Virtual multidisciplinary team meetings for the older population

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Carlos Sillero-Rejon[1,2], Hugh McLeod [1,2] Alyson Huntley[2]

[1] The National Institute for Health Research Applied Research Collaboration West (NIHR ARC West) at University Hospitals Bristol and Weston NHS Foundation Trust, Bristol, UK
[2] Population Health Sciences, Bristol Medical School, University of Bristol.

Original research question

Is there any evidence on how to effectively carry out practice-level multidisciplinary team (MDT) meetings virtually, specifically for people with frailty?

PICO

Population: Ideally frail people in the community in any setting. [However, if no evidence specifically on frail people we will broader criteria to older, complex patients].

Intervention: Virtual MDT meetings facilitated by any mechanism.

Comparison: Any if present.

Outcomes: Any information on design and conduct of such meetings but noting the original request's interest in aspects of

- *Levels of risk within frail people e.g. respiratory, cardiovascular disease*
- *Patient support after hospital discharge and hospital admission avoidance*
- *Involvement of other personnel with MDTs e.g. National Voluntary Service*
- *End of life care and use of Respect plans*

Design: any study design

Verdict

This review includes 10 recent publications describing eight virtual multidisciplinary team (vMDT) interventions. These vMDT interventions describe care of the general older population as well as specific neurological, mental health and metabolic conditions pertinent to the older, complex patient. No publications specifically on people with frailty were found. All but one of the studies are descriptive and observational in design; outlining the design and conduct of a vMDT and the authors interpretation of its utility. In this review we describe the studies and summarise the basic design features of vMDTs as well as the positive and negative experiences expressed by the authors. Quality appraisal of the included studies was not conducted due to the pragmatic design and reporting of the research. It is therefore important that the summary provided in this review should be taken as informational and not as evidence-based practice. However, the information provided below is likely to be of use to care professionals planning to use a vMDT for the older and frail population.

We conclude that vMDT might be an integral component for elderly population care. vMDTs have potential benefits, emphasising the possibility of bringing professionals from different backgrounds to work together and provide more integrated, efficient, accessible, and higher quality care overcoming geographical and timing barriers. vMDTs usually have some disadvantages or barriers for their implementation, emphasising the need of a proper infrastructure and good, designated co-ordination.

What does the evidence say?

A general search of PubMed found a framework paper outlining design and functionality of virtual multidisciplinary teams (vMDT). [1] Whilst this was based on cancer care it gave a framework in which to present more relevant publications on the older population [Table 1] as well as feasibility and implementation considerations for choices of the vMDTs [Table 2]. It also provided key search terms for our formal search.

A formal search of the literature in Medline via Ovid cross-referencing frail/older population, virtual terms and multidisciplinary team terms produced 122 citations. Double screening of these citations by title and abstract by the review team identified 15 potentially relevant publications. No relevant systematic reviews were identified. The full text of these publications was discussed by the reviewers as to whether they were a) relevant to the frail population b) there was sufficient information /detail worth data extracting. Nine publications were agreed to be relevant to the research question and to have sufficient useful information to warrant data extraction on the use of

virtual MDTs. Six publications were rejected but are listed under the PRISMA Diagram [Figure 1] in Appendix A. One further publication was found as a result of reading the full papers and their reference lists. All 10 publications describing eight types of vMDTs are outlined in Table 1, and further feasibility and implementation factors derived from these studies are available in Table 2.

Main findings

Ten publications were included that described eight types of vMDTs. The studies were conducted in the USA (n=4), Canada (n=2), The Netherlands (n=2), Sweden (n=1) and Scotland (n=1). [2-11] Nine of the ten studies were conducted in the past six years with the oldest publication published in 2008. [2] The design of the studies was predominantly descriptive and observational with only one randomised controlled trial included.[8]

None of the included studies focused on the frail population although four described the general older population, with the remaining studies focusing on neurological disease (Parkinson's, amyotrophic lateral sclerosis), mental health (dementia, depression (n=2)) and diabetes. Only one study was based in residential care facilities.[3]

Design features

- All vMDTs described had a physical centre from which they functioned and where some of the vMDT personnel were based.
- Some vMDT personnel worked face-to-face with patients collecting all relevant patient data to share and in other cases personnel collected data related to their discipline to share.
- One study used volunteers to collect patient data [4].
- Most studies focused on the functionality of vMDTs and how that enhanced patient management by professionals, with a few focusing on patient/carer experience.
- One vMDT study was also interventional aiming to reduce depression in older adults [8].
- Virtual communication was achieved via bespoke data management software, video conferencing, email, phone calls and websites - using personal computers, tablets and laptops.
- vMDTs need a good, designated co-ordinator.

