Healthcare Improvement Scotland | SHTG Advice on health technologies

SHTG Assessment
April 2023

An evidence review on multidisciplinary team support in primary care

What were we asked to look at?

The Scottish Health Technologies Group (SHTG) was asked to assess the evidence on the impact of introducing multidisciplinary team (MDT) support in primary care, to work alongside general practitioners (GPs).

Why is this important?

The 2018 general medical services (GMS) contract in Scotland proposed the addition of multidisciplinary primary care staff to GP practices and the community, to work alongside GPs and practice staff to reduce GP workload.[1] Since then there has been ongoing implementation of multidisciplinary working under the GMS contract, with recruitment of an estimated 3,220 new primary care staff. Using this approach allows GPs to retain their role as expert medical generalists and delegate responsibility for certain tasks to other healthcare professionals within the MDT. The introduction of the MDT can help to address the increasing demands on primary healthcare from an ageing population with complex care needs.[2]

What was our approach?

We conducted a review of the published literature on the clinical effectiveness, cost effectiveness, implementation issues and the views of healthcare professionals and patients on MDT working in primary care. We also carried out a primary costing analysis based on data provided by the Scottish Government and Public Health Scotland, available publications and other data sources. More information about SHTG Assessments can be found on our website.

What next?

The Assessment will be provided to the Scottish Government primary care directorate to inform discussions on MDT funding and implementation.

Key findings

Effects of multidisciplinary teams on outcomes for patients

1. An overview of 34 systematic reviews found that interprofessional collaboration in primary care was associated with improvements in clinical measures (HbA1c levels and blood pressure), medication outcomes, process of care outcomes and patient satisfaction. The overview did not provide estimated effect sizes for any outcome.
2. A meta-analysis of 39 studies (published after the overview) reported statistically significant reductions in HbA1c ($p \leq 0.007$), systolic blood pressure ($p < 0.001$) and diastolic blood pressure ($p < 0.001$) for patients receiving interprofessional collaboration based primary care compared with usual care.
3. A retrospective cohort study from the United States (102 family practices, n=113,452 patients) reported that patients from interprofessional collaboration based primary care practices had lower rates of healthcare use, including a significant reduction in the number of primary care appointments, compared with usual care: incidence rate ratio 0.93, 95% confidence interval (CI) 0.92 to 0.94, $p < 0.001$.

Effects of changing the skill mix within GP practices

4. A large mixed methods study in England (6,296 primary care practices) explored the effects of changing the skill mix in primary care practices by one GP, nurse, pharmacist or other direct patient care practitioner.
    - Adding other professions to the skill mix had a limited impact on GP workload, possibly because GPs changed to managing more complex cases and increased their supervisory responsibilities.
    - GPs worked longer hours when there were fewer GPs per 1,000 patients at their practice.
    - GPs reported delegating more tasks when the number of nurses and other direct patient care practitioners increased.
    - An increase in the number of nurses and pharmacists per 1,000 patients was associated with quality improvements in antibiotic prescribing.
5. A systematic review of 77 studies found that addition of healthcare professions to the primary care skill mix was associated with improvements in health markers.
    - Expanding the range of professions in the primary care team was associated with improvements in interim diabetes markers (HbA1c, blood pressure and cholesterol), improvements in self-assessed health status, and reductions in accident and emergency visits.
    - A greater proportion of patients received appropriate tests and services when interprofessional collaborative models of care were applied at their

primary care practice, when multidisciplinary care plans were used and when nursing professionals were added to the primary care team.

Facilitators to implementing MDT working in primary care

6. Multiple systematic reviews outlined similar factors that are associated with successfully implementing MDTs in primary care:
    - clear role boundaries and responsibilities for each healthcare profession
    - good communication including informal chats, team meetings and information technology systems that everyone can access
    - colocation of team members at a single site
    - a shared vision and goals
    - mutual respect and trust between professions and professionals, and
    - a named care coordinator who retains responsibility for a patient's care throughout their care journey.

Healthcare professionals' views and experiences

7. A systematic review and three qualitative studies explored healthcare professionals' views and experiences of MDTs in primary care. Studies included nursing staff, GPs and pharmacists.
    - Overall, healthcare professionals reported positive views and experiences of MDTs in primary care.
    - Most professions recognised that their roles were changing as a result of implementing MDTs in primary care and generally found this to be a positive experience. Changes to the GP role resulted in a greater focus on patients with complex care needs.
    - Concerns were raised about the time impact of supervisory roles on both GPs (the supervisor) and the nurses who were being supervised.
    - While nurses and GPs had similar views on what was important for successful collaboration, they often interpreted these factors differently.
    - MDT working reduced GP workload in some cases, but also raised concerns among GPs about deskilling.
    - Some GPs expressed concern that patients did not always seem to be aware that they had been seen by someone other than their GP.

Patient views and experiences

8. A systematic review, a mixed methods study and an observational study explored patient views and experiences of MDT working in primary care.

- Patient views and experiences of multidisciplinary primary care teams were generally positive.
- Patients described receiving more holistic care with MDTs.
- Patients felt able to access healthcare more quickly and get longer appointments when they had a choice of healthcare professionals.
- Patients viewed care coordination as an important element of multidisciplinary primary care.
- Patients did not always understand the different roles and remits of new healthcare professionals at their practice.
- Patient trust and confidence were reduced if they wanted to see a GP but instead saw a nurse. Communication quality was similarly perceived to be reduced as a result of patients not getting to see the healthcare professional of their choice.

Cost effectiveness

9. Based on a primary costing analysis using data from one health and social care partnership (HSCP), the increase in the national MDT workforce in primary care since 2018 is estimated to have saved 45,729 hours of GP time each week in 2022, equating to an avoided resource cost of approximately £6 million per week. These figures are not equivalent to net savings because they have not been balanced against the time and costs of the employed MDT workforce.
10. The cost analysis contains a number of caveats which affect the robustness of conclusions:
    - MDT staff impact on GP time was based solely on information specific to the composition of the Edinburgh City HSCP
    - more details about the proportion of staff on each Agenda for Change band, their working hours, and turnover rates are required in order to reliably estimate the costs associated with MDT staff nationally
    - insufficient data were available to quantify other cost benefits associated with MDT working in primary care
    - further information is required about the measures of variation needed to scale up the benefits observed in local practice (such as average practice list size, standard deviations and interquartile ranges), and
    - more robust economic evaluations are dependent on the development of routinely collected datasets that can better quantify the overlap in clinical roles and other metrics of collaborative working, as well as supervision and learning curve effects.

Contents

Introduction

The use of MDTs has been proposed as a way to address the increasing demands on primary healthcare arising from an ageing population with complex care needs.[2] In healthcare, 'multidisciplinary team' refers to a group of health and care professionals from two or more disciplines who provide care for the same patient or group of patients.[3] In primary care an MDT can consist of up to 30 professionals, each contributing to the holistic care of individual patients.

The 2018 GMS contract in Scotland proposed the addition of multidisciplinary primary care staff to GP practices to work alongside GPs.[1] Since then, implementation of MDT working under the GMS contract has seen the recruitment of an estimated 3,220 new primary care staff. Under the new way of working, GPs retain their role as expert medical generalists and delegate responsibility for certain tasks to other healthcare professionals. For example, clinical pharmacists could take responsibility for acute and repeat prescribing, and oversee medication and polypharmacy reviews. The introduction of MDTs in primary care should also reduce the amount of time GPs spend on managing minor health issues and completing administrative tasks, allowing them to devote more time to the care of patients with complex care needs.[4]

Research questions

1. What is the evidence on the effectiveness and cost effectiveness of multidisciplinary primary care teams supporting general practitioners?
2. What is the evidence on successfully implementing multidisciplinary team working in primary care?
3. What are patient and healthcare professionals' views on multidisciplinary primary care teams supporting general practitioners?

Literature search

A systematic search of the secondary and primary literature was carried out between 16 and 18 November 2022 using the Medline, Medline in process and Health Management and Policy (HMIC) databases. Key websites were searched for grey literature.

Results were limited to studies published since 2000 in the English language. No study design limits were applied.

Concepts used in all searches included: primary care, multidisciplinary teams, interprofessional collaboration, general practice or practitioners and multidisciplinary care.

A full list of resources searched is presented in *Appendix 2*.

