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Appendix

Realising the potential of community-based multidisciplinary teams: Insights from evidence

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About this appendix

This appendix provides supplemental information relating to the methods used in the analyses and the literature review, summarised in the Improvement Analytics Unit briefing *Realising the potential of community-based multidisciplinary teams: Insights from evidence*. The Improvement Analytics Unit (IAU) is a unique partnership between NHS England and the Health Foundation. We evaluate complex initiatives in health care in order to support learning and improvement.

1. Methods

1.1 Evaluation of MDTs

The analyses of the three MDT programmes were broadly similar. As one of the aims of the new care model vanguard programmes was to reduce unnecessary emergency hospital use, we investigated the effect of MDTs on outcomes relating to A&E attendances and emergency hospital admissions. To get a fuller picture of the effect of MDTs, we also investigated some other hospital outcomes. As our analyses were based on administrative data, we could not evaluate outcomes not routinely collected, such as quality of life or patient satisfaction. In general, the following outcomes were evaluated:

- Emergency hospital use: A&E attendances, emergency admissions, emergency hospital bed days or average length of stay, readmissions and emergency admissions that may be avoidable: emergency admissions for chronic ambulatory care sensitive conditions (CACS) and emergency admissions for urgent care sensitive conditions (UCS)[1,]
- Elective admissions and elective hospital bed days
- Outpatient attendances
- Proportion of deaths that occurred in hospital, as proxy for not dying in an individual's preferred place of death

In each case, individuals enrolled in the MDT were compared against a carefully chosen comparison group, selected using a process called 'matching'. The matched comparison group consisted of individuals selected because they had similar baseline characteristics to those who were enrolled. We used hospital data from the previous 3 years to determine these characteristics, which included age, gender, ethnicity, level of deprivation (Index of Multiple Deprivation, IMD, quintile), a range of long-term conditions and frailty indicators, and historic hospital use. As there were other concurrent interventions in these areas, we selected the comparison group from the same local area, to measure the effect of the MDTs over and above that of other local services.

The evaluations covered either the first approximately 1.5 or 2.5 years of MDT implementation (starting in 2015 for ECS and NEHF ICTs and 2016 for EPC). Patients were included in the study from the date they were referred or enrolled in an MDT to the end of the study period (or until they died or moved away). The average time that a patient was in a study ranged from 7 to 13 months. We compared outcomes of MDT patients to their matched comparison groups using multivariable regression modelling, which allowed us to further adjust for any remaining differences in baseline characteristics.

Although the MDT and comparison groups were similar on observable characteristics, there was a risk of unobserved differences between the groups on characteristics not observable in our data. This could bias the results ('unobserved confounding'). This was particularly a concern in NEHF, as patients were identified through clinical judgement, which could have been based on information that was not available in our data. We therefore also investigated whether there were differences in mortality between the groups. As it was not expected that the MDTs would negatively affect mortality, a difference mortality rates could indicate that there were differences in disease severity or in other characteristics that could bias the analysis results.

See individual reports and statistical analysis protocols for further details on methods, as well as strengths and limitations of the analyses.[2,3,4,5]

1.2 Longer term evaluations of integrated care programmes

We had previously evaluated the overall effect of an integrated care programme – the Integrated Care Transformation programme in Mid-Nottinghamshire – which also included MDTs as one of its main initiatives, over a 6-year period (April 2013 – March 2019).[6] Using similar methods as in Mid-Nottinghamshire, we evaluated the effect of the integrated care vanguard programmes in Fylde Coast and NEHF – the broader initiatives in which the three MDT models were introduced – over a 4.5 year period (April 2015 – February 2020).[6,7] As Fylde Coast comprised two clinical commissioning groups (CCGs) that differed substantially on characteristics such as demographics, rurality and level of deprivation, we analysed the two CCGs –Blackpool and Fylde and Wyre – separately.

In each of the four analyses, we evaluated the effect of the vanguard programmes on the population aged 65 and older, and 18 and older, respectively, in the local area by comparing hospital use against a carefully constructed comparison area. Each comparison area was made up of individuals within GP practices which were similar on practice and patient characteristics to those in the respective vanguard area, drawn from other areas of England. We looked at the effect in each year following the introduction of MDTs until February 2020, ie for 4.5 and 6 years, respectively – longer than most evaluations of programmes such as these.

