledge development, workforce, resources, organizational structure, partnerships, leadership and governance (Aluttis et al., 2013). More recently, the WHO Regional Office for Europe brought together a Coalition of Partners of experts from the public health community to accelerate the process of strengthening public health capacities and services by focusing on the enablers of these services (Van den Broucke, 2017).

A competent health workforce is one of these enablers. Whereas a well-trained health workforce has always been considered a key condition for the delivery of effective health services, the nature of the necessary competencies is being redefined in light of the current reorientation of these services. Primary care providers can play an important role in engaging individuals and communities in health promotion and disease prevention activities, yet this role is often underdeveloped or lacking due to high workloads, and lack of expertise and skills, or funding. The growing recognition of disease prevention and health promotion provides new opportunities to tackle these barriers. Within the diversifying primary care and public health workforce, new skills and tasks are being added to existing professional roles, new professional profiles emerge, and collaborations between professions become more important.

In the next section, we will provide an overview of skill-mix strategies that exist in primary and secondary prevention and health promotion, and consider the evidence of their effects while also pointing out the existing gaps in evidence and research. Next, we will summarize common trends and patterns of the major skill-mix developments and reforms that occurred across Europe, and present country examples in different contexts.

4.2 Research evidence on outcomes of skill-mix changes addressing prevention and health promotion

To document the skill-mix strategies that exist in primary and secondary prevention and health promotion, an overview of reviews was performed, resulting in a total of 35 systematic reviews on skill-mix changes (see Box 4.1). Ten reviews analysed the outcomes of skill-mix changes focusing on health promotion and prevention in healthy populations or population groups. Nineteen reviews analysed skill-mix interventions aimed at the prevention of diseases in specific groups through lifestyle-related risk factors (for example, people at risk of cardiovascular diseases, nutrition-related conditions and various other risk factors). Seven reviews specifically looked at skill-mix changes related to screening of various population groups. The reviews covered in this chapter are concerned with health promotion and prevention for the population at large and for subgroups, whereas Chapter 8 focuses particularly on vulnerable groups and their needs (see Chapter 8).

Skill-mix interventions in health promotion and prevention across the life cycle

Ten reviews analysed changes to the roles and skills of teams or individual professions to expand health promotion activities across the lifespan (Table 4.1). The settings and teams varied considerably, but most of the interventions took place in ambulatory health care settings. Some reviews also analysed skill-mix changes in non-health sectors, such as schools or the homes of at-risk groups. Selected reviews focused on health promotion activities and/or prevention for children, such as healthy eating and weight reduction programmes at schools run by nurses (Schroeder, Travers & Smaldone, 2016). The skill-mix interventions outside the

Box 4.1 Overview of the evidence on skill-mix innovations for health promotion and prevention

- Number of reviews: A total of 35 systematic reviews analysed the outcomes of skill-mix changes in health promotion and/or prevention, covering over 848 individual studies.
- Country coverage: The studies were conducted in over 40 countries.
- Methods: Thirteen reviews performed meta-analyses.

Table 4.1 *Skill-mix interventions for health promotion and primary prevention across the life cycle*

Skill-mix interventions			Outcomes ^o			
Description of intervention [Sources]	Content of interventions and skill-mix changes	Profession(s) in intervention and in comparator group	Population	Country	Population-/Patient-related outcomes	Health-system-related outcomes
Primary care provider-delivered diet-related health advice [1,2]	Interventions to promote healthy diet, including dietary counselling, advice and referrals, nutrition assessment, education on physical activity, motivational interviews	Intervention: Primary care professionals, including GPs, (school-) nurses, dieticians, health counsellors, physicians, exercise professionals Comparison: n/r	Schoolchildren attending primary, middle or high school [1] or healthy adults attending primary care [2]	UK, USA, IT, DK, JP, AU, NZ, NL, FI, Asia	- Significant reduction in weight and BMI (BMI (adults); -0.48, 95% CI -0.84 to -0.12; BMI z-score (children): -0.10, 95% CI -0.15 to -0.05) [1] - Statistically significant increase in fruit, vegetable and dietary fibre consumption [2] - Decrease in total fat intake [2] - Mean decrease in serum cholesterol of 0.10 mmol/L (95% CI -0.19 to 0.00) [2]	

Primary care provider-provided physical activity promotion for adults [3]	Interventions to increase physical activity, including advice or counselling given face to face or by phone, vouchers for or referrals to leisure centres, motivational interviews and written material	Intervention: Physicians, nurses, physical activity specialists, physiotherapists, health promotion specialists, working alone or in a team Comparison: n/r	Sedentary adults, aged >16 years	UK, NZ, USA, CH, NL, AU, CA	- Significantly improved self-reported physical activity at 12 months (OR 1.42, 95% CI 1.17–1.73; SMD 0.25, 95% CI 0.11–0.38) - Positive effects on cardiorespiratory fitness at 12 months 1/6 studies reporting on adverse events found a significant increase of 11% in falls and 6% in injuries during 12 months of follow up
Various skill-mix changes to enhance maternity and child health by various professions and lay health workers [4,5]	Various interventions to improve maternal or child health including care collaboration, education programmes, social service referrals, multilingual and culturally sensitive approaches	Intervention: Nurses, coordinators, case-managers, mental health professionals, dietitians, social workers, obstetricians, gynaecologists [4] or lay health workers (paid or voluntary) [5] Comparison: n/r or usual care	Pregnant women, mothers or/and their children in primary and community health care, with low socioeconomic status, from various ethnic groups	USA, AU, CA, NZ, UK, IE, BR, CN, IN, MX, PH, TH, ZA, TR, BD, BF, ET, GH, IQ, JM, PK, TZ, VN, Nepal	- Significantly improved gestational age and birth weight [4] - Significantly improved outcomes on breastfeeding [5] - Significantly improved immunization childhood uptake (RR 1.22, 95% CI 1.10–1.37; $P = 0.0004$) [4,5] - Significantly reduced child morbidity (RR 0.86, 95% CI 0.75–0.99; $P = 0.03$), child mortality (RR 0.75, 95% CI 0.55–1.03; $P = 0.07$) and neonatal mortality (RR 0.76, 95% CI 0.57–1.02; $P = 0.07$) [5] - Significantly improved care coordination [4] - Cost savings [4] - Insignificant increase in the likelihood of seeking care for childhood illness (RR 1.33, 95% CI, 0.86 to 2.05; $P = 0.20$) (3) [5]

Table 4.1 (cont.)