Clinical effectiveness

Effects of MDT on clinical outcomes and healthcare use

A narrative overview of systematic reviews, based on a robust methodology, assessed the effectiveness of interprofessional collaboration (IPC) in primary care.[2] The authors defined IPC as 'an ongoing partnership and/or interaction between at least two healthcare professionals from different backgrounds working together to improve patients' care.'[2] This is consistent with definitions of MDTs. The overview of systematic reviews considered IPC within a primary care setting, and between primary care professionals and professionals working in other settings, such as public health, mental health or care homes. Results for IPC that involved mental health care providers or professionals working in care homes were not included in our rapid review. Systematic reviews were identified in a comprehensive literature search of nine databases, as well as reference lists from included studies. Relevant systematic reviews were included in the overview regardless of their quality or the type of primary studies they included. The authors of the overview assessed the quality of systematic reviews using the ROBIS (risk of bias assessment in systematic reviews) tool. Risk of bias was rated by the overview authors as being low for 14 reviews, high for 16 reviews and unclear for four reviews. Results from the systematic reviews in the overview were grouped into six categories: clinical measures, medication outcomes, healthcare use, processes of care, patient satisfaction, and quality of life, functioning and other patient reported outcome measures (PROMs).

Thirty-four reviews were included in the overview; seventeen of them considered IPC within primary care or collaboration between primary care physicians (PCP) and nurse practitioners, specialty care professionals or pharmacists. The authors of the overview found minimal overlap in primary studies between the systematic reviews, which minimises the risk of interpretation bias caused by the same primary study being included in several reviews. Thirty-one reviews reported clinical measures, 20 reported PROMs, 14 reported medication outcomes, 12 reported processes of care, 12 reported patient satisfaction and 11 reported healthcare use. A summary of the number of systematic reviews supporting the findings in each outcome category is presented in *Table 1*.

Table 1: Summary of the number of systematic reviews supporting the findings in each outcome category in an overview of IPC in primary care[2]

Outcomes category	Improved outcomes*	Mixed results**	No change in outcomes***
IPC in primary care, eight systematic reviews			
Clinical	3	5	0
Medication	1	1	0
Healthcare use	1	4	0
Processes of care	3	0	0
PROMs (eg quality of life, functioning)	3	4	0
Patient satisfaction	5	0	0
PCP-nurse practitioner collaboration, one systematic review			
Clinical	0	1	0
Processes of care	1	0	0
PROMs (eg quality of life, functioning)	0	1	0
PCP-specialist care provider collaboration, five systematic reviews			
Clinical	1	3	0
Medication	1	1	0
Healthcare use	1	3	0
Processes of care	1	2	0
PROMs (eg quality of life, functioning)	0	4	0
Patient satisfaction	1	2	0
PCP-pharmacist collaboration, three systematic reviews			
Clinical	1	0	1
Medication	0	1	1
Healthcare use	0	0	1
Processes of care	0	1	0
PROMs (eg quality of life, functioning)	0	0	2

*Improvement in outcomes = a review reports improvements in all outcomes from any category

**Mixed results for outcomes = a review reports mixed findings (for example, improvement of one outcome but no change or worsening effect in another) between primary studies reporting the same outcome or between different outcomes in a given category

***No change in outcomes = a review reports no change in the outcomes from a category of outcomes.

The majority of reviews in the overview reported improvements in clinical measures, medication or process of care outcomes, and patient satisfaction, across IPC based primary care. Evidence on PCP collaboration with specialty care providers (normally professionals from secondary care) was mixed for all outcomes.

Effects on clinical measures:

In two reviews, IPC in primary care was associated with improvements in clinical measures of health such as reductions in HbA1c, blood pressure and body mass index in patients with diabetes. A third review found an association between IPC and reductions in blood pressure in patients with primary hypertension. In this review, the improvement in blood pressure outcomes were greater if the additional team member (a pharmacist or nurse) was able to make or propose changes to medications, compared with providing only adherence support and information on medications and hypertension.

Five reviews reported mixed results for the effects of IPC within primary care, that is, either primary studies in a review reported different results, or reviews reporting the same outcomes reached different conclusions. A single review focusing on PCP collaboration with nurse practitioners found IPC significantly increased the use of recommended care guidelines (for example, vaccinations for patients with chronic diseases), discussion of medication side effects and monitoring of diabetes control. A review exploring PCP collaboration with pharmacists as part of an MDT found statistically and clinically significant improvements in HbA1c and systolic blood pressure in patients with type II diabetes. A second review found no association between the degree of pharmacist involvement in IPC and improvements in health outcomes, except when results were stratified by type of pharmacy service, in which case a positive association was found for patient centered IPC services, such as polypharmacy.

Effects on patient satisfaction and PROMs:

For IPC in primary care, improvements in quality of life, functioning or other PROMs such as self-care, lifestyle or functional decline, were reported in three reviews. Four reviews reported mixed results for these outcomes. Five reviews reported improvements in patient satisfaction. Collaboration between PCPs and secondary care specialists was associated with greater patient satisfaction and improved processes of care in one systematic review, but two other reviews reported mixed results.

Effects on care processes:

Three reviews on IPC in primary care described positive effects of IPC on care processes, such as easier access to care or better provision of recommended tests. One systematic

review exploring potential organisational benefits of IPC in primary care reported better use of resources and access to services, shorter waiting times and increased comprehensive patient care with IPC compared with care provided by a single profession. Two reviews found that IPC models that involved individual care planning reported a greater number of favourable outcomes and greater effect sizes compared with other collaborative models.

A systematic review and meta-analysis published after the overview described above, compared IPC based primary care, involving three or more healthcare professionals, with usual care and controls in patients with diabetes, hypertension or both.[5] The systematic review and meta-analysis were based on a robust literature search that included ongoing trials. Fifty studies were included in the systematic review and 39 were used in the meta-analysis (11 studies did not present sufficient data to calculate a standardised mean difference (SMD) for the meta-analysis). Fifteen of the studies in the meta-analysis were randomised controlled trials (RCTs), seven were prospective cohort studies, one was a retrospective cohort study and 16 were pre-post studies. The meta-analysis authors used tools from the Cochrane Effective Practice and Organisation of Care group to assess risk of bias in included studies. Overall, RCTs had a low risk of bias for most factors, except for blinding or allocation. The non-RCT studies had high risk of bias from lack of randomisation and unclear risk of bias relating to levels of dropout and blinding.

The meta-analysis produced effect size estimates for the association between IPC in primary care and improvements in HbA1c levels, systolic blood pressure (BP) and diastolic BP in patients with diabetes, hypertension or both (*Table 2*). The meta-analysis results were consistent with the findings of the overview of reviews: IPC based care was associated with significant reductions in patient HbA1c levels and moderate reductions in patients' systolic and diastolic BP. For most outcomes the effect size was classed as moderate by the meta-analysis authors. There was considerable heterogeneity in the meta-analysis (measured by the I^2 statistic[*]),[6] which the systematic review authors noted could be caused by variations in sample size, population and setting, or by potentially significant publication bias. Because of the high heterogeneity, the results of this meta-analysis (*Table 2*) should be interpreted with caution.

[*] I^2 describes the percentage of the variability in effect estimates in a meta-analysis that is due to heterogeneity rather than chance. A rough guide to interpretation of I^2 in the context of meta-analysis is as follows:

- 0% to 40%: might not be important
- 30% to 60%: may represent moderate heterogeneity
- 50% to 90%: may represent substantial heterogeneity
- 75% to 100%: considerable heterogeneity

Table 2: Results from a meta-analysis comparing IPC based primary care with usual care and controls[5]

Outcome	n patients (n studies)	IPC vs. usual care/controls Standardised mean difference* (95% CI)	p value	I^2 (%)**
HbA1c <8.0	6,799 (12)	-0.13 (-0.20 to -0.06)	0.001	42.9
HbA1c ≥8 to <9	4,023 (10)	-0.24 (-0.39 to -0.08)	0.007	75.9
HbA1c ≥9	1,777 (12)	-0.60 (-0.80 to -0.40)	<0.001	81.5
Systolic BP	35,678 (25)	-0.31 (-0.46 to -0.17)	<0.001	95.4
Diastolic BP	35,656 (24)	-0.28 (-0.42 to -0.14)	<0.001	97.2

*In this table, a negative standardised mean difference indicates that the results favour IPC
**See footnote on previous page (page 10)
CI = confidence interval

A well reported retrospective cohort study compared the effect of IPC based care with traditional physician based care on healthcare use in the United States (US).[7] This study was included in the systematic review reported above, and may have been included in the reviews in the overview. It is included here because it reported the impact of IPC in primary care on healthcare use, including PCP visits, which is an outcome of interest that was not reported in the secondary literature. A total of 102 primary care practices, caring for 113,452 patients, were classified as either IPC based care (n=27) or traditional physician based care (n=75). The analyses were adjusted based on patient demographic characteristics, patient comorbidities (Charleson Comorbidity Index), geographical region of care, type of insurance, and number of healthcare interactions in the year prior to implementing IPC care. As shown in *Table 3*, patients receiving care in IPC practices had lower rates of healthcare use, including a statistically significant reduction in the number of primary care visits.