Analysed outcomes differed between the Mid-Nottinghamshire and the other evaluations but all four analyses concentrated on emergency hospital use. See individual reports for a full list of outcomes and results.[6,7,8] In this briefing, we focused on the population aged 65 and older, as this group is more similar to the MDT patient population,[1] and on the primary outcomes of A&E attendance and emergency admissions.

See individual reports and the statistical analysis plans for further details on methods, as well as strengths and limitations of the analyses.[6,9,10,11,12]

1.3 Literature review methods

We conducted a rapid review of systematic reviews of quantitative evidence on the impacts of MDTs in community settings for adults with complex health and care needs. We wanted to generate an overview of evidence relevant to the MDTs we studied through our IAU evaluations, so we limited our search to systematic reviews of the literature or umbrella reviews. The search strategy was developed in collaboration with a health services research information specialist. The protocol was not registered.

Literature search
We conducted searches in Embase, Health Management Information Consortium, Medline and Web of Science Social Sciences Citation Index for relevant studies in English published in the 10-year period up to June 2020. We tested our search strategy to ensure key 'tracer papers' were included in our results. For the purposes of our search, we defined community-based MDTs as care teams that draw on the experience of more than one health or care discipline (as defined by specialty or profession) to provide out-of-hospital care. MDTs needed to include at least one health professional (with or without a non-health professional). We used a broad definition given MDTs are described and reported in a mix of ways, often alongside wider integrated care interventions and programmes.

Study selection
We developed inclusion criteria to identify potentially relevant studies (Table 1). These focused on identifying papers studying MDTs with relevance to the English health and care system, delivered in community settings, and with at least one health professional working alongside other health or care professionals to deliver care to adults. Papers needed to report quantitative evidence on at least one patient or system-level outcome linked to MDTs – including health outcomes (such as quality of life), service use and quality (such as access to care and hospital admissions), and care costs. We excluded studies reviewing MDT processes, theories or frameworks without any quantitative evidence on MDT impacts. We excluded studies where MDTs were a minor component of the interventions studied.

Titles and abstracts of all papers were screened by staff from the Health Foundation and Cordis Bright (a research consultancy), with the full text reviewed if it appeared relevant. A sample of titles and abstracts was initially reviewed by both teams to ensure consistency and clarity on inclusion criteria, before Cordis Bright reviewed the full list. Studies were assessed against the inclusion and exclusion criteria, with any disagreements resolved through discussion with the Health Foundation team. Our initial search identified a large number of studies covering a diverse range of settings and patient groups – including studies with limited relevance to the community-based MDTs being developed in the NHS. At full-text review stage, we therefore removed some patient subgroups and settings from our inclusion criteria (italicised and marked with an $^{+}$ in Table 1) to ensure we only identified the most relevant studies, as well as any studies where community-based MDTs were only a minor component of the review. For the studies included, we assessed risk of bias using the AMSTAR 2 critical appraisal tool.[13]

Table 1: Initial inclusion and exclusion criteria for the literature review

(1) Age	(1) Adults of all ages
(2) Patient subgroups	(2) Patient subgroups for inclusion:
	1. Non-specific group defined as target populations: eg 'high need' 'high cost', 'high risk', 'at risk', 'most complex', 'complex conditions', and similar
	2. Social isolation or other social factors: factors relating to a person's social context that may affect a person's health, such as being socially isolated, housing instability, a recent life change such as a bereavement, or having caring responsibilities
	3. End-of-life status [or use of palliative care pathways][+]
	4. Multimorbidity* (LTCs) – 2+ comorbidities
	5. Frailty
	6. Specific long-term conditions:
	a. Dementia
	b. Chronic obstructive pulmonary disease (COPD)
	c. Serious mental ill health: individuals who have a diagnosis of schizophrenia, bipolar disorder or psychosis[+]
Intervention	Inclusion: reviews must include empirical studies of the introduction of a multidisciplinary community care team taking place in a developed country. We are not interested in reviews of process, theories or frameworks. Studies will be included where the MDT is one component of a multifaceted intervention (eg 'integrated care programmes')
	Exclusion: studies will be excluded for the following reasons: a) if the MDT component is thought to be a sufficiently minor part of the broader intervention, b) if MDT members are not described and it cannot be inferred that they include a health professional
	Key definitions:
	Multidisciplinary care teams: draw on the experience of more than one health or care discipline (as defined by specialty or profession) to provide out of hospital care to individuals, and must