Skill-mix interventions					Outcomes ^o	
Description of intervention [Sources]	Content of interventions and skill-mix changes	Profession(s) in comparator group	Population	Country	Population-/Patient-related outcomes	Health-system-related outcomes
Home visits for pregnant women or mothers [6,7] or prevention of child maltreatment [8]	Home visits to eliminate health disparities through action on social determinants of health [6] or to improve prenatal care utilization and birth weight [7] or to prevent child maltreatment [8]. Interventions included counselling, referrals, sometimes combined with phone calls, clinic visits and transport	Intervention: Home visitor or case managers, CHWs, nurses, social workers psychologists, or paraprofessionals, physicians, teams, firefighter Comparison: n/r	Pregnant women or mothers and/or their children who are underserved, ethnic minorities or who are at high medical or social risk	AU, USA (not consistently reported)	- Significantly improved parenting knowledge and self-efficacy skills [6] - Significantly reduced depressive symptoms among pregnant women after stressor reduction intervention [6] 7/17 studies found a significant increase in birth weight [7] 5/24 studies reported significantly improved gestational age [7]	- Significantly fewer overnight hospital stays ($P < 0.01$) [6] 5/11 studies with statistically significant rise in prenatal care utilization. Significant decrease among African American women in one study [7] - Cost savings ranged from €9206.64 to €182 912.59 (based on lifetime maltreatment cost value of €195 735.02)^a [8]
Pharmacist-delivered smoking cessation [9]	Smoking cessation interventions through counselling, either one-to-one or within group session	Intervention: Community pharmacists Comparison: Community pharmacists	Adults who smoke, attending community pharmacies	SE, UK, USA	- Improved smoking abstinence rates (RR 2.21, 95% CI 1.49–3.29) - Nicotine replacement therapy plus counselling showed better abstinence rates	

Expanded professional roles in health literacy education [10]	Lifestyle interventions to improve health literacy including information, self-management support, goal setting, education, group empowerment, motivational interviews and coaching, exercise logs, physical activity prescriptions, face to face and/or by phone	Intervention: Multidisciplinary teams, physicians, lay worker, nurse, others Comparison: n/r	Adults with at least one SNAPW (smoking, nutrition, alcohol, physical activity, weight) risk factor and low health literacy	AU, CA, CH, JP, NL, NZ, SE, UK, USA	- Improved health literacy in 71% of the included studies (37 out of 52), in particular among moderate to high-intensity interventions - By profession: physician-delivered interventions showed improved health literacy in 33% (3 out of 9) of the studies, dietitian/educator/nurse-delivered in 92% of the studies (11/12) and in 91% if provided in multiprofessional teams (10/11)
---	---	---	---	-------------------------------------	---

Abbreviations: BMI: body mass index; CHW: community health worker; CI: confidence interval; GP: general practitioner; mmol/L: millimoles per litre; n/r, not reported; OR, odds ratio; RR, relative risk; SMD: standard mean deviation; TB: tuberculosis.

Country abbreviations: AU: Australia; BD: Bangladesh; BF: Burkina Faso; BR: Brazil; CA: Canada; CH: Switzerland; CN: China; DK: Denmark; ET: Ethiopia; FI: Finland; GH: Ghana; IE: Ireland; IN: India; IQ: Iraq; IT: Italy; JM: Jamaica; JP: Japan; MX: Mexico; NL: the Netherlands; NZ: New Zealand; PH: Philippines; PK: Pakistan; SE: Sweden; TH: Thailand; TR: Turkey; TZ: Tanzania; UK: the United Kingdom; USA: the United States of America; VN: Vietnam; ZA: South Africa.

Notes: ^a no profession-specific outcomes were found. ^b Cost savings ranged from 15 000 Australian dollars to 298 000 Australian dollars, based on lifetime maltreatment cost value of 318 760 Australian dollars (converted on 12 September 2018, rate: 1 Australian dollar = 0.61 euros),

Sources: [1] Schroeder, Travers & Smaldone (2016); [2] Bhattacharya et al. (2013); [3] Orrow et al. (2012); [4] Kroll-Desrosiers et al. (2016); [5] Lewin et al. (2010); [6] Abbott & Elliott (2017); [7] Issel et al. (2011); [8] Dalziel & Segal (2012); [9] Saba et al. (2014); [10] Dennis et al. (2012).

traditional boundaries of the primary care settings involved home visit programmes by nurses or other professionals to prevent child maltreatment (Dalziel & Segal, 2012), and home visits for pregnant women at risk (Abbott & Elliott, 2017). In the other reviews, the interventions took place (mainly) in primary or ambulatory care settings.

The reviews evaluated the outcomes of skill-mix innovations with a large number of different interventions as well as outcome measures used.

- Two systematic reviews analysed the impact of interventions to reduce overweight and obesity among children or adults attending primary care providers, run by school nurses (Schroeder, Travers & Smaldone, 2016) or various primary care professions (Bhattarai et al., 2013). The interventions included a mix of education, changes to nutrition and physical activity programmes as well as counselling to school children and parents (Bhattarai et al., 2013; Schroeder et al., Travers & Smaldone, 2016). Meta-analysis revealed a significant reduction in children's weight (Schroeder, Travers & Smaldone, 2016) and a significant increase of the intake of fruits, vegetables and dietary fibre among individuals attending primary care providers, whereas fat intake decreased (Bhattarai et al., 2013).
- Physical activity promotion for sedentary adults was delivered by various primary care providers who applied different strategies, such as counselling, advice and motivational interviewing. Self-reported physical activity significantly improved and positive effects were reported for cardiorespiratory fitness. However, one of six studies also reported adverse events, notably a significant increase of 11% in falls and 6% in injuries within 12 months follow up (Orrow et al., 2012).
- Skill-mix interventions that focused on enhanced maternity and child health through improved education, counselling and collaboration among professions revealed an improvement on several outcome measures (Kroll-Desrosiers et al., 2016; Lewin et al., 2010), including improved birth weight, particularly among ethnic minorities (Kroll-Desrosiers et al., 2016) and significantly improved outcomes on breastfeeding and childhood immunization uptake (Lewin et al., 2010). Interventions that showed enhanced care coordination were also associated with cost savings (Kroll-Desrosiers et al., 2016).
- Two home visit programmes on health promotion and prevention for disadvantaged (pregnant) women or mothers resulted in fewer inpatient hospital stays, improved health, self-efficacy and fewer

depressive symptoms (Abbott & Elliott, 2017). Moreover, significant increases in prenatal care utilization and birth weight were also found (Issel et al., 2011). One home visit programme for children at risk of maltreatment resulted in cost savings (Dalziel & Segal, 2012). The most cost-effective programmes reported by Dalziel & Segal (2012) used professional home visitors (for example, nurses, midwives, social workers) in a multidisciplinary team, who targeted high-risk populations and included interventions beyond home visiting.

- Saba et al. (2014) analysed a smoking cessation programme through counselling by community pharmacists, targeted at patients with tobacco consumption and provided at an individual or group level. Overall, these smoking cessation sessions in community pharmacies were associated with improved abstinence rates.
- One review assessed the contribution of various primary care providers to enhance health literacy among various population groups, including healthy adults and people at risk for developing chronic conditions (Dennis et al., 2012). The skill-mix interventions varied considerably, ranging from expanded roles to include health literacy counselling, to intense, bundled packages of counselling, goal setting, group empowerment sessions to develop health literacy skills and lifestyle changes. Interventions delivered by physicians were generally brief, but those provided by nurses and other health professions tended to be more comprehensive and resulted in a higher number of studies with improved health literacy outcomes.

Skill-mix interventions in prevention targeting at-risk groups

A second group of reviews concerned interventions that were directed at specific risk groups. The groups again varied considerably: some interventions were targeted at groups that were at risk of cardiovascular diseases (Table 4.2), that were overweight or obese (Table 4.3), or that had multiple risk factors (Table 4.4). Several systematic reviews also included patients who had already been diagnosed with a disease, whereby the focus was to delay the progression of the disease and prevent the onset of multimorbidity, hence the inclusion of these reviews in this chapter. Interventions took place in the primary or community care setting in various countries around the world. The majority of interventions introduced new roles for different professionals or shifted tasks from physicians to other professions.