Table 3: Healthcare use by patients receiving IPC based primary care compared with traditional physician based primary care[7]

Service use measure	IPC vs. traditional physician care Incidence rate ratio (95% CI)	p value
PCP visits	0.93 (0.92 to 0.94)	<0.001
Hospital admissions	0.89 (0.85 to 0.94)	<0.001
Emergency department visits	0.77 (0.74 to 0.80)	<0.001
Specialty visits	0.98 (0.97 to 0.99)	0.02 (NS)
Urgent care visits	0.99 (0.97 to 1.02)	0.7 (NS)

NS = not statistically significant. In this study, adjustment for multiple comparisons meant the p value was only statistically significant at 0.008 or less.

Effects of changing the skill mix in primary care

A large, well conducted, mixed methods study assessed the impact of changing the skill mix in primary care practices in England.[8] The changes included the addition of clinical pharmacists, physician associates, paramedics and physiotherapists, to GP practices. Data used in the analysis included national datasets (2015–2019), an online survey of practice managers (2019), qualitative data from five GP practice case studies (2019) and patient surveys, focus groups and interviews (2019). The case studies deliberately collected data from practices with a range of health professions. Usable data for the analysis of effects on skill mix change on outcomes were available from 6,296 primary care practices. In the analysis, staff were grouped into three categories: GPs, nurses and other practitioners providing direct patient care (DPC) such as clinical pharmacists, physiotherapists and physician associates. *Table 4* summarises the average effect of an increase of one fulltime equivalent (FTE) member of staff in each category per 1,000 patients on outcome measures at a median sized primary care practice. For example, patient satisfaction with making an appointment increased by 0.008 for every GP added to a primary care practice team.

When the number of GPs at a practice increased, there was a shorter time period between patients seeing a GP. Practices with more nurses saw an increase in the time period between patient GP appointments; this suggests that nurses had taken responsibility for seeing some patients in place of the GP. While this improved timely patient access to appointments at the practice, there was a suggestion it did not necessarily reduce GP workload since many GPs took on a supervisory role for other healthcare practitioners. In terms of secondary care use, an increase of one GP per 1,000 patients was associated with a 61.3% reduction in accident and emergency (A&E) attendances, indicating many patients sought advice from their GP rather than risk a long wait in A&E. The number of patients admitted to hospital increased with an increase in GPs (0.411 admissions for every one extra GP) or nurses (0.601 admissions for every extra nurse). This may reflect the ability of GPs and some nurses to refer patients directly to the relevant department at the hospital.

A higher proportion of patients reported having a very good or fairly good experience making an appointment at practices with more GP FTEs per 1,000 patients. Patient satisfaction with their experience attending the general practice increased by 0.8% for an increase of one FTE GP per 1,000 patients. Patient satisfaction decreased by the same amount for an increase of one FTE DPC practitioner.

The study used the ratio of broad to narrow spectrum antibiotic prescribing as a surrogate for quality of prescribing. With the increase in antibiotic resistance, prescribing of narrow spectrum antibiotics is generally preferred. An increase in the number of nurses in a practice was associated with the greatest reductions in the ratio of broad to narrow spectrum antibiotics prescribing. Increasing numbers of clinical pharmacists were also associated with a lower ratio of broad to narrow spectrum antibiotics prescribing. Increasing the number of

clinical pharmacists was associated with the greatest reduction in the total number of antibiotics prescribed (ASTRO-PU in *Table 4*).

There was a significant increase in GP job satisfaction associated with an increase in the number of GP FTE per 1,000 patients at their practice (0.49 increase in satisfaction score for one GP FTE increase per 1,000 patients), but no difference in GP job satisfaction with increases in FTE nurses or other DPC practitioners. GPs reported working longer hours when there were fewer GP FTE per 1,000 patients at their practice. Employment of more FTE nurses and other DPC practitioners had a limited impact on the workload of GPs, possibly because of the increase in supervisory responsibilities for GPs as a result of employing more nurses and DPC practitioners. GPs did report being able to delegate more tasks with increasing FTE of nurses and DPC practitioners in their practice.

Table 4: Change in outcomes at a median primary care practice for an increase of one FTE per 1,000 patients in each staff category[8]

Outcome	Staff category				
	GP	Nurse	DPC (includes pharmacist)	DPC only	Pharmacist only
	For a 1 unit increase in staff in each category, the outcome changes by:				
Patient satisfaction scores (making appointments)	0.008	-0.013	-0.010		
Patient satisfaction scores (general practice)	0.008	-0.007	-0.008		
Percentage of broad to narrow spectrum antibiotic prescribing	0.021	0.009	-	-0.005	-0.173
Total items prescribed per ASTRO-PU*	0.000	0.002	-	0.002	-0.007
A&E attendances	-0.613	0.1113	2.290		
Hospital admissions	0.411	0.601	-0.130		
Outpatient attendances	12.951	-11.249	-12.214		
Time (months) since last saw a GP	-0.051	0.087	0.022		
Time (months) since last saw a nurse	0.077	-0.244	-0.126		
GP job satisfaction score	0.049	-0.018	-0.060		

GP working hours per week	-0.037	0.401	0.007		
GP task delegation	-0.603	1.144	1.652		

DPC = direct patient care; A&E = accident and emergency

*Astro-PUs are used to weight prescribing information to allow people to compare prescribing in different practices based on individual practice populations. The weighting is applied based on the practice populations for age, sex and patients aged 65.

A systematic review with narrative synthesis explored the influence of IPC team characteristics, including the professional skill mix, on team processes and goals in publicly funded primary care systems (Australia, Canada, New Zealand, United Kingdom).[9] Studies that focused on general primary health care and care of patients with diabetes, asthma, ischaemic heart disease, hypertension and multimorbidity were selected for inclusion as they represent the most common conditions encountered in primary care. Studies that used quantitative methods, qualitative methods or mixed methods were included in the review. The review authors assessed the quality of the included studies using the mixed methods appraisal tool (MMAT) which gives each study a quality rating on a four point scale. Higher scores indicate that the studies were higher quality and met more of the appraisal criteria. Seventy-seven studies were included in the review; most scored three or four points on the MMAT appraisal and used qualitative methods (38 studies).

Involving a wider range of healthcare professions in primary care delivery was associated with offering a broader range of services for patients. For example, the addition of clinical pharmacists, occupational therapists, physiotherapists, dietitians, podiatrists and diabetes educators, increased the breadth of primary care services offered to patients with diabetes. A greater proportion of patients received appropriate tests and services when IPC models of care were applied at their primary care practice, when multidisciplinary care plans were used, and when nursing professionals were added to the primary care team. Appropriate use of medications was improved by the addition of a pharmacist to primary care practice in one study, but another study found no impact. Introducing an IPC model in primary care was also associated with reductions in healthcare use, such as avoiding A&E visits as a result of diabetes complications and reductions in hospital admissions.

In general, the addition of health professions to primary care was associated with improvements in health markers. For example, addition of a pharmacist, nurse practitioner or nurse to a primary care practice was associated with improvements in interim diabetes markers such as HbA1c, BP and cholesterol. Expanding the primary care team was also associated with improvements in self-assessed health status, an increase in older patients being able to stay in their own homes, and reductions in A&E visits. These findings were not universal and several studies did not find any changes to specific health outcomes following expansion of the primary care team.