Positive aspects of vMDTs reported in the studies

- Allows multidisciplinary colleagues to have the ability to work together whilst geographically separate.

- Potential to improve working relationships between health professionals, and between health professionals and their patients.
- Potential to improve work efficiency and delivery of care.
- Potential to be cost-effective.
- It can meaningfully involve patients and their families/carers
- It can potentially improve patient outcomes and in a timelier way
- It can increase access to care for some patient groups.

Negative aspects of vMDTs reported in the studies

- Most vMDT staff do not have face-to-face contact with patients. This is difficult for some clinical assessments and potentially unsatisfactory for patients.
- Training of all staff involved needs to be adequate and personnel need to be clear of their roles.
- Some personnel/ clinics involved in vMDT set ups have less time and less resources than others involved e.g. less staff, less experience, poor IT and connectivity and image quality.
- Some of this research is funded by companies so they could potentially be a conflict of interest.
- In some countries, e.g. USA and Canada, vMDTs are not always part of patients' health insurance schemes.
- If a vMDT provides an extra service than usual care, this service can be overwhelmed by demand.

Strength of the evidence

Nine of the 10 publications included were descriptive observational studies. In addition, the original research question posed was based on identifying the practical aspects of conducting vMDTs. For these reasons, the authors felt quality appraisal was of limited value for this review. It is therefore important that the summary provided in this review should be taken as informational and not as evidence-based practice.

Summary of searches

COVID-19 resources were searched by HM and CSR and no relevant literature was found.

The virtual MDT framework paper was found in an ad-hoc search by CSR.[1]

The formal search in Ovid Medline was run by AH. The outcome of the search was dual screened by all three of the reviewers. Firstly, the titles and abstracts were screened by using the following criteria.

INCLUDE and EXCLUDE based on

1) The population studied was broadly applicable to the frail population.
2) The study mentions a vMDT or something that equates to one.
3) vMDT is the focus of the study i.e. is it likely to describe the vMDTs processes and practicalities for allow data extraction.

For the full paper inclusion, facilitated by discussion, we used the above but sought to include relevant publications whether they included significant detail on the virtual MDT or not; presenting all the studies in Table 1 and feasibility and implementation factors in Table 2. Data extraction was shared by all authors. Full paper exclusions are listed in appendix A.

AH led on the write up, CSR contributed additional work and all authors approved final version.

Date question received: **29/04/20**
Date searches conducted: **04/05/20**
Date answer completed: **13/05/20**