Table 4.2 Skill-mix interventions for prevention targeting at-risk groups with cardiovascular risk factors

Skill-mix interventions					Outcomes ^a	
Description of Intervention	Interventions and skill-mix changes	Profession(s)	Population	Countries	Patient-related outcomes	Health-system-related outcomes
Prevention and management of cardiovascular diseases (CVD) risk factors by pharmacist or nurses [1–5]	Interventions such as written or verbal patient educational interventions, intensified patient care, patient-reminder systems and medication management	Intervention: Expanded roles by pharmacists and/or nurses, working alone [2,5] or in collaboration with physicians [1,3,4] Comparison: GPs, pharmacists, physicians, nurses, cardiologists [1–3,5], n/r [4]	Patients with risk factors or diagnosis for CVD or prescribed lipid-lowering medication	AE, AU, BR, CA, CH, CL, CN, ES, HK, IN, PT, TH, TW, USA, [1–3,5]; n/r [4]	- Significant reduced systolic/diastolic blood pressure (–8.1 mmHg, 95% CI –10.2 to –5.9/–3.8 mmHg, 95% CI –5.3 to –2.3) [1] or similar findings [3,5] - Significant reduced total cholesterol (–17.4 mg/L, 95% CI –25.5 to –9.2) [1]; (MD 17.57 mg/L, 95% CI 14.95–20.19) [4] or similar findings [5] - Significant benefits for BMI [5] - Significant reduced risk of smoking [1] - Significant improved medication adherence on lipid-lowering intake [4] - Nurse-led education improved QoL [2]	- Nurse-led education reduced readmission and hospitalization [2] - Nurse-led interventions were more cost-effective than usual care [2]

Pharmacist-delivered CVD interventions [6]	Interventions included education, follow up, identification of drug-related problems, recommendations to patient's physician	Intervention: Community pharmacists Comparison: n/r	Patients at risk for CVD	AU, BE, BR, CA, CL, MX, NE, NL, SP, TR, UK, USA	- Significantly improved outcomes in most of the studies - Reduced HbA1c and systolic blood pressure
Physiotherapist-delivered physical activity-interventions ^b [7]	Physiotherapist interventions aimed at increasing physical activity levels	Intervention: Physiotherapists Comparison: Physiotherapists	Adults with risk factors for NCD or suffering from NCDs	AU, DE, NL, NO	- Significantly more patients achieved the minimum recommended physical activity levels (OR 2.15, 95% CI 1.35–3.43, $P = 0.001$) - Significant effect on total physical activity level (SMD 0.15, 95% CI 0.03–0.27, $P = 0.02$) - Efficacy of interventions did not differ based on their length

Abbreviations: CI: confidence interval; CVD: cardiovascular disease; GP: general practitioner; HbA1c: glycated haemoglobin; MD: mean difference; n/r: not reported; NCD: noncommunicable disease; OR: odds ratio; QoL: quality of life; SMD: standardized mean difference.

Country abbreviations: AE: United Arab Emirates; AU: Australia; BE: Belgium; BR: Brazil; CA: Canada; CH: Switzerland; CL: Chile; CN: China; ES: Spain; DE: Germany; HK: Hong Kong; IN: India; MX: Mexico; NE: Nigeria; NL: the Netherlands; NO: Norway; PT: Portugal; SP: Spain; TR: Turkey; TH: Thailand; TW: Taiwan; UK: the United Kingdom, USA: the United States of America.

Notes: ^a No profession-specific outcomes were found. ^b Intervention group includes both at-risk populations and patients with the disease(s).

Sources: [1] Santschi et al. (2011); [2] Rice et al. (2018); [3] Santschi et al. (2014); [4] Deichmann et al. (2016); [5] Santschi et al. (2012); [6] Ifeanyi-Chiazor et al. (2015); [7] Kunstler et al. (2018).

The outcomes of these skill-mix innovations covered a range of different interventions as well as patient- and health-system-related outcome measures:

- Out of the seven reviews identified, five addressed the prevention and management of cardiovascular risk factors by various professions, including pharmacists and/or nurses, alone or in collaboration with other professions such as GPs. Nurse- and pharmacist-led interventions comprised educational programmes, medication management and reminder systems. Patient-related outcomes improved for both nurse and pharmacist-led interventions. Overall, total cholesterol (Deichmann et al., 2016; Santschi et al., 2011, 2012), risk of smoking (Santschi et al., 2011), body mass index (Santschi et al., 2012) and blood pressure (Santschi et al., 2011, 2012, 2014) were reduced significantly in the intervention groups and quality of life improved (Rice, Say & Betihavas, 2018). Deichmann et al. (2016) reported significantly improved medication adherence on lipid lowering intake. Cost-effectiveness was reported for nurse-led interventions. Moreover, nurse-led education to at-risk groups led to reduced readmission and hospitalization rates (Rice et al., 2018).
- Interventions provided by community pharmacists covered patient education and follow up as well as identification of drug-related problems and providing therapeutic recommendations to physicians. Most studies reported positive effects on patient-related outcomes. Interventions for patients with diabetes and hypertension showed clinically reduced blood pressure and glycated haemoglobin (Ifeanyi Chiazor et al., 2015).
- Clinic-based interventions by physiotherapists aimed at increasing physical activity generally involved face-to-face contact on a one-to-one basis, and often included additional telephone contact. The interventions showed significant positive effects on the total physical activity and significantly helped patients to achieve the minimum recommended level of physical activity (Kunstler et al., 2018).

Six systematic reviews reported on interventions directed at populations with a high body mass index, including adults and children with overweight or obesity and patients with special nutritional needs (Table 4.3).

- The effects of nurse-led weight management and lifestyle counselling were evaluated in three systematic reviews. The programmes

Table 4.3 *Skill-mix interventions for prevention targeting at-risk groups with body mass/nutrition-related risk factors*

Skill-mix interventions			Outcomes ^a			
Description of intervention	Interventions and skill-mix changes	Profession(s)	Population	Countries	Patient-related outcomes	Health-system-related outcomes
Nurse-delivered weight management interventions and lifestyle counselling ^b [1–3]	Lifestyle interventions, including behavioural counselling, goal setting, motivational interviewing, lifestyle education [1–3] and the use of theoretically based behaviour change techniques [1]	Intervention: Nurses, alone or with multidisciplinary teams (e.g. dietitians, CHWs, physiotherapists) Comparison: GPs, cardiologists, paediatric or public health nurses, nutritionists [2,3], n/r [1]	Children and adults, in most studies with socioeconomic, lifestyle or health-related risk factors, few with a diagnosis or chronic disease	UK, USA, FI, NL, NZ, AU, NO, SE, RU, TR, TW	- Statistically significant weight reduction [1–3] - Significant improvements in systolic and diastolic blood pressure, cholesterol, favourable dietary intake, fitness status, physical activity and health status [1] - Patient satisfaction increased statistically significant [3] or insignificant [1] - Practice nurses achieved equally good health outcomes compared to GPs [3]	- Practice nurses took longer in their consultations than GPs [3] - Nurses' more comprehensive approach: more likely to address weight, diet and physical activity than that of GPs [3]

Table 4.3 (cont.)