	include at least one health professional (with or without a non-health professional)
	Health professionals may include: nurses, occupational therapists, physiotherapists, doctors, pharmacists, paramedics
	Non-health professionals may include: social workers, volunteer/community organisations, non-health private companies
	Community: providing health or care services in out-of-hospital settings. This may include: general practice, residential or nursing homes, at the patient's home, *in the transfer period between an inpatient and out-of-hospital setting*[+], NHS community trust and mental health facilities where the patient is not exclusively being managed as an inpatient
Outcome	Inclusion: studies must include either one patient or system-level outcome
	Exclusion: we are not systematically considering a) outcomes for carers or non-health/care organisations (eg voluntary, community and social enterprise organisations), b) staff experience, communication or knowledge, or c) generic enablers and barriers regarding implementation of the intervention. If outcomes of this type are described alongside either patient or system outcomes, they will be included, but studies will be excluded if these are the only outcomes. Reviews are excluded if outcomes are not described at MDT level (eg if they are only described at the level of a broader integrated care review, rather than MDT-specific)
	Key definitions:
	Patient outcomes include: changes to health status (morbidity, mortality), quality of life or quality of care, patient activation, satisfaction or experience
	System-level outcomes include: changes in service use/utilisation*, impact on costs/CBA/cost-effectiveness, improvements in services. While the MDT intervention must be in a community setting, system-level outcomes can be included for any part of the health and social care system
	* eg GP appointments, accident and emergency use, hospital admission, readmission, length of stay, outpatient appointments etc

Setting	'Developed economies' as defined by the United Nations
	Must include at least one study from the UK
Language	English language
Publication	Only peer-reviewed published reviews

Data extraction and synthesis

For included studies, we extracted and summarised data in electronic templates covering the following domains: study design, MDT context, care settings, staff involved in delivering MDTs, patient or population groups targeted, aims of MDTs, outcomes linked to MDTs, mechanisms linked to outcomes, and other factors. We used these templates to synthesize data from the studies. No meta-analysis was carried out given the lack of quality data on impacts, the broad nature of the phenomena studied, and the heterogeneity of study designs. We use a narrative approach to reporting the data synthesis.

Limitations

Our review has several limitations. First, a lack of a standardised definition of MDTs or widely used taxonomies makes identifying appropriate literature difficult. MDTs are often weakly defined and poorly described, and studies frequently combine evidence on MDTs with other similar interventions. We used our inclusion criteria to attempt to identify the most relevant studies. But some studies we reviewed included a mix of interventions linked to integrated care – not all directly related to MDTs in England.

Second, our search involved identifying evidence on the impact of MDT working at a broad level. This meant that we excluded evidence on specific interventions that might be used by MDTs, such as comprehensive geriatric assessment or case management. It also meant that we excluded evidence on the impact of MDTs in some settings, such as hospitals and rehabilitation settings. We also only focused on identifying evidence on the impacts of MDTs, so excluded qualitative evidence on how MDTs work.

Third, we only reviewed evidence from systematic reviews of the literature. This allowed us to provide an overall picture of evidence on MDTs across a large body of studies. But it also meant that a heterogenous mix of interventions from different contexts were studied together. For the individual reviews we included, study authors also noted the heterogeneity of primary studies within their reviews.

Finally, our study is limited by the quality of the evidence we reviewed. The studies included in our review were often poor quality, and the studies themselves consistently noted both a lack of evidence and the poor quality of the primary studies they included in their own reviews. There was also a lack of consistency in outcomes reported and some kinds of outcomes – such as patient experience measures – were often missing from studies. This limits our understanding of the impacts of MDTs.