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Disclaimer

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Table 1: Primary studies

Author Year Country	**Study Type**	**Population studied**	**Brief description of Virtual MDT**	**Timing** Synchronous /nonsynchronous	**Composition** (personnel) Constant /varying	**Geography** Local/not limited	**Platform** Sound/vision Texts/images Virtual diagnostics	**Location** Single /many	**Authors Results/ Conclusions**
General older/elderly population (n=4)									
Vimarlund 2008 Sweden	Case study Aim: to explore the effects of the use of an ICT tool for elderly homecare in Sweden.	Participants were researcher & practitioners actively involved in the development of this project: 3 home care personnel in municipality, academic project leader & a doctoral student.	Old@Home an online information access and communication tool to improve and guarantee quality home care for elderly patients allowing access to information from a wide range of different care professionals. The system aimed to actively involve staff, patients, and relatives through a consistent information flow.	Asynchronous	Care professionals including GPs, district nurses or physiotherapists & home help service personnel.	Unclear	A wide range. Virtual health record, virtual care plan and web service.	Different electronic health records. More than one including PC, laptops, tablet etc.	Old@Home helped to set horizontal links & permitted communication between individuals who worked together but geographically separated. It increased work efficiency & mitigated pressure, reduced wating times & isolation for professionals; It provided real-time information, improved relationships between professionals as well as patients and their relatives. It built new and more efficient work routines, more accessible & avoided duplicities technology.
Stern 2014 Canada	Descriptive Aim: to determine the clinical and cost effectiveness of enhanced multi-disciplinary teams vs. 'usual care'	Pressure ulcers in long term care (LTC) facilities	Advanced practice nurse (APN) visited intervention facilities to educate staff on pressure ulcers supported by an off-site hospital based expert multi-disciplinary wound care team via email, phone or video link.	Synchronous	ANPs. Hospital-based MDT: nurse practitioner. Chiropodist Occupational therapist. Plastic surgeon. "access to a wide variety of additional hospital based specialists"	LTC facilities with at least 100 beds and within 100km of MDT-based hospital	Hospital based expert MDT accessed via "email, telephone, or video link as needed"	Many: 12 LTC facilities	Intervention was cost effective "with most benefit through cost reduction initiated by APNs". However, the face-to-face ANP role was viewed as more important than little used remote MDT support.
Kastner 2017 Canada	Descriptive Aim: to investigate sustainability & scalability	Older adults with multiple chronic diseases	Patient home visits by trained volunteers to collect & transmit relevant health information using e-health tech to	Synchronous	Volunteer pairs. Physicians. Nurses. System navigators. Other health care professionals.	Local	Touch screen tablets integrated with family practice electronic patient records, via "automation of	11 patients of 4 family physicians	A range of sustainability and scalability issues were identified, including the need for clarity about purpose, staff training, coordination, use of IT

	determinants of pilot to inform further implementation		identify clients' health goals & chronic disease risks & inform care from an inter-professional healthcare team.				data transfer from tablets to electronic medical records"		
De Jong 2016 The Netherlands	Descriptive Aim: to evaluate the use of a tool, Congredi, for electronic communication by professionals for the care of home-dwelling elderly patients.	Research group was recruited through general practices & home care organizations 300 GPs & 650 nurses who were approached 21.4% (203/950) took part. 75.9% female. The age group between 30-50 years was 49.3%	Congredi an e-communication tool for providers originally developed in primary health care. It has the option to share data in a care plan	Asynchronous	A professional open record for a patient & starts making a care plan, based on the patient-centred (social, functional, mental, physical, & communication) domain model. The professionals involved can be invited to link & view record & the shared care plan. The types of activities 1) care activities: (a) assessment of the current problems, (b) care actions needed to address the problems of the patient c) observations of the care process and evaluation. 2)communication by secure emailing for sending & receiving emails to colleagues. 3) inviting professionals to link, which can occur at different moments in time during the care process	Presumably, a wide area as they recruited 300 GPs & 650 nurses through general practice and home care organisations	Congredi software & email	Many: general practices & home care organizations	'An e-communication tool was usable for improving multidisciplinary communication among professionals. It even seemed to yield results for 40% of the professionals who used the e-care plan on their own. The content of the tool provided an active communication practice, with significant increases observed in the actions that must be shared for the effective coordination of care.
Neurological conditions (n=2)									
Pulley 2018 USA	Descriptive study Aim: to determine whether multidisciplinary care of ALS patients using the store and	Amyotrophic lateral sclerosis (ALS)	Store (using telemedicine and forward method for the multidisciplinary care of ALS patients.	Asynchronous	Telemedicine nurse travels to patient's home for comprehensive, multidisciplinary assessment which is video recorded.	Not limited Although publications suggest that team were all in the same hospital	Video recording (Store & forward) Plus, email	One location	'Patient satisfaction was excellent and provider satisfaction was very good. The store and forward method of telemedicine is an acceptable alternative to