Implementing MDT in primary care

An overview of systematic reviews, based on a robust methodology, explored the barriers and facilitators to IPC in primary care.[10] The overview considered IPC within a primary care setting, and between primary care and professionals in another care sector, such as public health, mental health or care homes. The authors of the overview stated it was not possible to differentiate between barriers and facilitators to implementing IPC versus barriers and facilitators to practicing IPC, therefore the barriers and facilitators described below apply to both. Systematic reviews were identified in a literature search that covered nine databases. All systematic reviews were eligible for inclusion in the overview, regardless of their quality or the type of primary studies they included. The authors of the overview assessed the quality of included systematic reviews using the ROBIS appraisal tool. The risk of bias was low for 11 reviews, high for 15 reviews and unclear for three reviews.

Twenty-nine systematic reviews with minimal overlap of included studies were incorporated into the overview. The low overlap of included studies reduces the risk of interpretation bias caused by the same primary study being included in several reviews. Twenty reviews included mixed method studies, six used qualitative studies and three incorporated quantitative studies. The authors of the overview grouped the barriers and facilitators reported in the systematic reviews into four categories: system, organisation, inter-individual and individual. Twenty-two barriers and 20 facilitators to IPC in primary care were identified (*Table 5*). The most frequently cited barriers were:

- lack of long term funding
- lack of time, training and leadership for healthcare professionals in IPC teams
- lack of clear role boundaries and responsibilities
- poor communication
- concerns about losing their professional identity and power dynamics caused by traditional hierarchies among healthcare professionals, and
- doubts about the benefits of IPC and resistance to change.

The most frequently reported facilitators were:

- available funding and supportive policies (at local and national levels)
- reorganising primary care practices and team structure
- colocation of teams of professionals at one site
- training and availability of sufficient human resources
- good communication

- respect for each other and cohesion between healthcare professionals, and
- a positive attitude towards IPC.

Table 5: Facilitators and barriers to IPC in primary care[10]

Barriers	N reviews*	Facilitators	N reviews*
System level			
Financial constraints, such as a lack of long term funding	8	Available funding and financial resources	11
Lack of political support or the presence of unfavourable policies (that may limit expansion of professional roles)	5	Supportive policies, systems and government	10
No multidisciplinary approaches to care are taught in healthcare education	4	Offering incentives and compensation (may not apply in publicly funded healthcare systems)	7
Fragmentation of patient care from seeing different healthcare professionals	3	Healthcare education teaching IPC as part of the curriculum	4
Organisation level			
Human resource limitations (lack of time, lack of healthcare professionals to fill roles) leading to increased workloads	19	Reorganising primary care practices and team structures	21
Lack of training in implementing or participating in IPC based primary care	16	Tools to support care processes, such as care plans, referrals systems and guidelines	20
Lack of organisational support and leadership for IPC	9	Colocation and facilitated access to other healthcare professionals in primary care	20
Inefficient or no shared IT systems	7	Professional education and training in implementing and participating in IPC	19
Lack of access to other healthcare professionals and lack of colocation	7	Sufficient human resources to support manageable workloads for all professionals involved in IPC	18

Inefficient organisation of processes etc. (including referral systems)	5	Tools for team communication, such as feedback sessions and team meetings	17
		Effective leadership, team leaders or a lead professional	15
		Accessible management systems and organisational support	12
		Audits, evaluations and visibility of the positive results of IPC in primary care	8
Inter-individual level			
Lack of clarity regarding role boundaries and responsibilities for each profession	16	Good quality communication, including communication systems and informal communication	21
Poor communication between team members	15	Appreciating and valuing other professionals for what they can bring to the team	20
Desire to protect personal territory or professional identity	14	Creating team cohesion through, for example, team building exercises	19
Imbalance of power caused by traditional hierarchies between disciplines	10	Defining roles and tasks, sharing power	18
Lack of appreciation of other professional contributions or skills	10		
Lack of common goals	7		
Different cultures, ideologies and work styles between professions	6		
Lack of team cohesion	3		
Individual level			
Doubts regarding the benefits of IPC	9	Positive attitudes, commitment and interest in IPC	13

Resistance to change (too burdensome, lack motivation)	4	Perceived benefits to patients and professionals, and positive expectations	5
Concerns about patient confidentiality	4	Prior experience of collaboration with other healthcare professionals	5

*number of systematic reviews citing each barrier or facilitator. Reviews could cite more than one barrier and facilitator.

A moderate quality scoping review of the primary literature, published after the overview of systematic reviews, reached similar conclusions.[11] The scoping review was based on a literature search of three databases but did not assess the quality of the included studies. Studies included in the scoping review used a variety of methods including qualitative, quantitative, mixed methods and literature review methods.

Five themes were identified as being essential for successful IPC in primary care:

- acceptance and team readiness for collaboration (21 studies)
- acting as a team rather than an individual (26 studies)
- coordination within primary care (20 studies)
- communication strategies and shared decision making (16 studies), and
- integration of caregivers and their skills and competences (16 studies).

A literature review published in the grey literature in 2018 identified factors that were associated with successful MDT working in healthcare.[12] The results should be interpreted with caution as very little information is provided about how this review was conducted.

Six features of successful MDT working in the community setting were identified:

- being collocated in general practices that included both generalists and specialists
- focusing on case management and providing patient support in their home
- joint care planning and coordinated needs assessment
- having a named care coordinator who retains responsibility for patient care throughout their care journey, and
- sharing clinical records across the MDT.

A report based on a workshop for healthcare professionals working in general practice in the UK sought to explore practical and cultural factors affecting successful implementation of MDT in primary care that involved pharmacists.[13] Feedback from the workshop participants highlighted a strong belief that MDT working in general practice improved

quality and access to care for patients, added value to healthcare delivery and had system wide benefits for the NHS. The enablers identified aligned with the findings from the secondary literature.

Healthcare professionals' views and experiences

A systematic review explored the views and experiences of nurse practitioners (NP) and medical practitioners (MP) on collaborative working in primary care.[14] The review authors summarised the findings of the included studies without attempting any further interpretation of individual study results, with the exception of a thematic analysis to identify key themes in the literature. Thirty articles, reporting on 27 studies that used qualitative, quantitative or mixed methods, were included. The studies collectively involved 1,641 MP and 380 NP. The authors assessed the quality of included studies using a range of study design specific appraisal tools, such as the Joanna Briggs Institute qualitative assessment research instrument. The review authors considered the overall quality of included studies to be moderate. One qualitative study was excluded from the review for not reporting any participant quotes to demonstrate the credibility of their results. Thirteen survey studies had low response rates and lacked representative samples. Two mixed methods studies used convenience samples for the quantitative element of their research.

The systematic review reported overall agreement between NP and MP on elements important for successful collaborative working, but also described differences in their understanding of the meaning of some facets of collaboration (*Table 6*). The views of MP on collaboration with NP were more favourable when the individual had experience of working in such a collaboration. Medical practitioners rarely saw NP as autonomous health professionals, instead perceiving an NP to only by truly autonomous when they did not need to consult an MP on any aspect of a patient's care. The perception of NP was that the supervisory role assumed by many MP in IPC resulted in a hierarchical working relationship and not an equal collaboration. Medical practitioners expressed concerns about collaborating with NP, including an increased workload caused by new supervisory responsibilities, an increased workload for the MP because their caseload was filled with patients with complex care needs and MP deskilling in tasks taken on by the NP.

Table 6: Comparison of NP and MP perceptions of collaborative working in primary care[14]

Dimension of comparison	NP views	MP views	Views common to both
Important elements of collaboration	Respect as a fellow health professional; a reciprocal relationship	Complementary practice styles; shared vision and goals	Working together; consultations between professionals; trust and mutual respect; communication; competence; care coordination; NP autonomy; a shared philosophy
Sharing	Exchange of knowledge and ideas about patient management	Shared offices; shared patients	
Working together	Reciprocal discussions about patients	Providing advice to NPs	
Practice reality	Collaboration can be hierarchical and one sided; collaboration only initiated by NPs	Collaboration can be interdependent or hierarchical	Perceived level of communication is high; perceived level of collaboration is collegial
Competence	Defined by MP; pressure to demonstrate competence	Important for NP to recognise their limits	
Autonomy	NP is autonomous health professional; NP has full responsibility for patient care; consultations with MP as required	NP is an assistant; limited autonomy of NPs; NP is autonomous only when no MP consultation is required	
Supervision	Some NPs valued MP input, others felt controlled through supervision	MPs prefer that NP practice under their supervision for complex cases	MP is available on site for NP consultation

Three primary qualitative studies, not included in the systematic review, sought the views and experiences of healthcare professionals on working in MDT in primary care in the UK.[15-17]

The most recent qualitative study explored GP's understanding of MDT working in primary care.[16] A purposive sample of GPs working at practices from a single Care Commissioning Group in England, were invited to participate. Participants were interviewed by telephone using a predefined set of open questions. The interviewers (study authors) were GPs working in the same practices as the study participants, which may have biased the interpretation of interview responses. Of 12 potential participants, six GPs agreed to be interviewed (50% recruitment rate). Five of the six participants were female and interviews lasted an average of 24 minutes (range 16 to 29 minutes). All but one participant fell in to the 40 to 50 years old age bracket; one was slightly younger. These participant characteristics were broadly representative of the local GP population.