2. Findings from the literature review

Table 2: Summary of evidence from relevant reviews on MDT impacts

Paper	Study characteristics	Intervention	Impacts studied	Health outcomes	Quality	Cost
Baxter S et al (2018). Understanding new models of integrated care in developed countries: a systematic review	Systematic review. 267 studies included in total, of which 38 include MDTs or MDT meetings as a principal component of the intervention as defined by Baxter et al For studies with MDTs, 15 from the UK and 23 from other high-income countries Smaller subset of 167 studies (quantitative studies and systematic reviews) on impacts reported separately, of which 54 were carried out in the UK [ref BMC]	Review focused on wide range of changes to the organisation and delivery of services that aimed to increase integration of services Studies focused on MDTs included interventions in a range of settings, including primary, community, social care, hospital, and other settings Interventions focused on patients receiving health care services and staff delivering them. Mix of population groups targeted and staff delivering services	Any outcome related to the delivery of services, including effectiveness, efficiency or quality, and/or the effect on patients and staff Impacts presented here are for all interventions studied, with additional impacts described by the authors linked to MDTs		Overall, analysis of the mix of integrated care interventions indicated evidence of perceived improved quality of care, increased patient satisfaction, and improved access to care. Evidence was inconsistent or limited regarding all other outcomes reported, including system-wide impacts on primary and secondary care For MDTs, three UK studies reported on 'simple' MDT initiatives and found mixed impacts on care processes. Several studies reported on 'complex' MDT interventions and reported positive results – including reductions in length of stay and hospital costs, reduced length of stay, reduced numbers of admissions and readmissions, reduced waiting times, reductions in the	Overall, inconsistent evidence on costs of provision

					numbers of inappropriate referrals, and perceived improvements in care and access to services	
Damery S et al (2016). Does integrated care reduce hospital activity for patients with chronic diseases? An umbrella review of systematic reviews	Umbrella review. 50 reviews included in total of which 10 focus on what the authors define as MDT interventions For the reviews focused on MDTs, 2 of the author teams were from the UK, 6 from Canada, 2 from Ireland	Umbrella review focused on interventions implemented in any health or social care setting that cross the boundary between two or more settings The subset of boundary-spanning MDT interventions was defined as multiple health and/or social care professionals working together to provide care for people with complex needs. Umbrella review also looked at other types of boundary-spanning interventions Focused on interventions targeting adult patients with one or more chronic conditions Staff groups involved in interventions included some combination of condition-specific expertise, nurses, occupational therapists, physiotherapists, social workers, GPs and occasionally pharmacists or case managers	Any measure of hospital admission or readmission Length of stay Accident and emergency use Health care costs Impacts presented here are those relating to the MDT intervention subset, as defined by Damery et al	-	MDT interventions for general chronic disease management (three reviews) showed mixed effectiveness or no significant association for any outcomes MDT interventions were generally effective when used for patients with single conditions compared to controls – though evidence for this tended to relate mostly to heart failure interventions For patients with heart failure, three reviews found a reduction in admission rates, one review a reduction in readmissions, three reviews a 2-day reduction in length of hospital stay, and one review significantly reduced A&E use One review reported a relative risk reduction for admissions in patients with COPD	Limited robust evidence. One review reported significantly lower health care costs for patients with heart failure receiving MDT interventions (but the authors note that little detail was given to substantiate how)