	forward method of telemedicine was feasible and acceptable to patients and providers.				Nurse edited the video into segments: neurology; speech/nutrition; PT/OT; respiratory; and social work. Team members notified when videos available for review. Videos viewed by ALS team who made recommendations & e-mail assessments to clinic director, who develops a comprehensive care plan based on multi-disciplinary input.				live telemedicine for multi-disciplinary care of ALS patients.'
Pretzer-Aboff 2015 USA	Descriptive study Aim: to describe implementation of an Integrative holistic health care Model for People Living with Parkinson's Disease.	Parkinson's Disease	Hybrid model with a mix of telehealth and face-to-face interactions	Synchronous	Movement disorder specialist Nurse practitioner Physical therapist Speech therapist Clinical psychologist Registered dietitian PD research team.	Not limited i.e. movement disorder specialist was involved approximately 100 miles away at another Hospital	Video-conferencing telehealth technology	One location	'The PD Telehealth Clinic provides access to specialized multidisciplinary and advanced care and was successfully implemented. This model can be replicated in other nurse managed health centres across the United States.'
Mental health (n=3)									
Rothschild 2016 USA	Randomised Controlled Trial Aim: to test the efficacy of a virtual team intervention in reducing depressive symptoms in minority elderly as measured by the 9-item Patient Health	Low-income older African Americans and Hispanics. Inclusion criteria: i) age 60 or older; ii) BMI >25.0; iii) Hispanic or African American; iv)	BRIGHTEN intervention to treat depression in older adults, to address cardiometabolic syndrome based on the link between depression, physical activity, increased waist circumference and smoking to increased cardiac risk among urban minorities.	Asynchronous	Varying. Team members included: a geropsychologist; a psychiatrist; a social worker; a chaplain; a dietitian; a pharmacist; and an occupational therapist.	Unclear	BRIGHTEN Website and email. Phone. Recordings.	BRIGHTEN website as a main location. Potentially more, including emailing.	This manuscript reports recruitment results and challenges due to participants' characteristics. Authors were able to recruit the desired population: low-income African American and Hispanic elderly populations with mild range of depression

	Questionnaire (PHQ9).	score of ≥8 PHQ-9 (symptoms of depression)	BRIGHTEN is virtual multidisciplinary team for: - Electronic assessment and team consultation. To develop multidisciplinary recommendations and patients' treatment. - Care management. Including monthly follow-ups done by phone. Psychotherapy. Cognitive Behavioural Therapy done in person and supervises virtually for the BRIGHTEN team.						symptoms and high BMI. There were some demographics differences between African American and Hispanic participants.
Emery 2016 USA	Feasibility study – Observational Aim: to test feasibility of a virtual team intervention in reducing depressive symptoms in the older population (60yrs+)	Participants were screened in nine primary clinics. Inclusion criteria: 60+ years old. Participants were excluded due to cognitive impairment or psychotic disorder.	BRIGHTEN intervention described in the study above.	Asynchronous	The virtual team included psychologist, social worker, psychiatrist, physical therapist, occupational therapist, dietetics, chaplain, and pharmacist.	Unclear	Mainly email. Also, phone and Fax.	Potentially more than one.	2422 older adults were screened. 150 participants enrolment in BRIGHTEN with 76 participants six months later. Significant improvement in depression symptoms and general mental health Authors concluded that BRIGHTEN provided high level of care and highlighted the enrolment of a strong minority and a broader team-based intervention. Practitioners felt connected to a multidisciplinary team. Challenges: Some clinics were less prepared (time and resources) having bad implications in fidelity.

									Physician had limited time for screening and a lack of training dealing with mental health issues. This intervention contributed to fight against mental health stigma (particularly in elderly people) BRIGHTEN program was an innovative solution to access professionals to meet metal health needs in clinics.
De Jong 2018 The Netherlands	Descriptive observation comparative study Aim: to evaluate the use of a professional e communication tool Congredi in a care context that differed in complexity- dementia	96 records of patients with dementia: n=43 with low complex needs and n=53 with high complex needs	Congredi an e-communication tool for providers originally developed in primary health care. It has the option to share data in a care plan	Asynchronous	As above for De Jong 2018 care providers included case managers, GPs, nurses, and paramedic carers	It was unclear as to the geographical area of the study- it was described as records being extracted from the Congredi system for use in comparison	E-tool using e-mail for communication.	Potentially more than one location	42 data were gathered over 42 weeks. Comparing low complex patient care with high risk complex care: Mean care activities5.61 vs. 10.43 p=0.01 Mean no. of personnel involved 2.51 vs. 3.58 p=0.01 For low complex patients' personnel were mostly (several) case managers 41.9% For high complex patients, the most frequent were case managers and nurses 43.4% 'it was concluded that professionals are using Congredi adequately in the multi-disciplinary care of patients with dementia.'