Skill-mix interventions				Outcomes ^a	
Description of intervention	Interventions and skill-mix changes	Profession(s)	Population	Countries	Health-system-related outcomes
Diet-related intervention by various professions [4,5]	Interventions to promote healthy diet, including dietary counselling, advice, information and referrals, assessment, motivational interviews, diagnosis and monitoring	Intervention: Health care professionals (e.g. dietitians, GPs, nurses, physicians, exercise professionals), working alone or in a multidisciplinary team Comparison: n/r	Adults, attending primary care, in most studies with lifestyle-related risk factors and few with chronic diseases	UK, USA, AU, BR, CA, DK, HK, IT, JP, KR, PT, TR, TW, NZ, NL, FI	• Significant improvements in dietary behaviours [4,5] • Significant increase in daily vegetable and fruit intake, fish intake and consumption of high-fibre bread [4] • Significantly improved glycaemic control, anthropometry and cholesterol, triglycerides [5]
Skill-mix and organizational changes on weight reduction ^b [6]	Interventions to change the behaviour of health professionals or the organization of care to promote weight reduction	Intervention: Physicians, dietitians, nurses, NPs Comparison: Professionals delivering standard care	Children and adults with overweight or obesity, some with comorbidities	AU, UK, USA	• Weight loss was achieved at a modest cost (−5.60 kg, 95% CI −4.83 kg to −6.37 kg) and by a doctor–dietician team (−6.70 kg, 95% CI −7.52 kg to −5.88 kg) • Reduced BMI z-score with shared care (adjusted MD −0.05, 95% CI −0.14 to 0.03)

Abbreviations: BMI: body mass index; CHW: community health worker; CI: confidence interval; GP: general practitioner; MD: mean difference; n/r: not reported; NP: nurse practitioner; OR: odds ratio; SMD: standardized mean difference.

Country abbreviations: AU: Australia; BR: Brazil; CA: Canada; DK: Denmark; FI: Finland; HK: Hong Kong; IT: Italy; JP: Japan; KR: South Korea; NL: the Netherlands; NO: Norway; NZ: New Zealand; PT: Portugal; SE: Sweden; TR: Turkey; TW: Taiwan; UK: the United Kingdom; USA: the United States of America.

Notes: ^a No profession-specific outcomes were found. ^b Intervention group includes both at-risk populations and patients with disease(s)

Sources: [1] Sargent, Forrest & Parker (2012); [2] Petit Francis et al. (2017); [3] Van Dillen & Hiddink (2014); [4] Ball et al. (2015); [5] Mitchell et al. (2017); [6] Flodgren et al. (2017).

encompassed consultation, motivational interviewing and education. Body mass index and overweight were significantly reduced in the intervention groups (Petit Francis et al., 2017; Sargent, Forrest & Parker, 2012; van Dillen & Hiddink, 2014). Significant improvements were also reported for weight control, blood pressure, cholesterol and physical activity (Sargent et al., 2012). Successful programmes involved nurses engaged in health promotion activities, operating within multidisciplinary teams and/or providing consultations, physical activity education and coaching over the phone (van Dillen & Hiddink, 2014).

- Individualized nutrition care for patients with special dietary needs delivered by health care professionals including dietitians and nurses working alone or in teams ranged from assessment and diagnosis to intervention and monitoring. These interventions led to a significant increase of the daily intake of vegetables, fruits, fish and high-fibre bread (Ball et al., 2015), and significantly improved glycemic control, dietary change, anthropometry, cholesterol, triglycerides (Mitchell et al., 2017).
- One Cochrane review analysed two types of interventions on weight reduction. Interventions by health professionals covered different strategies including educational programmes, whereas interventions addressing the care organization involved multidisciplinary teams and shared care models. Significantly reduced weight and body mass index scores were reported for the dietitian-led and shared care (dietitian–physician) interventions. Interventions directed at professionals, such as education, tailoring and clinical decision tools, showed only a small positive effect on weight loss. Weight loss was achieved at modest costs in the interventions provided by physicians only or in collaboration with dietitians (Flodgren et al., 2017).

Six systematic reviews were concerned with multiple risk groups (Table 4.4). The interventions focused on task shifting and the uptake of new roles by nurses, pharmacists or lay health workers. The results in terms of patient and health system outcomes were mixed.

- One review evaluated task shifting with regard to secondary prevention from physicians to nurses. Nurse practitioners and other specialized nurses with additional training took over tasks from physicians in the secondary prevention and performed them independently or under supervision of a physician. Prevention measures

Table 4.4 *Skill-mix interventions for prevention targeting at-risk groups with multiple risk factors*

Skill-mix interventions			Outcomes		
Description of intervention	Interventions and skill-mix changes	Profession(s)	Population	Countries	Health-system-related outcomes
Nurse task shifting interventions under autonomous or delegated responsibility ^b [1]	Physician–nurse task shifting for secondary/tertiary prevention. Tasks included assessments, history taking, diagnostics, monitoring, prescriptions, referrals, follow ups	Intervention: NPs, licensed nurses Comparison: Family physicians, paediatricians, geriatricians	Patients in primary care with wide range of diagnoses (e.g. type 2 diabetes, hypertension)	NL, RU, UK, ZA	- Most studies (84%) showed no significant differences between nurse-led care and physician-led care - Nurse-led care showed better outcomes in secondary prevention of heart diseases - Positive effect in managing dyspepsia and lowering CVD risk in diabetic patients - Significantly reduced differences for stroke risk and CHD risk

Health-related lifestyle advice by professionals or lay health workers [2–4]	Lifestyle advice, including physical activity or nutrition counselling, education, goal setting, identifying barriers, introducing self-management. Delivered in person, by phone, post or online	Intervention: Various health care professionals [3,4] or trained, but unqualified health-related lifestyle advisors [2] Comparison: n/r	Patients with lifestyle-related risk factors (for CVD, diabetes, overweight, fatty liver disease, hypertension)	AU, FI, NL, SE, US [4]; n/r [2, 3]	• Significant reduction in weight (5/6) [3] • Increased physical activity [3] • Little evidence for the effectiveness of interventions for promotion of exercise or improved diets [2], significant decrease in blood pressure (6/7) [3], improved blood lipids [2] and blood glucose control (7/10) [3] • Improved cardiovascular risk factors [4]	• Cost-effectiveness varied, but was predominantly positive [2]
Pharmacist-delivered interventions [5]	Interventions included education, follow up, recommendations for preventing or managing diabetes or CVD and/or their major risk factors	Intervention: Pharmacists Comparison: Pharmacists	Patients at risk or suffering from diabetes or CVD	n/r	• Some interventions (patient education, patient follow up, identification of drug-related problems and subsequent physician recommendations) were effective in the majority of studies	

Table 4.4 (cont.)

Skill-mix interventions			Outcomes		
Description of intervention	Interventions and skill-mix changes	Profession(s)	Population	Countries	Health-system-related outcomes
Nurse-led prevention of falling [6]	Structured home-based health promotion to prevent falls	Intervention: Public health nurses, community nurses, specialist nurses Comparison: GPs and other health professionals	Older patients >75 years with long-term medical needs such as chronic heart failure, Parkinson's disease, stroke	UK	- Significantly reduced risk of death (OR 0.80, 95% CI 0.68–0.95) - Reduction in falls, but not significant - No significant effect on hospital admission and number of individuals moving into residential care - Three studies on costs found potential cost savings, but face several limitations

Abbreviations: CHD: coronary heart disease; CVD: cardiovascular disease; n/r: not reported; NP: nurse practitioner.

Country abbreviations: AU: Australia; FI: Finland; NL: the Netherlands; RU: Russian Federation; SE: Sweden; UK: the United Kingdom; USA: the United States of America; ZA: South Africa.

Notes: ^a No profession-specific outcomes were found. ^b Intervention group includes both at-risk populations and patients with disease(s).