Abendstern M et al (2012). Variations in structures, processes and outcomes of community mental health teams for older people: a systematic review of the literature	Systematic review. 45 studies included in total of which 7 provided evaluative evidence. All 7 studies had MDTs providing part of the intervention as defined by Abendstern et al Of these 7 studies, 6 were from the UK and 1 was from Australia	Review focused on multidisciplinary community mental health teams for older people (CMHTOP). Aimed to capture outcomes associated with specific intervention components Care settings included care homes, community and domiciliary settings Target patient group was older people with mental ill health Range of staff, such as mental health nurses, consultant psychiatrists, social workers, occupational therapists, psychologists and support workers – though few studies included all these staff members Review looked at outcomes associated with a mix of CMHTOP intervention components, such as : team membership, single management structure, co-location of core team members, common standardised assessment, and other components	Any outcome associated one or more components of CMHTOP interventions Impacts presented here are for all intervention components studied by Abendstern et al. Some of these components are less relevant to MDT working	One study reported improvements in quality of life linked to intensive care management, but no effect on depression	Three studies found teams operating single points of access/open referral systems may improve access without loss of appropriateness for patients referred to the CMHTOP. One study found a dedicated referral role improved access One study found flexible support as part of focused, long-term input by a CMHTOP improved support to carers and prolonged service user community tenure	One study reported increased social care costs linked to intensive care management
Davies SL et al (2011). A systematic review of integrated working between care homes and health care services	Systematic review. 17 studies included in total of which the majority have some element of MDT working 9 studies from UK, 5 Australia, 2 US, 1 Sweden	Review focused on integration between primary health care professionals and care homes. Studies had to contain one or more of the following features: clear evidence of joint working; joint goals or care planning; joint arrangements covering operational and strategic issues; shared or single management arrangements; joint commissioning at macro and micro level	Health and wellbeing (eg changes in health status, quality of life) Service use (eg number of GP visits, hospital admissions) Cost (eg savings due to avoided hospitalisations)	Majority of studies found either mixed effects or no effect when compared with the controls	Majority of studies showed interventions had either mixed effects or no effect when compared with the controls	Review notes insufficient information was available to evaluate cost

		Target patient group was people living in nursing or care homes Range of staff groups included in interventions. Included combinations of care home staff (including managers and care staff) and health care staff (GPs, district nurses, nurse specialists, pharmacists, psychiatrists and psychologists) For studies with MDTs, interventions included multidisciplinary case conferences and team meetings, multidisciplinary consultation and collaboration, multidisciplinary care, and a mix of other MDT processes	Process-related outcomes (eg changes in quality of care, increased staff knowledge, uptake of training and education and professional satisfaction) Impacts presented here are for all interventions studied by Davies et al			
Deschodt M et al (2020). Core components and impact of nurse-led integrated care models for home-dwelling older people: A systematic review and meta-analysis.	Systematic review and meta-analysis. 19 studies included in total all of which had MDT as a component of the intervention as defined by Deschodt et al 6 studies from the US, 8 Netherlands, 1 Canada, 1 Spain, 1 Switzerland, 1 UK/England, 1 New Zealand	Review included nurse-led integrated care interventions Interventions focused on home-dwelling older people Care settings included patients' home or in a flat with domestic service Staff groups varied. 16/19 studies made a distinction between a core group of professionals providing most care and a wider team that could be drawn upon if needed. Practice nurses, registered nurses, advanced nurse practitioners or geriatric nurse specialists, together with the GP, were part of a core MDT in 13/19 studies. Social workers were also involved in the core group in 2/19 studies	Health related quality of life (HR-QoL) and activities of daily living measures Emergency department visits Nursing home admissions Mortality Impacts presented here are for all interventions studied by Deschodt et al	Meta-analyses showed no overall effect on mortality (measured in 12 studies), HR-QOL (6 studies) and activities of daily living (11 studies). Small number of individual studies reported a positive impact on mortality (1 study) and HR- QoL (3 studies)	Meta-analyses showed no overall effect on hospital admissions (measured in 11 studies), emergency department visits (7 studies) or nursing home admissions (6 studies) Small number of individual studies reported a positive impact on hospital admissions (1 study) and emergency department visits (1 study	-

		Review considered MDTs as a component of nurse-led integration interventions, alongside 18 other components				
Edwards ST et al (2017). Effectiveness of Intensive Primary Care Interventions: A Systematic Review	Systematic review. 18 studies included in total, all of which have interdisciplinary/ multidisciplinary working as defined by Edwards et al 13 studies from the US, 2 Sweden, 1 Spain, 1 Australia, 1 UK	Review focused on multicomponent, interdisciplinary intensive primary care interventions. Authors defined intensive primary care as a separate programme (possibly within an existing primary care setting) that addresses a spectrum of medical and social needs, and coordinates care across settings Review divides studies into three groups: 5 studies are classed as home-based models of primary care replacement, 5 as clinic-based primary care replacement, and 8 as community-based primary care augmentation Target patient group was complex patients at high risk of hospitalisation or death Review included any interventions providing care in an ambulatory setting Staff groups varied. The most commonly included staff in intervention MDTs were physicians (resident physician and geriatrician), nurses (gerontological nurse practitioner and nurse practitioner), social workers, physical therapists,	Mortality rate Hospital admission/readmission Hospital days Emergency department visits Impacts from all three types of intensive primary care interventions as defined by Edwards et al are reported here together	Most studies showed no significant impact on mortality	Most studies showed no significant impact on emergency department use Impacts on hospital admissions/readmission varied	-