All six of the study participants felt that GP roles had changed and would continue to change, and some felt that they had lost face to face time with patients because of these changes. They described how their role was expanding to include supervision of other professionals within the MDT. They felt that their changing role and increasing supervisory duties were a source of stress and extra responsibility. Interviewees felt that their role in an MDT was as a leader, but acknowledged they could also learn from other professionals within the MDT. A few respondents felt they had lost control, particularly over patient related decision making, because of introducing MDT working. Participating GPs acknowledged that MDT working had been beneficial for patients and primary care practices, including being able to share roles and delegate responsibility to other members of the team. The study participants reported communication issues when MDT were dealing with the care of patients with complex care needs that involved multiple agencies. Other perceived constraints on MDT working included a lack of technology or systems to support team working, time pressures on staff and staff shortages or mobility between organisations. Two participants commented on their personal reluctance to change from traditional methods of working in primary care.

The second qualitative study explored stakeholders views on the integration of pharmacists into primary care practices in London.[17] Stakeholder groups included GPs, practice managers, nurses, pharmacy staff, receptionists and patients. Semi structured interviews, based on in depth guides, were conducted face to face in the GP practices. Forty-seven stakeholders took part in interviews lasting between 15 and 45 minutes. Nine patients agreed to be interviewed.

Participants discussed the complementary nature of the roles and skills of individuals working in an MDT and the contribution those pharmacists had made. These contributions included decreasing the workload of GPs when pharmacists had appointments with patients

instead of the GP. All GPs interviewed (n=7) in this study reported that the introduction of pharmacists to their practice had reduced GP involvement in medication management, facilitated more appropriate use of GP skills and allowed GPs to increase their patient facing activity.

Participants discussed the need for suitable educational training and a clear understanding within the MDT of each profession's role and competencies. Primary care practice staff reported increased understanding of the role of pharmacists in patient care and the pharmacy team described increased job satisfaction as a result of their expanded roles. Two GPs and a nurse expressed concerns about the potential for deskilling in medication prescribing or for disruptions in continuity of patient care to occur as a result of introducing pharmacists to the MDT. Introducing pharmacists to GP practices encountered initial hurdles around developing trust in each other. Both GPs and pharmacists stated they trusted each other, but agreed that it had taken time to build that trust. A few study participants felt that GPs initially exhibited a lack of trust and engagement with pharmacists, but that this had been resolved over time. Communication was raised as a source of concern among stakeholders and a strong preference was expressed for having pharmacists colocated within GP practices to allow for informal discussions between the professions.

Patients who were interviewed about the introduction of pharmacists to primary care MDT discussed the benefits of having timely access to pharmacists, with appointments available more quickly than GP appointments. Many patients were happy to have repeat appointments with a pharmacist, especially since they were offered longer appointments than with GPs. Some patients were unaware that the person they had an appointment with was a pharmacist and not a GP, which caused concern among GPs interviewed in this study.

A focus group study from the Republic of Ireland sought community nurses' views on working in an MDT.[15] Four focus groups were conducted, involving public health nurses, community registered general nurses, practice nurses and community mental health nurses. These groups represented almost all of the nurses working in the study area. Each focus group consisted of four to eight participants from a mix of rural and urban primary care teams. A discussion guide was used to stimulate conversation in the focus groups. Transcripts of the focus groups underwent thematic analysis.

Overall, the study participants (n=22) felt that being part of an MDT was a positive experience, especially if the team was collocated. Participants acknowledged that it had taken time for the members of an MDT to bond and learn to work well together. Impediments to forming a successful MDT were identified as nurses needing to adapt to new management structures and ineffective team building exercises. Provision of effective team building programmes was felt to improve understanding of other professionals' roles and improve team formation. Interdisciplinary relationships varied between teams, but nurses generally felt they integrated well into MDT consisting of other healthcare

disciplines. This integration of nurses into an MDT had resulted in improved patient referral processes within the team. Study participants all agreed that the role of nurses in primary care teams had expanded but had concerns about how the MDT affected their traditional way of working, where they were expected to cover a specific geographical area, rather than patients registered with a particular GP.

Patients' views and experiences

A systematic review explored how patients with chronic conditions experienced IPC based care in a primary care setting.[18] Studies of any design, published in any language and any year, were included in the review. Six included studies were translated from languages other than English. The review authors assessed the quality of included studies using the MMAT appraisal tool. The quality of included studies varied but was considered relatively low overall. This should be taken into account when interpreting the results reported. The results of the included studies were analysed thematically as part of a metasynthesis. Forty-eight studies (n=3,803 patients, carers or family members) were included in the metasynthesis: 34 qualitative, six quantitative and seven mixed methods studies. The chronic conditions experience by the patients in the included studies were diabetes, mental health, chronic pain, cardiovascular disease and a range of other conditions or multimorbidities.

Patients described how IPC had widened their care networks to include health professionals other than their GP. They felt that this widening of their network allowed gaps in traditional or usual care to be filled by other professionals in the team. Patients felt part of a more collaborative approach to managing and overcoming challenges associated with living with a chronic condition. Participants described experiencing more holistic care through IPC that covered their physical, mental, social and spiritual wellbeing. They felt like they were treated as both a patient and a person in IPC based care. A few patients felt that, despite IPC, their care was still diagnosis focused and did not address their wider care needs.

Study participants found IPC based care to be a positive experience and willingly engaged with teams they described as supportive and trustworthy. This increased sense of connection with healthcare professionals occurred through a range of communication modes including face to face appointments, telephone calls and emails. Patients particularly appreciated the greater access to healthcare professionals possible with IPC based care, for example when they had a question but did not feel it required an appointment. It was the perception of patients that IPC provided by colocated health professionals better reflected team based care and improved communication, teamwork and service accessibility. Longer appointments with healthcare professionals other than GPs meant patients felt listened to and more able to communicate their problem. GPs were viewed as being time poor and

unable to provide the same depth of conversation that other health professionals, such as nurses, offered.

Formal, team based care planning provided structure to patient care in IPC practices and led to positive care experiences among patients. Patients' care experience was particularly positive when care plans reflected their personal goals and care needs. It should be noted that not all experiences of care plans were positive, particularly among patients with mental health conditions. A central care coordinator was viewed as an essential element of effective IPC from a patient perspective. The benefits of a care coordinator were described as having a key contact person, a central location for medical information and notes to be held, and having someone to guide patients through their care when they were unable to do so themselves. Some patients expressed a preference for their GP to take on the care coordinator role because they perceived the GP to be the most knowledgeable healthcare professional.

Two observational studies, not included in the systematic review, further explored patient views and experiences of MDT in primary care.[4, 8] The mixed methods study described in the *effect of changing the skill mix in primary care* section of this report also explored patient views on the impact of changes in the skill mix.[8] The study conducted a survey of 125 patients, and focus groups involving another 29 patients, at one GP practice. Half of the survey respondents (63/126) had consulted a healthcare practitioner other than the GP. The majority of patients felt that all their concerns had been dealt with (82%), that they had probably seen the right healthcare practitioner (94%) and that they had seen the type of practitioner they wanted (77%). The majority of patients (65/125) also felt that they received better care when they were always, or mostly, seen by the same healthcare practitioner. The survey showed that patients often had a limited understanding of new healthcare practitioner types, role and remit. Sixty-seven percent (84/125) of survey respondents did not know how to find out about the types of problems or conditions dealt with by each healthcare profession.