Sources: [1] Martínez-González et al. (2015); [2] Pennington et al. (2013); [3] Tapsell & Neale (2016); [4] Frenichs et al. (2012); [5] Evans et al. (2011); [6] Tappenden et al. (2012).

were delivered during the course of disease to patients with various diagnoses. Most studies included in this review did not show a difference in patient-related outcomes between nurse-led and physician-led care. Some studies showed better outcomes for nurse-led secondary prevention of heart diseases, for managing dyspepsia and for lowering cardiovascular risk in individuals with diabetes and for significantly lowering differences in mean fall from baseline for stroke risk (Martínez-González et al., 2015).

- Several reviews evaluated health-related lifestyle advice performed by either trained lay health workers (Pennington et al., 2013) or by various health care professionals (Frerichs et al., 2012; Tapsell & Neale, 2016). The interventions were directed at adults with different health conditions and encompassed education, counselling and support delivered in person, via telephone or electronically. Improved cardiovascular risk factors (Frerichs et al., 2012) and physical activity and significantly improved blood pressure, blood glucose control, weight (Tapsell & Neale, 2016) and blood lipids (Pennington et al., 2013) were reported. However, little evidence of effectiveness, measured via resource use, was reported for interventions promoting exercise or healthy diets. Where interventions were effective, their cost-effectiveness varied greatly. Incremental cost-effectiveness ratios were estimated at £6000 for smoking cessation, £14 000 for a telephone-based type 2 diabetes management and £250 000 or greater for promotion of mammography attendance and for HIV prevention among drug users (Pennington et al., 2013).
- One review focused on pharmacist interventions to prevent diabetes or cardiovascular diseases in patients at risk or to improve self-management in already diagnosed patients. The interventions combined patient education, follow up, identifying drug-related problems and providing recommendations for the prevention and management of the diseases. Patient education, patient follow up, identification of drug-related problems and subsequent physician recommendations were effective in the majority of studies (Evans et al., 2011).
- One review focused on nurse-led prevention of falling in older patients with multiple risk factors at risk of admission to hospital, residential or nursing care. The review showed a significantly reduced risk of death associated with the intervention, but could not show a significant effect on the number of falls and admissions to hospital and residential care. The identified economic evaluations tended to show cost savings, but faced several methodological shortcomings (Tappenden et al., 2012).

Table 4.5 Skill-mix interventions with a focus on screening

Skill-mix interventions					Outcomes ^a	
Description of intervention	Interventions and skill-mix changes	Profession(s)	Population	Countries	Patient-related outcomes	Health-system-related outcomes
Patient navigation [1–3]	Patient navigator such as face-to-face, mail, phone interventions including education or support in identifying barriers, setting up appointments and by making reminder calls	Intervention: Trained laypersons or health professionals (e.g. bilingual), working in a team Comparison: n/r [1,2]; Control group without PN or intervention group before intervention [3]	Patients in primary care, medically underserved (often vulnerable) [1–3] as well as non-proficient Anglophone populations [3]	USA, BD, CA	- Increased access to screenings (OR 2.48, 95% CI 1.93–3.18, $P < 0.00001$) [1], improved breast, cervical or colorectal cancer screening [2], significant increased screenings rates for breast, cervical, or colorectal cancer (14/15 studies) [3] - Improved completion of diagnostics [2]	- Increased probability to attend recommended care events (OR 2.48, 95% CI 1.27–5.10, $P = 0.008$) [1] - Improved referral and follow up [2]
Transdisciplinary interventions with focus on social determinants of health [4]	Home visits conducted alone or as part of a transdisciplinary community secondary prevention to eliminate health disparities through action on social determinants of health	Intervention: CHWs, paraprofessionals, nurses, social workers, physicians, firefighter, research staff, case managers Comparison: n/r	Disadvantaged populations, including ethnic minorities	USA	- Significantly improved mammography attendance ($P < 0.01$), Papanicolaou screening ($P < 0.01$) and Hepatitis B screening ($P < 0.01$) - No significant difference in prostate cancer screening rates in low-income African-American men	

Interventions to improve cervical cancer screening [5]	Interventions to improve screening, diagnosis or treatment, through patient navigation or education with written or multimedia materials	Intervention: Nurses, NPs, lay health workers, community health aides, physicians, care managers Comparison: n/r	Racial and ethnic minority, as well as low-income women	USA	• Increase in cervical cancer screening rates when education was delivered by lay health workers in combination with other interventions, as well as through navigation and phone support • Significant increase in screening rates through multiple interventions and unique combinations in multiple interventions
Nurse-delivered colorectal cancer screening [6]	Nurse-led endoscopy in colorectal cancer screening	Intervention: Endoscopy nurses, NPs Comparison: Gastroenterologists, general surgeons, physician endoscopists	Asymptomatic males and females aged 45 years and older	USA, CA	• Nurses detected significantly higher adenomas compared with physicians and polyps at similar rates to endoscopists • Absence of complications during endoscopy • Greater patient satisfaction for nurse-led care • Nurse-led endoscopy produced lower costs compared with physician-led by approximately \$100 (Nurse: \$183, Physician: \$283)

Table 4.5 (cont.)

Skill-mix interventions			Outcomes ^a		
Description of intervention	Interventions and skill-mix changes	Profession(s)	Population	Countries	Health-system-related outcomes
Nurse-delivered skin cancer screening [7]	Nurse-led clinical skin cancer assessment/examination	Intervention: APNs, NPs, specialized nurses Comparison: Physicians, general or expert dermatologists	Patients eligible for skin cancer (melanoma) screening	UK, USA (not consistently reported)	• High sensitivity to identify malignant lesions by NPs (100%) • Dermatology nurses showed less sensitivity compared with dermatologists with expertise in skin cancer and general dermatologists

Abbreviations: APN: advanced practice nurse; CHW: community health worker; CI: confidence interval; n/r: not reported; NP: nurse practitioner; PN: patient navigator; OR: odds ratio.

Country abbreviations: BD: Bangladesh; CA: Canada; UK: the United Kingdom; USA: the United States of America.

Notes: ^a No profession-specific outcomes were found.

Sources: [1] Al-Faisal et al. (2017); [2] Roland et al. (2017); [3] Genoff et al. (2016); [4] Abbott & Elliott (2017); [5] Glick et al. (2012); [6] Joseph, Vaughn & Strand (2015); [7] Loescher, Harris & Curriel-Lewandrowski (2011).

Skill-mix interventions targeting screenings

Seven reviews focused on interventions by health professionals or lay health workers to facilitate the access to screenings. There were also non-health professionals involved, such as firefighters.

- The role of a patient navigator was introduced in three reviews for patients completing screenings, mostly targeting vulnerable individuals. Patient navigators, including health professionals, trained lay persons and community health workers and provided assistance in person, via mail or phone to increase screening and diagnostic rates. As a result, patients were significantly more likely to attend recommended care events and attend screenings (Ali-Faisal et al., 2017). Roland et al. (2017)) also reported increased screening and mammography uptake and improved completion of diagnostics, referral and follow up. Genoff et al. (2016) showed significantly improved screening rates for breast, cervical and colorectal cancer.
- Transdisciplinary secondary prevention interventions in the community targeting the social determinants of health were conducted through home visits in the review by Abbott and Elliott (2017). These were delivered by physicians, nurses, social workers, community health workers and firefighters. Disadvantaged population groups reported significantly improved mammography attendances, Papanicolaou cervical screenings and Hepatitis B screenings. However, no significant difference was found for prostate cancer screening rates among low-income African-American men.
- Interventions to improve screening of cervical cancer in women through patient navigation or education resulted in increased screening rates when interventions were delivered by lay health workers (Glick et al., 2012).
- Nurse-delivered colorectal cancer screenings in asymptomatic adults aged 45 years or more showed that nurses detected significantly higher rates of adenomas compared with physicians, and polyps at comparable rates to endoscopists. Higher patient satisfaction and absence of complications were also among the positive outcomes. Regarding resource use, nurse-led screenings resulted in lower costs compared with physician-led services (Joseph, Vaughan & Strand, 2015).
- One review focused on skin cancer screening, including the assessment and examination performed by nurse practitioners, other

advanced practice nurses or specialized nurses. The interventions were compared to screenings conducted by physicians or general and expert dermatologists. Overall, nurses showed a high sensitivity to identify malignant lesions, although there were differences in their level of specialization and sensitivity (Loescher, Harris & Lewandrowski, 2011).