		mental health providers, and pharmacists				
Flanagan S et al (2017). The effectiveness of integrated care interventions in improving patient quality of life (QoL) for patients with chronic conditions. An overview of the systematic review evidence	Umbrella review. 41 reviews included in total, of which 10 had MDTs as a major component of the interventions as defined by Flanagan et al Of these 10 studies, 5 review author teams were from Canada, 2 Ireland, 1 US, 1 Netherlands, 1 UK	Review focused on integrated care interventions implemented in/across at least two health and/or social care settings (eg primary care, secondary care, community settings). MDTs were classed as one such intervention Target patient population was adults undergoing management of one or more chronic conditions as defined by Flanagan et al Staff groups involved in MDTs were not specified	Quality of life Impacts presented here are those relating to the MDT intervention subset as defined by Flanagan et al	Most reviews (7/10) – 1 looking at cancer, 4 heart failure, 2 unspecified chronic conditions – reported mixed outcomes 3/10 reviews reported positive findings for QoL (1 looking at rheumatoid arthritis, 1 COPD and 1 unspecific chronic conditions)		
Stokes J et al (2015). Effectiveness of case management for 'at-risk' patients in primary care: A systematic review and meta-analysis	Systematic review and meta-analysis. 36 studies included of which 21 employed MDTs for delivery of case-management interventions. The remaining 15 studies with case management delivered by a single case manager are also used in the analysis as a comparator MDT intervention studies (21 total): 12 studies from USA, 2 Canada, 2 Netherlands, 1 Spain,	Review focused on case management interventions. Those provided by an MDT were a subgroup investigated by Stokes et al Review focused on effectiveness of case management overall, as well case management delivered by a single case manager vs MDTs Care setting was primary care Target population was adults (aged 18+) with long-term conditions Staff groups involved varied. Teams included some combination of nurses, social workers, physicians, pharmacists, occupational therapists, physical therapists, trained case managers/facilitators, psychologists,	Self-assessed health status Mortality Total cost of care Health care utilisation Patient satisfaction Impacts presented here relate to both the effectiveness of case management overall and the difference in effectiveness between case management delivered by a single case manager vs MDTs	Meta-analyses showed no significant differences between case-management and controls regarding mortality A small significant effect favouring case management was found for patient satisfaction in the short and long term Analyses suggested the effectiveness of case management may be improved with regards to short-term mortality and short-term self-reported	Meta-analyses showed no significant differences between case management and controls regarding utilisation of primary and non-specialist care, or secondary care. This is in both short and long term No significant difference in these outcomes between case management delivered by a single case manager and by MDTs	Meta-analyses showed no significant differences between case management and controls regarding total cost in either the short or long term. No significant difference in these outcomes between

	1 Italy, 1 Australia, 1 France, 1 Hong Kong Single case manager intervention studies (15 total): 9 studies from USA, 3 Canada, 1 UK, 1 Switzerland, 1 New Zealand	psychiatrist, health educator, department managers, community-based services liaison, case assistant, community organiser, homemakers Key components of the interventions examined included: adopting methods to identify 'at-risk' patients to receive the case management; case management, including case-finding, assessment, care planning, care coordination, regular review, monitoring and adaptation of the care plan; and primary care/community-based management, regardless of where the case was first identified		health status outcomes when delivered by a multidisciplinary team compared with a single case manager. However, these effects are extremely small and may not be significant		case management delivered by a single case manager and by MDTs

Quality of the reviews was assessed using the AMSTAR–2 critical appraisal tool[137] and is available on request from the authors.

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