Diabetes (n=1)

MacRury 2018 Scotland	Descriptive Aims: i) to evaluate the technical feasibility of a care pathway using innovative technology, and ii) to establish process enhancement of the pathway to justify a larger-scale study.	Diabetes	Face-to-face consultation by community podiatrist and virtual consultation with members of the multidisciplinary foot team	Synchronous	Community podiatrist specialist diabetes podiatrists diabetes consultant	Remote and rural locations	Email and video consultation link to the patient's home facilitated by a network router stored in the community podiatrist's car outside the patient's home	Many	Increase in consultation time for community podiatrists. Quicker diagnosis, improved accuracy of diagnoses, and improved access to treatment for patients.

Table 2: Feasibility and implementation factors in choosing technologies to support a virtual multidisciplinary team (vMDT)as described in Munroe & Swartzman British Journal of Medicine 2013 [1]

Factor	**Permanence** Is a permanent retrievable searchable archive of team discussions required?	**Symbolic meaning** The medium is the message: will people feel disrespected if, for example, they receive an email rather than a phone call?	**Training & support** How much training and support will participants need to use the system effectively?	**Access** Will participants be able to access the system, or will firewalls and other security measures prevent them from participating?	**Bandwidth** Will participants have access to sufficient bandwidth so that frustration (as, e.g., when large files are downloaded) is avoided?	**Image quality** Will any images used in the virtual meeting be of sufficient quality to ensure reliable interpretation and assessment by team members?	**Automatic notification** Would participants wish to be notified automatically if there was a topic that required their input, or would they prefer to monitor the system themselves?	**Other**
General older/elderly population (n=4)								
Vimarlund 2008 Sweden	No specific information given	No specific information given	Training stated as important part of success of intervention: raising staff involvement & commitment with the organization.	Unclear. Although, they considered the different devices used by providers. Information is also sensitive. Therefore, security measures were expected.	Fibre-optic infrastructure connecting primary healthcare centres, Old@Home units, and a residential home for the elderly.	No specific information given	No specific information given	
Stern 2014 Canada	No specific information given	No specific information given	Not enough information.	Virtual communication with the MDT was feasible but played only a minor role	No specific information given	No specific information given	No specific information given	
Kastner 2017 Canada	No specific information given	No specific information given	A range of training and support would be required for volunteer and staff	Not enough information.	The intervention could be viewed as “overwhelming” for practices including “paper-based primary care practices”	N/A	Not discussed, but it was noted that practices may lack the “physicians to address identified problems”	
De Jong 2016 The Netherlands	To start Congredi, a professional opens a record for a patient and starts making a care plan. The professionals involved with this patient can be invited to link and can thus view the record, including the	This paper was involved in the provider perspective and did not have any specific detail on patient response.	Providers applied to managers to go on the Congedi course. Once it was agreed they attended a half day course	‘Congredi consists of a care plan that is usable at any moment in time.’	No specific information given	No specific information given	No specific information given	This project was financially supported by CZ Health Insurance Company. CZ had no role in the study.