Education and training of the professionals involved in the skill-mix interventions

The training of the professionals was not systematically reported across the systematic reviews reported in the previous sections. However, some reviews provided information on the educational background of the professionals who had been included in the skill-mix interventions. For instance, Loescher, Harris & Lewandrowski (2011) noted that nurse practitioners and advanced practice nurses underwent additional training programmes for skin cancer screening ranging from 10 minutes to 4 months, demonstrating the variability in the length of training.

Limitations and strength of evidence

The systematic reviews presented above did not systematically report comparison groups and interventions. Due to the great heterogeneity of the interventions covered in the reviews, some of which report complex interventions that also alter the organization of care, the attribution of causality between skill-mix interventions and outcomes must be done with caution. Health-system-related outcomes were less frequently evaluated than patient/population-specific outcomes, whereas profession-specific outcomes are missing. The quality of the reviews also varied considerably: there were 13 meta-analyses, four cost-effectiveness analyses and two Cochrane reviews.

Conclusions: summary of the evidence

As documented in the majority of the reviews summarized above, skill-mix innovations for health promotion and prevention show evidence of positive outcomes for patients and for the health systems. Health promotion and primary prevention across the life cycle have become increasingly the remit of primary care professionals. Several skill-mix

innovations have emerged that explicitly focus on health promotion or prevention, ranging from the allocation of tasks to nurses and pharmacists to shared care models. Overall, these have shown a positive impact on individuals or risk groups in terms of lifestyle choices and outcomes. Moreover, innovative programmes such as home visits to prevent child maltreatment can save costs. Outcomes associated with cardiovascular, body mass and various other risk factors have given proof of improved patient- and health-system-related effects. The introduction of patient navigators as well as transdisciplinary home visits can be an effective strategy to expand screening rates, particularly for vulnerable population groups or individuals who would otherwise not participate in screenings.

4.3 Skill-mix innovations and reforms: trends

The skill-mix innovations for primary or secondary prevention and health promotion reviewed in the previous section can be considered against the backdrop of three major trends that can be observed in the health sector, and particularly in public health.

More informed decision-making

Shared decision-making, defined as “an approach where clinicians and patients share the best available evidence when faced with the task of making decisions” (Elwyn et al., 2012), as opposed to clinicians making decisions on behalf of patients, is gaining increasing prominence in health care. The trend is not restricted to decisions on medical treatment, but is also seen in preventive health and health promotion (for example, screening participation, vaccination, breastfeeding, diet advice). Policy-makers are often favourable towards the idea of shared decision-making, not only because they support the right of patients and citizens to be involved in decisions concerning their own health, but also because of its potential to reduce overuse of interventions that are not clearly associated with benefits for all, to reduce unwarranted health care practice variations, and to enhance the sustainability of the health care system (Légaré et al., 2018). The value of shared decision-making is supported by evidence from a growing number of studies showing knowledge gain by patients, more confidence in decisions, more active patient involvement, and generally a choice for more conservative treatment options (Elwyn et al., 2012). However, to allow

for shared decisions, patients and citizens who decide on preventive measures must have the capacity to act independently and to make their own choices. Shared decision-making therefore depends on tasks that help confer agency on the patients by providing them with information about the likely benefits and risks of different options, and by supporting the decision-making process, taking into account their personal values and preferences. This process involves a continuing dialogue between health providers and decision-makers. Apart from a sufficient level of health literacy on the part of the patient, it requires adequate communication skills on the part of health workers. But more importantly, it also implies an important shift in the role of health workers, from that of an expert making decisions for the patient to that of an educator and coach in the decision-making process. To make this possible, new tasks must be added to their task description. The reviews summarized above make clear that new tasks and roles with a focus on health promotion or prevention are being introduced in primary care. Not only are tasks allocated to other actors such as nurses, nurse-practitioners, pharmacists, community health workers, patient navigators and lay persons, but more elaborate shared care models are also beginning to emerge. Overall, these skill-mix innovations have shown a positive impact on individuals or at-risk groups in terms of lifestyle choices and outcomes.

Internet as a health information source

With the availability of the internet and changes in media health coverage, the context in which patients consume medical and health information has changed dramatically. A Eurobarometer study on European citizens' digital health literacy (Eurobarometer, 2014) revealed that six out of ten European respondents use the internet to search for health-related information, and over half of these do so at least once per month. Information about health topics is abundantly available, but not always accurate and often contradictory. As such, being well-informed about health is not so much a matter of finding information, but rather a question of finding out which information sources that are accessed give adequate and useful information, and whether they are reliable.

As these changes influence the ways in which individuals obtain, interpret and evaluate health information, they also have an impact on the role of health care providers. Whereas traditionally physicians were gatekeepers of health care information and services to their patients,

most physicians are now experiencing the effects of patients coming to their offices armed with printouts from the internet and requesting certain procedures, tests or medications (Hesse et al., 2005). Although patients still rely on health care providers as their most trusted information source on health, the role of physicians may no longer be seen as solitary caretakers but as trusted partners in helping patients sort through information derived from an expanding network of personal and mediated information channels. Again, this new role requires a series of new skills and a reorganization of the task division within the health system, with tasks being allocated to a range of actors within the health sector to ensure that patients' information needs and questions are being addressed.

A diverse and expanding primary care and public health workforce

Unlike the medical workforce, with its clearly established professions and curricula, the workforce for public health is very diverse. In addition to public health specialists (epidemiologists, health policy-makers, health educators, environmental health experts, health economists) and professionals in primary or ambulatory health care (physicians, nurses, dentists, pharmacists, midwives), there is also an important role for those who are not directly involved in health organizations, but whose activities can contribute to improving population health, such as social workers, teachers, police or urban planners (Aluttis et al., 2014). In this regard, Davies (2013) makes a distinction between specialist and mainstreamed public health and health promotion workers. The first are specialists at both academic and professional levels who have been trained in public health or health promotion as a scholarly discipline and who possess the knowledge, skills and practical experience to perform their tasks. The second are people inside and outside the health sector who work to promote health as defined by the Ottawa Charter, regardless of their professional designation. They represent the social movement aspect of public health and health promotion, more than the discipline.

Within the specialist public health and health promotion workforce, tasks are increasingly shared by or reallocated between professions. Prevention and health promotion tasks are taken up by specialists from a growing range of disciplines. For instance, public health nurses are

added to primary care centres and general practice in a number of countries, including France, the Netherlands and Slovenia. In a similar vein, pharmacists increasingly take up a role as health promotion actors. This was seen in Belgium, for example, where a programme was introduced allowing pharmacists to be paid a fee to provide medico-pharmaceutical advice to clients using new medication (Box 4.2).