Participants in focus groups in the mixed methods study (n=29) felt that it was easier to get appointments at their GP practice because of the increased range of healthcare professionals available. Focus group participants also expressed the view that waiting times were only reduced if patients were willing to accept an appointment with healthcare professionals other than their GP. Patients felt that navigating the new online and telephone triage systems to access an appointment with a member of the MDT at their GP practice was more difficult than the old system. Participants also expressed concern about the need to disclose their medical problems to receptionists in the new booking system and questioned the robustness of the training or the level of expertise of the receptionists. Once a patient had experienced a consultation with a new type of healthcare professional, they were more likely to report being happy with non-GP appointments. This was perhaps a result of the perception that non-GPs could provide longer appointments and more holistic

care. Concern was noted that for some patients, particularly the elderly, the increased diversity of healthcare professionals in primary care practice could disrupt long established relationships between a patient and their GP.

The second observational study used responses from the English General Practice Patient Survey (GPPS) to explore the effects of patients not being able to get an appointment with their choice of GP or nurse (potentially because of the changing skill mix in primary care).[4] Data from the 2013–2014 GPPS mail survey were used in the analysis. Data were used to assess the effect that getting a different appointment type to the one requested had on patient confidence and trust in the healthcare professional seen, and on patient reported communication quality. Patient reported confidence and trust were assessed based on responses to a single question in the GPPS that covers this concept. Patient reported communication was assessed using the five relevant items in the survey. The analyses were adjusted for GP practice, patient age, gender, ethnicity, confidence in managing own health, the presence of long standing health conditions and deprivation. The study authors considered the survey response rate (34%, n=870,085) to be comparable with other national surveys.

The majority of survey respondents got an appointment with the healthcare professional of their choice: 96% of people who wanted to see or speak to a GP and 93% of people asking to see or speak to a nurse. Patient reported trust and confidence was lowest for patients who had asked to see a GP or speak to a GP but instead saw or spoke to a nurse: adjusted mean difference (compared with patients who asked to see a nurse and did so) -15.8 points, 95% CI -17.6 to -14.0 and -13.5 points, 95% CI -15.9 to -11.0, respectively. The lowest patient reported communication quality scores were for patients who wanted to see a GP but spoke to a nurse: adjusted mean difference -10.5, 95% CI -11.7 to -9.3. These results represent substantial differences in GPPS scores since the measurement scale is from zero to 100. Patient experience scores on the GPPS were also lower when they asked to see a health professional (either a GP or nurse) face to face but were instead given a telephone consultation.

Cost effectiveness

Available publications and datasets

Three of the studies reviewed in the clinical effectiveness section contained information (such as cost data) to support an economic analysis on MDT in primary care.[2, 7-9] One mixed methods study specifically reported relevant patient outcome data in an NHS setting.[8] Findings from the mixed methods study (based on the information contained in *Table 4*) are summarised below.

- A larger number of clinical pharmacist FTE per 1,000 patients was associated with a lower ratio of broad to narrow spectrum antibiotics being prescribed, fewer total antibiotics prescribed and lower average costs per item. The study authors used lower usage of broad spectrum antibiotics to indicate high quality prescribing. GP numbers had no effect on these prescribing outcomes/costs.
- Increasing the number of FTE nurses per 1,000 patients contributed to reductions in the prescription ratio for broad to narrow spectrum antibiotics.
- Increases in the number of nurses and other DPC practitioners (not clinical pharmacists) increased the number of items prescribed, although for these staff groups there were reductions in prescribing costs.
- An increase in the number of FTE GPs was associated with a reduction in A&E attendances. Where the number of FTE GPs or nurses increased, there were more hospital admissions (emergency and elective).
- Increased numbers of DPC practitioners were associated with higher levels of A&E attendance and lower hospital admissions.
- For outpatient appointments, referrals were higher in practices with higher numbers of FTE GPs, whereas practices with higher numbers of FTE nurses and other DPC practitioners had lower outpatient attendance.
- An increase in the number of FTE nurses reduced the time since patients last saw a nurse and increased the time since patients last saw a GP.

The study authors noted the complex effects of new ways of working on practices where the skill mix has changed.[8] For example, the cost of prescribed antibiotics was lower in practices with more FTE nurses and other DPC practitioners even though the prescribing volume was higher. This could reflect unmet patient needs identified by these healthcare professionals, improvements in chronic disease management or non-prescribing staff seeking support from GPs and other prescribers. Prescriptions reviewed by GPs or other prescribers may be subject to less scrutiny because the nurse or DPC practitioner has already considered it, thus creating an increase in overall prescribing volume.

In Scotland, the lack of routinely available data limits the ability to measure the effects of increased MDT working in primary care. Data have recently been published on primary care 'encounters' from 2018 to 2022, which are classed as direct (face to face, telephone or online consultation) or indirect (medicine reviews and administrative tasks such as referrals to secondary care, processing laboratory requests and reviewing test results).[19] The extent of shared encounters that involve more than one profession or collaboration of GPs and other clinical staff for the same patient is unclear. For an increasing proportion of encounters with other professional groups, such as allied health professionals (AHP), nurses, pharmacists, social workers, physician associates and clinical support workers, it was not

possible to categorise the encounter as direct or indirect. This may reflect the difficulties associated with trying to measure these multidisciplinary activities.

Statistics from 2012–13 (the most recent year for which data are available) indicated that, prior to the GMS contract 2018, 4.17% (95% CI 4.10% to 4.25%) of the practice list population saw their GP and 2.67% (95% CI 2.55% to 2.79%) saw a practice nurse.[20] The total percentage of practice list patients seen by the GP and practice nurse combined was 4.52% (95% CI 4.47% to 4.57%). This suggests there was considerable overlap in the patients being seen by both types of healthcare professional. Of all patients seen in primary care in 2012–13, 75% were seen by a GP and 48% were seen by a practice nurse, meaning that 41% of the patients seen by the practice nurse had also been seen by their GP and 7% had been seen only by the practice nurse.

A 2022 case study from the Edinburgh City HSCP provided a useful method for quantifying the value of MDT contributions in primary care in terms of equivalent GP time.[21] It is reasonable to assume that time spent by other healthcare professionals on a task may not wholly replace the equivalent time a GP previously spent on the same work. For example, if a GP spent 50% of their time reviewing medications and decided to hire an advanced nurse practitioner with prescribing abilities to support medication reviews, it is unlikely that the amount of time spent by a GP on reviewing medications would subsequently reduce to zero even if the advanced nurse practitioner spent 50% of their time reviewing medications. The Edinburgh case study measured the estimated GP hours saved by addition of one whole time equivalent (WTE) MDT professional (*Table 7*).

Table 7: MDT professional WTE time to offset GP hours per week in one case study

1 WTE practice embedded MDT professional	Offset GP hours per week
Physiotherapist	20 (5 sessions)
Community link worker	4 (1 session)
Advanced nurse practitioner	24 (6 sessions)
Advanced paramedic	20 (5 sessions)
Mental health nurse	20 (5 sessions)
Pharmacotherapy team member	12 (3 sessions ‘average across a skill-mixed team’)
Qualified pharmacist	12+ (‘more than three sessions’)

The data in *Table 7* relate specifically to the care provided within the Edinburgh City HSCP and the assumptions that underpin the analysis may not be generalisable to other parts of Scotland. For example, if a practice hires an advanced nurse practitioner whose existing skillset is well suited to the needs of the local practice population this could save more GP

time than if the advanced nurse practitioner's skillset was not directly applicable because they may initially have higher training and GP support needs. This could disproportionately affect practices where it is harder to recruit new staff (D New, Primary Care Evaluation and Insight Manager, Edinburgh City HSCP. Personal Communication, 9 December 2022. A Abdelgawad, Transformation Manager, NHS Lothian. Personal Communication, 9 December 2022).

In *Table 7*, the offset in GP time associated with community link workers (CLW) is low. A return on investment study looking at the workload of MP in Edinburgh and Dundee predicted that for every £1 investment in CLWs, a range of social and economic benefits worth between £27 and £50 was accrued over a period of 1 year.[22] The CLW intervention provided welfare rights advice, employability support and housing advice among various other social issues. The main unit costs of value were estimated wellbeing from 'relief from being overly burdened by debt' and membership of a social group, rather than direct clinical benefits accrued from an NHS perspective. A small amount of GP and nurse time saved was included in the return on investment, confirming that CLW provide a clinically specific benefit.