	shared care plan on an ongoing basis.							
Neurological conditions (n=2)								
Pulley 2018 USA	Not explicitly discussed but the following was stated 'The goal was to have the live videoconference as soon as possible after availability of the care plan.' 'All devices that stored data had tracking ability and remote erasure capability.'	A patient satisfaction questionnaire was used, and it was reported that the patients were uniformly satisfied with telemedicine visits (Table 2). Patient satisfaction with the traditional in-person multidisciplinary ALS clinic was also excellent (Table 3).	Training was provided: during neuro-muscular clinic with neurologist for Medical Research Council grading. in the outpatient physical therapy/ occupational therapy & speech therapy clinic; & at the pulmonary lab for respiratory therapy. Training on video equipment included simulated patient evaluations.	Some providers indicated disagreement regarding the ease of the process. The nutritionist seemed to be generally less satisfied with telemedicine than other providers and this was not due to difficulty with viewing the video, the formatting, or obtaining the information to assess the patient.	No specific information given	Provider satisfaction seemed to suggest this was adequate	No specific information given	Tele-consultation does not come under current medical insurance in the for patients living in Alaska and Hawaii. – would need to be paid by patient. Live video conferencing considered in future plans Lack of provider – patient physical contact may be an issue
Pretzer-Aboff 2015 USA	'Issues are documented and tracked and discussed at monthly team meetings.'	Unclear The authors describe the benefits of the system for patients and they also facilitate interaction with carers but there are no data to suggest that either have been asked what they think about the system.	'It is,... a model that takes a great deal of team coordination & ongoing training. Team members have to learn to work together to use similar documentation tools, agree on data collection tools, how to use the information collected & when to refer patients to other team members.' The authors describe that nurses had PD educational training & 'developed' a strong skill set in use	This was outlined in future plans. 'Documentation is centralized into one electronic medical record. The next phase of development for the clinic is to begin care coordination that involves all the aforementioned healthcare providers to be at the table face-to-face (or virtually face-to-face via video conference) to discuss selected patient cases with the goal of improved	It was found that during this study, internet connections are often somewhat unstable and unpredictable, and the team members have limited availability on clinic days. During a busy clinic, deviation from the schedule can create chaos and patient satisfaction with their care may be impacted.	The store and forward method included the large video files. These needed to be stored & therefore adequate computer storage capacity needed. Playback of the videos can be challenging if the internet connection does not provide a high-speed connection or has sufficient memory. Excessive buffering of the videos was a major area of concern for the clinic	No specific information given	Other issues flagged up by authors Tele-consultation does not come under current medical insurance in the USA – would need to be paid by patient. Patients do not normally have access to movement therapist, so this professional was overwhelmed with requests for appointments

			of telehealth technology. There was no detail on how skilled or any training for other care professionals involved.	patient care & outcomes.'		team members early in the study, but, in general, this was later solved.		
Mental health (n=3)								
Rothschild 2016 USA and **Emery** 2016 USA	Yes. BRIGHTEN intervention involved multidisciplinary professionals to provide different perspectives for an integrated care to the population. This was solved mainly with the Programme Coordinator which role was to coordinate patients and providers and collate information.	BRIGHTEN intervention involved the assessment and team consultation electronically. This was particularly important to implement the action plan and care management by the Programme Coordinator who expected that professionals' recommendations were stored electronically. Moreover, the website was built to respect the confidentiality of the data. Therefore, the medium was important.	There is no information about how much training and support were needed. However, authors indicated that those clinics with less computer skills and knowledge were less successful. There are also mentions about visits and continue support from the Programme Coordinator.	Not enough information. However, the paper form Rothschild (2006) states that they needed to develop a website-based tool to meet security needs due to the confidentially requirements. Members needed to log on into the secure website to access the data and provide recommendations.	Not enough information. However due to the nature of the files and the sensitivity of the information a lack of enough infrastructure might have led to frustration. Additional security was required to maintain confidentiality.	No specific information given	Programme Coordinator was in charge to notify by email to the rest of members to log on into the secure website and read evaluations to provide recommendations.	The role of the programme coordinator seemed particularly important. They were in charge to provide training and support, also to collate recommendations and share them with participants to develop an action plan. Programme Coordinator also connected participants with recommended services and managed follow-up.
De Jong 2018 The Netherlands	As above	This paper was involved in the provider perspective in terms of high and low complex dementia patients. It did not have any specific detail on patient response.	As above. training was 4 hours in duration	As above	No specific information given	No specific information given	No specific information given	This study focused on examining the difference of managing high and low complex dementia patients as opposed to investigating implementation issues

Diabetes (n=1)							
MacRury 2018 Scotland	No specific information given	No specific information given	Appropriate training in the use of equipment would be required	Appropriate security was viewed as important	Steps to maximise "connectivity" were viewed as key	Tablets were used to take images of "amazing sharpness"	No specific information given

Search details

Initial project screen:

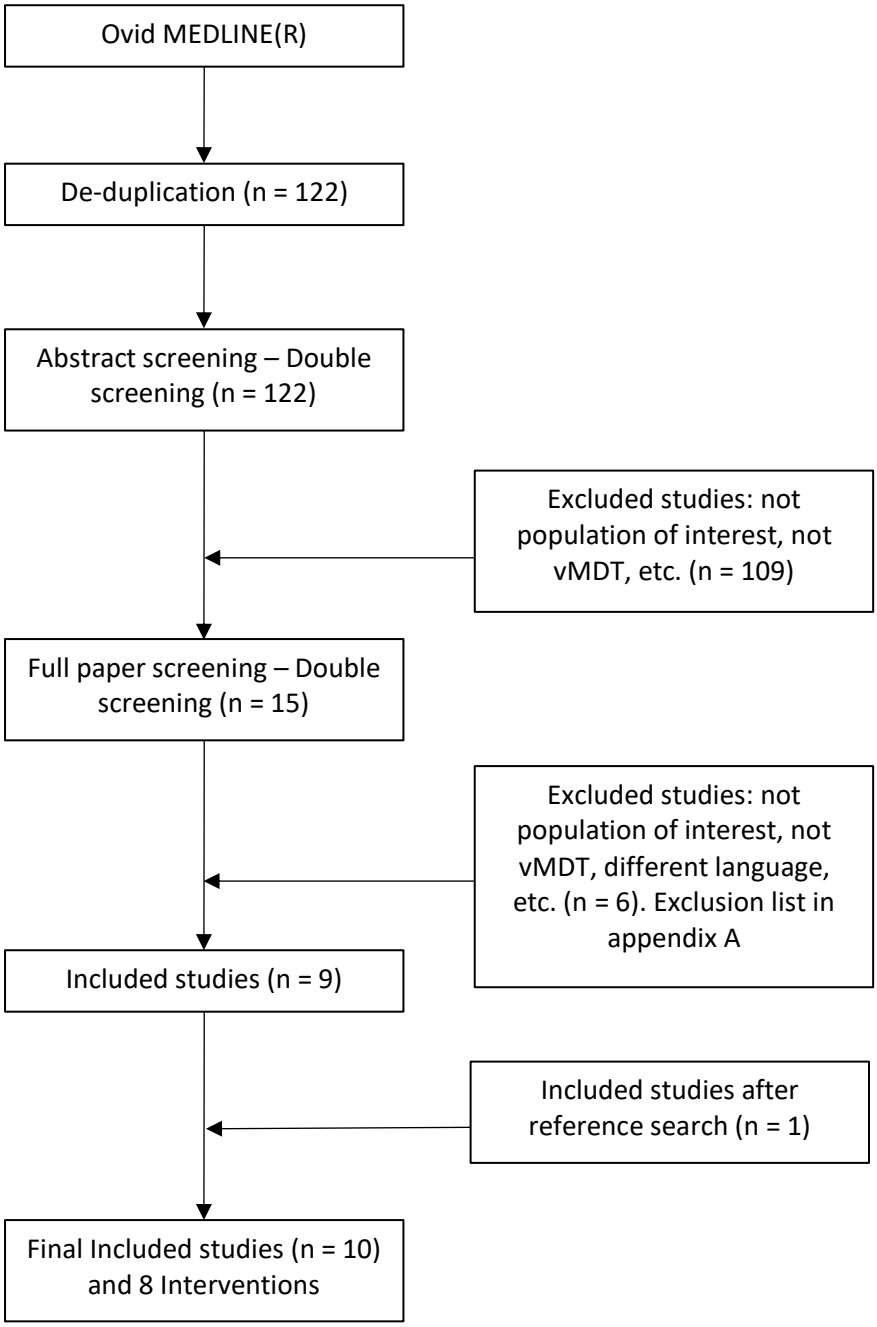
Source	Link	Relevant Evidence Identified
CEBM, University of Oxford	https://www.cebm.net/covid-19/	None found
Evidence aid	https://www.evidenceaid.org/coronavirus-resources/	None found
Cochrane Methodology Review Group	Infection control and prevention: https://www.cochranelibrary.com/collections/doi/SC000040/full Evidence relative to critical care: https://www.cochranelibrary.com/collections/doi/SC000039/full	None found
Department of Health and Social Care Reviews Facility	http://eppi.ioe.ac.uk/COVID19_MAP/covid_map_v3.html	None found
UCSF COVID19 papers	https://ucsf.app.box.com/s/2laxq0v00zg2ope9jppsqtnv1mtxd52z	None found
PHE Knowledge and Library Services	https://phelibrary.koha-ptfs.co.uk/coronavirusinformation/	None found
WHO Global Research COVID19 database	https://www.who.int/emergencies/diseases/novel-coronavirus-2019/global-research-on-novel-coronavirus-2019-ncov	None found
CDC COVID19 guidance	https://www.cdc.gov/coronavirus/2019-ncov/hcp/index.html	None found