This trend also necessitates an enhanced collaboration between different disciplines involved in prevention and health promotion. When tasks shift, the collaboration between health workers from different disciplines needs to be re-calibrated. This is seen in a pilot project on

Box 4.2 Pharmacists' support of novice users of medicines

In 2013, a New Medicines Service (NMS) was introduced in community pharmacies in Belgium to support asthma patients who were novice users of inhaler devices with corticosteroids. The protocol-based intervention used the Asthma Control Test (ACT) and the Medication Adherence Report Scale (MARS) to assess asthma control and medication adherence. The NMS was the first initiative that put advanced pharmaceutical care into practice in Belgium. An evaluation study involving telephone interviews with pharmacists, semi-structured interviews with patients eligible for NMS, focus groups with GPs and lung specialists, and a work system analysis in community pharmacies revealed that the introduction of the NMS programme was not sufficiently embedded in the Belgian health care organization (Fraeyman et al., 2017). As a result, there was low uptake and resistance to its implementation by pharmacists, patients and other health care professionals. Apart from practical barriers, pharmacists found it difficult to identify new asthma patients when they were not informed about the diagnosis. A lack of commitment from physicians, patients and pharmacists was also noted, especially in the early start-up phase of the programme. Many pharmacists did not see how NMS differed from existing pharmaceutical care. Physicians considered this service as part of their own tasks and discouraged ACT for asthma follow up in the community pharmacy. To increase the uptake of this type of service and its possible extension to other patient groups, more collaboration among the different health care professionals during design and implementation would be required, as well as systematic data collection to monitor the quality of the service, better training of pharmacists, and more information for patients and physicians.

Box 4.3 Introducing diabetes screening in the pharmacy

Diabetes mellitus is the fourth largest cause of death in the EU. Of the approximately 32 million people in the EU who live with type 2 diabetes, many are unaware of their condition. The high prevalence of undiagnosed diabetes and the risk of complications create a strong imperative for diabetes screening. Although testing for and diagnosing diabetes is a task for medical professionals, pharmacists can also play a role in screening patients at high risk for diabetes, assessing their health status, referring them to other health care professionals as appropriate, and monitoring outcomes, thus empowering patients to take informed decisions about their health. On the other hand, diabetes screening by pharmacists can be a challenge for the relationship between health care professionals, as it involves a shift in their respective roles and requires an optimization of the communication between them with regard to patient follow up. A project currently taking place in Belgium explores how the introduction of diabetes screening in pharmacies influences the health care relationship of pharmacists and GPs with their patients and the professional relationship between them, identifies the factors that encourage or impede this partnership relationship, and develop guidelines and tools to enhance a collaborative approach to diabetes screening.

setting up a system of regular and structured consultation between GPs and pharmacists in Brussels who sell diagnostic self-tests (Box 4.3).

Involvement of non-health professionals and citizens is also seen in mental health. Examples from Canada, the United Kingdom and France show the role of volunteers delivering “safe and well visits”, mobile crisis teams, or firefighters responding to people who have been confronted with traumatic experiences.

4.4 Conclusions and outlook

The skill-mix innovations presented in this chapter respond to challenges within the health services that require a more prominent role for prevention and health promotion. The current healthcare landscape is characterized by a need for more informed decision-making, a rapidly expanding digitalization making the internet an important information source regarding health, new roles for primary care providers and a diversifying primary care and public health workforce. There are three

different types of skill-mix innovations tackling the challenge: tasks are shifted and re-allocated, existing roles are expanded, and in some cases teamwork/consultation is introduced. In terms of proxy indicators, most examples have been successful in delivering services to needs which otherwise would have remained unaddressed. Several countries have introduced reforms with expanded roles for nurses, pharmacists, dieticians, GPs or other (often non-health) specialists, yet these reforms have so far remained at a small scale. Fully integrating individual health promotion and prevention activities into routine care remains a challenge in most countries, despite emerging evidence on the effectiveness of the interventions involving skill-mix innovations.

References

- Abbott LS, Elliott LT (2017). Eliminating health disparities through action on the social determinants of health: a systematic review of home visiting in the United States, 2005–2015. *Public Health Nurs*, 34(1):2–30.
- Ali-Faisal SF, Colella TJE, Medina-Jaudes N et al. (2017). The effectiveness of patient navigation to improve healthcare utilization outcomes: a meta-analysis of randomized controlled trials. *Patient Educ Couns*, 100(3):436–448. (<http://www.sciencedirect.com/science/article/pii/S0738399116304839>).
- Aluttis C, Brand H, Michelsen K et al. (2013). Review of Public Health Capacity in the EU. Luxembourg, European Commission, DG SANCO.
- Aluttis C, Maier CB, Van den Broucke S et al. (2014). Developing the public health workforce. In: Rechel B, McKee M, eds. *Facets of Public Health in Europe*. Maidenhead, Open University Press: 255–266.
- Ball L, Leveritt M, Cass S et al. (2015). Effect of nutrition care provided by primary health professionals on adults' dietary behaviours: a systematic review. *Fam Pract*, 32(6):605–617.
- Beaglehole R, Dal Poz M (2003). Public health workforce: challenges and policy issues. *Hum Resour Health*, 1: 4.
- Bhattarai N, Prevost AT, Wright AJ et al. (2013). Effectiveness of interventions to promote healthy diet in primary care: systematic review and meta-analysis of randomised controlled trials. *BMC Public Health*, 13:1203. (<https://www.ncbi.nlm.nih.gov/pubmed/24355095>).
- Dalziel K, Segal L (2012). Home visiting programs for the prevention of child maltreatment: cost-effectiveness of 33 programs. *Arch Dis Childhood*, 97(9):787.
- Davies JK (2013). Health promotion: a unique discipline? Auckland, Health Promotion Forum of New Zealand.

- Deichmann RE, Morledge MD, Ulep R et al. (2016). A meta-analysis of interventions to improve adherence to lipid-lowering medication. *Ochsner J*, 16(3):230–237. (<https://www.ncbi.nlm.nih.gov/pubmed/27660570>).
- Dennis S, Williams A, Taggart J et al. (2012). Which providers can bridge the health literacy gap in lifestyle risk factor modification education: a systematic review and narrative synthesis. *BMC Fam Pract*, 13(1):44. (<https://doi.org/10.1186/1471-2296-13-44>).
- Elwyn G, Frosch D, Thomson R et al. (2012). Shared decision making: a model for clinical practice. *J Gen Intern Med*, 27(10):1361–1367.
- Eurobarometer (2014). European citizens' digital health literacy. A report to the European Commission. (https://ec.europa.eu/commfrontoffice/publicopinion/flash/fl_404_en.pdf, accessed 23 June 2020).
- Evans C, Watson E, Eurich D et al. (2011). Diabetes and cardiovascular disease interventions by community pharmacists: a systematic review. *Ann Pharmacother*, 45:615–628.
- Flodgren G, Gonçalves-Bradley DC, Summerbell CD (2017). Interventions to change the behaviour of health professionals and the organisation of care to promote weight reduction in children and adults with overweight or obesity. *Cochrane Database Syst Rev* (11). (<https://doi.org/10.1002/14651858.CD000984.pub3>).
- Fraeyman J, Foulon V, Mehuys E et al. (2017). Evaluating the implementation fidelity of New Medicines Service for asthma patients in community pharmacies in Belgium. *Res Soc Admin Pharmacy*, 13(1):98–108.
- Frerichs W, Kaltenbacher E, van de Leur JP et al. (2012). Can physical therapists counsel patients with lifestyle-related health conditions effectively? A systematic review and implications. *Physiother Theory Pract*, 28(8):571–587.
- Genoff MC, Zaballa A, Gany F et al. (2016). Navigating language barriers: a systematic review of patient navigators' impact on cancer screening for limited English proficient patients. *J Gen Intern Med*, 31(4):426–434. (<https://doi.org/10.1007/s11606-015-3572-3>).
- Glick SB, Clarke AR, Blanchard A et al. (2012). Cervical cancer screening, diagnosis and treatment interventions for racial and ethnic minorities: a systematic review. *J Gen Intern Med*, 27(8):1016–1032. (<https://www.ncbi.nlm.nih.gov/pubmed/22798213>).
- Hesse BW, Nelson DE, Kreps GL et al. (2005). Trust and sources of health information: the impact of the Internet and its implications for health care providers: findings from the first Health Information National Trends Survey. *Arch Intern Med*, 165(22):2618–2624.
- Ifeanyi Chiazor E, Evans M, van Woerden H et al. (2015). A systematic review of community pharmacists' interventions in reducing major risk factors for