The Scottish Government provided us with additional data; a summary of local MDT evaluation studies submitted to Public Health Scotland (PHS), and Primary Care Improvement Programme (PCIP) data on outcomes associated with the changes in MDT working in primary care. Based on this data, the number of WTE primary care staff recruited in Scotland for each professional discipline are shown in *Table 8*. Additional data from Scottish Government and PHS are described in *Appendix 3.* There are insufficient details available to allow analysis beyond the methods described below.

Table 8: MDT primary care staff WTE in Scotland 2018-2022

Staff Group	Staff Member	WTE 2018	WTE 2019	WTE 2020	WTE 2021	WTE 2022
Pharmacotherapy	Pharmacist	130.1	159.0	151.2	100.2	69.5
	Pharmacy technician	38.3	49.6	82.4	78.9	117.2
Vaccinations, community treatment and care services	Nursing	24.7	53.8	155.3	166.5	151.6
	Healthcare assistants	11.7	95.5	85.4	89.5	204.3
	Community other	1.9	36.6	25.5	29.1	80.9
	Advanced nurse practitioners	18.0	49.0	53.6	65.9	23.0

Urgent care (advanced practitioners)	Advanced paramedics	3.1	9.0	2.5	0.8	5.5
	Other	2.6	10.9	9.1	15.1	13.1
Additional professional roles	Mental health workers	13.9	39.7	49.1	113.0	44.2
	Physiotherapists	11.1	35.1	70.5	55.6	24.1
	Other	2.2	18.5	20.4	0.6	3.4
Community link workers		47.1	49.9	67.2	28.4	56.3

Method

The data in *Table 7* from the Edinburgh City HSCP were used to estimate a provisional monetary value for the growth in the primary care MDT workforce in terms of the equivalent hours of GP time saved. GP time saved was considered of value since the aim of expansion in MDT staff was to free up GP time so they could concentrate on more complex cases and patients could be seen by more appropriate specialists in a more timely manner (for example, for physiotherapy or pharmacy review).

The estimate of GP time saved per MDT staff WTE added was applied to the *cumulative* WTE of MDT recruited in primary care each year from *Table 8*. Where an estimate for the number of sessions had not been provided for the vaccinations and community treatment and care services, the average estimated hours saved across all professional groups was used. The estimated contribution from healthcare assistants was reduced to the 25th percentile of hours saved to compensate for potentially overestimating the effect of recruited WTE on GP hours saved. For pharmacists, as the estimated saving was greater than 12 hours, 13 hours was used to produce a conservative estimate of GP time saved.

The unit cost of an hour of GP time, including DPC, was estimated as £132 at 2021 prices, based on the Personal Social Services Research Unit (PSSRU) unit costs of health and social care. [23] PSSRU data were also used to estimate the annual number of weeks worked during the year (that is, not including annual leave, sickness absence and study leave/continuing professional development hours) which was 43.6 weeks for non-nursing staff and 41.4 weeks for nurses.

It was not possible to account for sporadic vacancies that would affect GP hours, for example while a new member of staff is recruited. The assumption is made that MDT posts created since 2018 have not since been withdrawn. Nor was it possible to account for additional annual leave accrual over time, depending on the number of years of service a staff member has worked for the NHS.

It is acknowledged that while the method and data presented from the case study in Edinburgh City HSCP may not be generalisable to other parts of Scotland, it does offer a standardised method of considering the value of MDT in primary care that can be used as a template for future estimates of cost effectiveness.

Results

The estimated weekly avoided costs for GP time associated with an increasing MDT workforce in primary care are shown in *Table 9*. Please note, these are not net savings, as they do not take into account the cost of the employed MDT workforce (the necessary additional data on their working hours and Agenda for Change pay scales are not available for this review).

Table 9: Estimated weekly and annual avoided GP costs associated with the growing MDT workforce in primary care, cumulative shown by year

	2018	2019	2020	2021	2022	Total
Total weekly GP hours saved	3,932	12,541	23,588	35,079	45,729	NA (see annual figure)
Annual GP hours saved	169,389	537,899	1,009,466	1,499,309	1,952,176	5,168,239
Total weekly value of GP time avoided (GBP)	£519,042	£1,655,415	£3,113,590	£4,630,478	£6,036,291	NA (see annual figure)
Annual value of GP time avoided (GBP)	£22,359,303	£71,002,717	£133,249,526	£197,908,747	£257,687,198	£682,207,491

Discussion

The results show the substantial avoided cost of GP time saved that is associated with growing the primary care MDT workforce. These data should be treated with caution as they were not developed with the intention of applying them nationally at scale. The approach does offer a standardised way of quantifying the value of one additional WTE healthcare professional on GP time saved. The method can be further developed to be generalisable across Scotland through feedback on the components involved in these estimates. For example, appointment length, the average working week of staff members needed to estimate the number of WTE hours, and the number of patients seen per week on average. Further estimation of the training needs for new MDT staff and the learning curve duration, as well as the overlap in the number of patients seen by multiple MDT members including the GP (which could limit the number of GP hours saved) would also be useful.

It was not possible to undertake a regression analysis similar to that conducted in the English mixed methods study,[8] but it may be possible in future using linked datasets. This depends on what additional data are available, for example, whether referrals to acute care routinely provide the name of the GP practice making the referral. This would allow the data on the composition of the MDT of that practice to be applied to the referrals. The appropriateness of doing so also needs to be considered; changing referral practices may reflect new MDT staff identifying additional problems for patients that could have gone unnoticed had it not been for the MDT service. In such cases a reduction in referrals may not be warranted. The proportion of responding GP practices that do not have access to each of the services provided by MDT professionals continues to reduce year on year. For some services there is still patchy provision that could create inequities in care.

Primary care practices have a considerable degree of autonomy in how they organise their MDT service. National datasets may not be readily able to translate these complexities into standardised datasets that support a national analysis. Progress with the experimental dataset on GP encounters held by PHS could usefully provide a systematic way of accounting for the collaborative nature of MDT working.[19] This dataset would be useful in understanding what aspects of GP caseload time can be saved through the growth of the MDT workforce. Further work is needed to clarify whether the savings in GP time spent on routine tasks that can be undertaken by others, results in better patient outcomes for both the complex patient cases receiving more GP time, and the routine cases being treated by other MDT staff.

Conclusion

Evidence from the secondary literature indicates that MDT in primary care have a positive effect on clinical outcomes. Much of the published literature did not provide effect size estimates, meaning that the extent of the positive impact is uncertain. The secondary evidence did not report adjustments for confounding factors in the review methods or in the primary studies included. The range of conditions and outcomes reported in the literature were mainly limited to patients with diabetes and high BP. There were indications from the same body of evidence that MDT in primary care may reduce healthcare use by patients, including reducing the number of primary care visits.

Evidence exploring the concept of changing the primary care skill mix similarly indicated that MDT working resulted in improvements in health markers, particularly for patients with diabetes. One large UK based mixed methods study found that increasing the skill mix in primary care had a limited effect on GP workload. This is potentially because GPs took on new supervisory responsibilities or had their caseload filled with patients with complex care needs who are likely to require additional GP time and input.

The secondary literature describes important facilitators and barriers to MDT working in primary care. Key facilitators included defining the role and remit for all healthcare practitioners in the team to ease any uncertainty; good communication and colocation of staff; and developing MDT relationships based on mutual trust and respect. Many of the facilitators and barriers described in this secondary literature were reiterated in the qualitative literature exploring the views of healthcare professionals on MDT.

Both healthcare professionals and patients generally had positive views and experiences of MDT in primary care. Most healthcare professionals were aware that their roles within primary care were changing and accepted this as a positive thing. There were some concerns around deskilling, the perceived patient confusion over the type of professional they had seen and a lack of common understanding of the meaning behind key factors required for good MDT working. Patients generally found MDT primary care more accessible and holistic than traditional practice. They expressed a degree of discontent when not able to get an appointment with the healthcare professional of their choice and did not always understand the roles and remit of new professionals at their practice.

Overall, the potential cost effectiveness of MDT working in primary care is best illustrated in terms of GP time saved, whereby, for the most recent year available (2022) 45,729 additional hours – valued at over £6 million – in terms GP time have become available every week as a result of investment in the MDT workforce since 2018. To be clear, this estimate is not a net saving because it does not include the costs of the new MDT staff. More details about the proportion of staff on each Agenda for Change band and their working hours are

required in order to estimate the costs associated with hiring MDT staff. In addition, these results are based on data from Edinburgh city alone, and may not be generalisable to the whole of Scotland.