Search for SRs and Primary studies

Source	Search strategy	Number of Hits	Relevant evidence identified
KSR Evidence			Not searched
Medline	Database: Ovid MEDLINE(R) <1946 to present> Search Strategy: --- 1 multidisciplinary team meeting.mp. (231) 2 Patient Care Team/ (64779) 3 multidisciplinary collaboration.mp. (996) 4 multidisciplinary case conference.mp. (24) 5 1 or 2 or 3 or 4 (65849) 6 Coronavirus/ or Pandemics/ or Coronavirus Infections/ or COVID.mp. (13110) 7 5 and 6 (11) 8 virtual*.mp. (124742) 9 Remote Consultation/ or remote*.mp. (78562) 10 Information Technology/ (336) 11 Telemedicine/ (21958) 12 online management.mp. (31) 13 e-health.mp. (2614) 14 8 or 9 or 10 or 11 or 12 or 13 (221081) 15 Frail Elderly/ (11198) 16 rockwood.mp. (452) 17 Aged/ (3043480) 18 "Aged, 80 and over"/ (900324) 19 15 or 16 or 17 or 18 (3085356) 20 5 and 14 and 19 (122)	122	
Rayyan "COVID-19 Open Research Dataset"			Not searched

Appendix A.

Figure 1. PRISMA Flow Diagram.



Excluded studies after full paper screening:

Emerson, J., Welch, M., Rossman, W., Carek, S., Ludden, T., Templin, M., Moore, C., Tapp, H., Dulin, M., & McWilliams, A. (2015). A Multidisciplinary Intervention Utilizing Virtual Communication Tools to Reduce Health Disparities: A Pilot Randomized Controlled Trial. *International Journal of Environmental Research and Public Health*, *13*(1), 31. https://doi.org/10.3390/ijerph13010031

Reason for exclusion: pilot protocol study and not fully vMDT

Fabbri, G., Gorini, M., Maggioni, A. P., Oliva, F., & Area, S. A. (2007). Heart failure: the importance of a disease management program. *Giornale italiano di cardiologia (2006)*, *8*(6), 353.

Reason for exclusion: Italian language

Katz, I. J., Pirabhahar, S., Williamson, P., Raghunath, V., Brennan, F., O'Sullivan, A., Youssef, G., Lane, C., Jacobson, G., Feldman, P., & Kelly, J. (2018). iConnect CKD - virtual medical consulting: A web-based chronic kidney disease, hypertension and diabetes integrated care program: iConnect CKD - virtual medical consultation integrating care. *Nephrology*, *23*(7), 646–652. https://doi.org/10.1111/nep.13070

Reason for exclusion: virtual consultation; not fully vMDT

Messina, W. (2016). Decreasing Congestive Heart Failure Readmission Rates Within 30 Days at the Tampa VA: *Nursing Administration Quarterly*, *40*(2), 146–152. https://doi.org/10.1097/NAQ.0000000000000154

Reason for exclusion: telehealth; not fully vMDT

Morgan, D. G., Crossley, M., Kirk, A., D'Arcy, C., Stewart, N., Biem, J., Forbes, D., Harder, S., Basran, J., Dal Bello-Haas, V., & McBain, L. (2009). Improving access to dementia care: Development and evaluation of a rural and remote memory clinic. *Aging & Mental Health*, *13*(1), 17–30. https://doi.org/10.1080/13607860802154432

Reason for exclusion: vMDT not main element of the intervention

Taylor, A. M., Bingham, J., Schussel, K., Axon, D. R., Dickman, D. J., Boesen, K., Martin, R., & Warholak, T. L. (2018). Integrating Innovative Telehealth Solutions into an Interprofessional Team-Delivered Chronic Care Management Pilot Program. *Journal of Managed Care & Specialty Pharmacy*, *24*(8), 813–818. https://doi.org/10.18553/jmcp.2018.24.8.813

Reason for exclusion: virtual component only for pharmacist