- cardiovascular disease. *Value in Health Regional Issues*, 7:9–21. (<http://www.sciencedirect.com/science/article/pii/S2212109915000102>).
- Issel LM, Forrestal SG, Slaughter J et al. (2011). A review of prenatal home-visiting effectiveness for improving birth outcomes. *J Obstet Gynecol Neonat Nurs*, 40(2):157–165.
- Joseph J, Vaughan R, Strand H (2015). Effectiveness of nurse-performed endoscopy in colorectal cancer screening: a systematic review. *Gastroint Nurs*, 13:26–33.
- Kroll-Desrosiers AR, Crawford SL, Moore Simas TA et al. (2016). Improving pregnancy outcomes through maternity care coordination: a systematic review. *Women's Health Issues*, 26(1):87–99. (<http://www.sciencedirect.com/science/article/pii/S1049386715001607>).
- Kunstler BE, Cook JL, Freene N et al. (2018). Physiotherapist-led physical activity interventions are efficacious at increasing physical activity levels: a systematic review and meta-analysis. *Clin J Sport Med*, 28:304–315.
- Légaré F, Adekpedjou R, Stacey D et al. (2018). Interventions for increasing the use of shared decision making by healthcare professionals. *Cochrane Database Syst Rev*, 7:CD006732.
- Lewin S, Munabi-Babigumira S, Glenton C et al. (2010). Lay health workers in primary and community health care for maternal and child health and the management of infectious diseases (Review). *Cochrane Database Syst Rev*, 3:CD004015.
- Loescher LJ, Harris JM Jr, Curiel-Lewandrowski C. (2011). A systematic review of advanced practice nurses' skin cancer assessment barriers, skin lesion recognition skills, and skin cancer training activities. *J Am Acad Nurse Pract*, 23(12):667–673.
- Martínez-González NA, Tandjung R, Djalali S et al. (2015). The impact of physician-nurse task shifting in primary care on the course of disease: a systematic review. *Hum Resour Health*, 13:55.
- Mitchell LJ, Ball LE, Ross LJ et al. (2017). Effectiveness of dietetic consultations in primary health care: a systematic review of randomized controlled trials. *J Acad Nutr Dietet*, 117(12):1941–1962. (<http://www.sciencedirect.com/science/article/pii/S221226721731002X>).
- Orow G, Kinmonth A-L, Sanderson S et al. (2012). Effectiveness of physical activity promotion based in primary care: systematic review and meta-analysis of randomised controlled trials. *BMJ*, 344:e1389.
- Pennington M, Visram S, Donaldson C et al. (2013). Cost-effectiveness of health-related lifestyle advice delivered by peer or lay advisors: synthesis of evidence from a systematic review. *Cost Effect Resource Alloc*, 11(1):30. (<https://doi.org/10.1186/1478-7547-11-30>).
- Petit Francis L, Spaulding E, Turkson-Ocran R-A et al. (2017). Randomized trials of nurse-delivered interventions in weight management research: a systematic review. *West J Nurs Res*, 39(8):1120–1150.

- Rice H, Say R, Betihavas V (2018). The effect of nurse-led education on hospitalisation, readmission, quality of life and cost in adults with heart failure. A systematic review. *Patient Educ Couns* 101(3):363–374. (<http://www.sciencedirect.com/science/article/pii/S0738399117305578>).
- Roland KB, Milliken EL, Rohan EA et al. (2017). Use of community health workers and patient navigators to improve cancer outcomes among patients served by federally qualified health centers: a systematic literature review. *Health Equity*, 1(1):61–76.
- Saba M, Diep J, Saini B et al. (2014). Meta-analysis of the effectiveness of smoking cessation interventions in community pharmacy. *J Clin Pharm Ther*, 39(3):240–247.
- Santschi V, Chiolerio A, Burnand B et al. (2011). Impact of pharmacist care in the management of cardiovascular disease risk factors: a systematic review and meta-analysis of randomized trials. *JAMA Intern Med*, 171(16):1441–1453.
- Santschi V, Chiolerio A, Paradis G et al. (2012). Pharmacist interventions to improve cardiovascular disease risk factors in diabetes: a systematic review and meta-analysis of randomized controlled trials. *Diabetes Care*, 35(12):2706–2717. (<https://www.ncbi.nlm.nih.gov/pubmed/23173140>).
- Santschi V, Chiolerio A, Colosimo AL et al. (2014). Improving blood pressure control through pharmacist interventions: a meta-analysis of randomized controlled trials. *J Am Heart Assoc*, 3(2):e000718.
- Sargent GM, Forrest LE, Parker RM (2012). Nurse delivered lifestyle interventions in primary health care to treat chronic disease risk factors associated with obesity: a systematic review. *Obesity Rev*, 13(12):1148–1171. (<https://www.ncbi.nlm.nih.gov/pubmed/22973970>).
- Schroeder K, Travers J, Smaldone A (2016). Are school nurses an overlooked resource in reducing childhood obesity? a systematic review and meta-analysis. *J School Health*, 86(5):309–321.
- Tappenden P, Campbell F, Rawdin A et al. (2012). The clinical effectiveness and cost-effectiveness of home-based, nurse-led health promotion for older people: a systematic review. *Health Technol Assessment*, 16(20):1–72. (<https://www.ncbi.nlm.nih.gov/pubmed/22490205>).
- Tapsell L, Neale E (2016). The effect of interdisciplinary interventions on risk factors for lifestyle disease: a literature review. *Health Educ Behav*, 43:256–270.
- Van den Broucke S (2017). Strengthening public health capacity through a health promotion lens. *Health Promo Int*, 32(5):763–767.
- van Dillen SME, Hiddink GJ (2014). To what extent do primary care practice nurses act as case managers lifestyle counselling regarding weight management? A systematic review. *BMC Fam Pract*, 15:197. (<https://www.ncbi.nlm.nih.gov/pubmed/25491594>).
- World Health Organization (1986). Ottawa charter for health promotion. *Health Promo*, 1, iii–v.

- World Health Organization (2016). Midterm progress report on implementation of the European Action Plan for Strengthening Public Health Capacities and Services. Copenhagen, WHO Regional Office for Europe.
- World Health Organization / UNICEF (2018). Declaration of Astana. Global Conference on Primary Health Care From Alma-Ata towards universal health coverage and the Sustainable Development Goals Astana, Kazakhstan, 25 and 26 October 2018. (<https://www.who.int/docs/default-source/primary-health/declaration/gcphc-declaration.pdf>, accessed 31 July 2019).