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Appendix 1: Abbreviations

A&E	accident and emergency
AHP	allied health professional
ASTRO-PU	age, sex and temporary resident originated prescribing unit
BP	blood pressure
CI	confidence interval
CLW	community link worker
DPC	direct patient care
FTE	fulltime equivalent
GBP	Great Britain pounds
GP	general practitioner
GPPS	general practice patient survey
HMIC	health management and policy
IPC	interprofessional collaboration
MDT	multidisciplinary team
MMAT	mixed methods appraisal tool
MP	medical practitioner
NP	nurse practitioner
NS	not significant
PCP	primary care physician
PHS	Public Health Scotland
PCIP	primary care improvement programme
PROM	patient reported outcome measures
RCT	randomised controlled trial
ROBIS	risk of bias assessment tool for systematic reviews
SMD	standardised mean difference
UK	United Kingdom
US	United States
WTE	whole time equivalent

Appendix 2: Resources searched

Resource	Results
HIS projects	0
Grey literature	
King's Fund	1
Health Foundation	0
Google search	7
Secondary literature	
Cochrane library	0
TRIP database	0
Medline	2 generic 1 specific
HMIC	0
INAHTA HTA database	0
Primary studies (UK case studies, qualitative literature, economic evaluations)	
Medline	12 generic (including qualitative) 6 specific (including qualitative, limited to UK) 17 specific (not limited to UK)
Cochrane library	0

Appendix 3: Additional data provided by Scottish Government

Confidential data have been blacked out for publishing.

Data on the proportion of primary care practices without access to specialist services provided by each professional staff group are shown in *Table A* for the last two financial years (ending March 2021 and 2022).

Table A: Primary care practice with no access to specialist services by professional group in Scotland (total n practices = 930)

Staff group	Service	% of Scottish practices without access	
		2021	2022
Pharmacotherapy	Level 1 service	4%	2%
	Level 2 service	14%	5%
	Level 3 service	37%	22%
Community treatment and care services	Phlebotomy	30%	23%
	Minor injuries and dressings	35%	28%
	Ear syringing	51%	33%
	Suture removal	47%	29%
	Chronic disease monitoring	65%	44%
Vaccination transformation programme	Preschool	13%	9%
	School age	11%	7%
	Out of schedule	45%	17%
	Adult immunisation	77%	12%
	Adult influenza	12%	1%
	Pregnancy	9%	0%
	Travel	96%	17%
Urgent care services		54%	49%
	Physiotherapists	46%	44%

Additional professional services	Mental health workers or support	35%	22$
Community link workers		35%	24%

The remaining data provided by Scottish Government contained point estimates of the amount of activity in the services listed in *Table A*, where the services were available, and which primary care teams had reported this information to PHS. An economic evaluation at national level, based on these point estimates is not possible because there are insufficient details available on the size and location of responding practices for each outcome to allow appropriate scaling of the data.

Should further data become available it may be possible to provide nominal estimates for the whole of Scotland based on the levels of service coverage shown in *Table A*. Outcomes in the dataset are unlikely to be the sole activity performed by each professional group. For example, pharmacotherapy staff are unlikely to spend all their time writing prescriptions. Excluding unmapped encounters from the national data from PHS, the ratio of direct to indirect encounters within the practice for 'other clinicians' was, on average, 1.5:1, and it is unclear whether staff would tolerate performing a single activity as their WTE role.[19] In addition, data provided from local services may disproportionately represent the outcomes that are most readily available, such as number of appointments or patients seen, rather than the outcomes where the greatest benefit associated with the change to MDT working can be shown.

Reported outcomes from the confidential Scottish Government data are summarised in *Table B* where they contained reference to an underlying sample (typically the number of GP practices providing data for that outcome measure unless otherwise stated).

Table B: Reported outcomes associated with each professional group in Scotland (data in confidence because of low numbers in some cells)

Staff group	Reported outcome	Number of practices contributing data (or otherwise specified)
Pharmacotherapy	Number of acute prescriptions per day	[redacted]
	Reduction in the number of acute prescriptions per 1,000 patients over 1 year (2019 to 2020)	[redacted]
Community treatment and care services	Number of phlebotomy appointments provided in 1 month	[redacted]
Vaccination transformation programme	Number of vaccinations provided in 9 weeks	[redacted]
	Number of vaccinations provided in 5 months	[redacted]
Urgent care services	Number of patients seen in 1 year	[redacted]
	Number of appointments in 1 year	[redacted]
	Number of home visits in 12 weeks	[redacted]
	% of calls triaged to a same day appointment by an advanced nurse practitioner	[redacted] (calls to GP practice)
	% of appointments with a return in 7 days seen by an advanced nurse practitioner or GP	[redacted] appointments
	Average days until return appointment following an advance appointment with an advanced nurse practitioner or GP	[redacted] advance appointments
Mental health services	Total number of patient GP contacts compared with prior to and during receipt of mental health nurse support	[redacted]
	Average number of GP consultations per month with a mental health presentation, 18 months and 35 months after introduction of mental health role	[redacted]
	Number of appointments per week	[redacted]
	% of new patient attendances in mental health	[redacted]

	% of prescription requests sent to GP from new patient attendances	[redacted]
	% of referrals sent back to GP from new patient attendances	[redacted]
	Change in the number of unscheduled admissions	[redacted]
	% of patients offered a return appointment	[redacted]
Occupational therapy services	Average number of appointments per patient 6 months before and 6 months after receiving occupational therapist support	[redacted]
	Number of patients seen in 1 year	[redacted]
	% of patients who improved on the WHO quality of life scale, occupational performance score, Canadian occupational performance measure	[redacted] paired scores
	Cost saving in terms of falls prevented between February 2020 and March 2021	[redacted] home assessments
	Cost associated with secondary care referrals prevented	[redacted] avoided referrals
	Cost associated with avoided use of medication	[redacted] patients where occupational therapist input altered use of medication
Physiotherapy services	Number of appointments in 1 month	[redacted]
	Number of patients seen in 1 year	[redacted]
	% of patients seen by physiotherapy staff, requiring a prescription from the GP	[redacted]
	% of patients seen by physiotherapy staff who required a fit note from the GP	[redacted]
	% of patients seen by physiotherapy staff who required GP reviews	[redacted]
	% of patients seen by physiotherapy staff who required a follow up GP appointment	[redacted]
	% of physiotherapy staff's patients referred back to the GP	[redacted]

	Median number of referrals per month to orthopaedic surgery in the 12 months before and 11 months after the introduction of physiotherapy staff	[redacted]
	Cost savings estimated from change in injection provider from hospital consultant to physiotherapist (band 7)	[redacted] injections
	% increase in patients managed in their community by having a physiotherapist in the practice	[redacted]
	Number of direct access appointments offered by advance practice physiotherapists	[redacted]
	% of physiotherapist's patients requiring a follow up with a GP	[redacted]
	% of physiotherapist's patients requiring a referral to secondary care	[redacted]
	% of patients in practices without a physiotherapist who required a referral to secondary care	[redacted]
	Reports of any missed diagnoses	[redacted]
	Reports of any safety issues	[redacted]
	Number of physiotherapy appointments needed to generate a reduction of 104 musculoskeletal appointments in outpatients per month	[redacted] (GP clusters)
Community link workers	Number of referrals to CLWs	[redacted] early adopter sites
	Number of contacts in 1 year	[redacted]
	% of referrals that were referred by the GP	[redacted]
	Average score on short form Warwick Edinburgh mental wellbeing scale	[redacted] (before) and [redacted] (after) patients
	% of referrals recording mental health as a reason	[redacted]
	% of referrals where an onward referral for mental health support was made	[redacted]
	% of all appointments that are return appointments	[redacted]

Not specifically aligned to a role	Number of onward referrals from GP practices	[redacted]
	Number of appointments avoided annually by supporting 50% of patients to self administer B12 injections	Service offered to [redacted] people
	Number of unscheduled referrals from general practice	[redacted] acute sites
	Change in the percentage of health and care experience survey respondents who received most of their treatment from the GP as opposed to another healthcare professional (2017/18 to 2021/22)	National data