

Methods and Effectiveness of Communication Between Hospital Allied Health and Primary Care Practitioners: a Systematic Narrative Review

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Abstract

Background There is a compelling rationale that effective communication between hospital allied health professionals and primary care practitioners could improve quality and continuity of patient care. It is not known which methods of communication are used, nor how effectively they facilitate the transition of care when a patient is discharged home from hospital. Our systematic review aims to investigate the methods and effectiveness of communication between hospital allied health professionals and primary care practitioners.

Method Systematic review of quantitative and qualitative studies with narrative synthesis. Medline, CINAHL, EMBASE, PsycInfo and Proquest Nursing and Allied Health Sources were searched from January 2003 until January 2020 for studies that examined hospital allied health professionals communicating with primary care practitioners. Risk of bias in the different study designs were appraised using recognised tools and a content analysis conducted of the methodologies used.

Results From the located 12,281 papers (duplicates removed), 24 studies met the inclusion criteria with hospital allied health professionals communicating in some form with primary care practitioners. There was, however, limited literature investigating the methods and/or the effectiveness of communication between hospital allied health professionals and primary care practitioners.

Conclusion There is currently no 'gold standard' method or measure of communication between hospital allied health professionals and primary care practitioners. There is an urgent need to develop and evaluate multidisciplinary communication with enhanced health information technologies to improve collaboration across healthcare settings and facilitate continuity of integrated people-centred care.

Registration: www.crd.york.uk PROSPERO CRD42019120410

Background

Discharge planning is a routine feature of healthcare, with a goal of improving the coordination of services following discharge from hospital [1]. Discharge communication provides a vital link between hospitals and primary care and is an important determinant of positive patient outcomes following hospitalization [2], helping to maintain seamless transitions of care between healthcare providers. Ineffective communication and information transfer, particularly during transitions of care [3], can have substantial implications for patient safety and continuity of care [4], patient and care provider comprehension and satisfaction [2], as well as resource use [5].

Despite quality and economic imperatives to improve hospital discharge planning [1] and facilitate transitions of care [5], no single intervention has consistently demonstrated a reduction in rehospitalisation when implemented alone [6]. The World Health Organization set global priorities in 2018 to promote integrated people-centred health services through collaboration and integration across sectors, healthcare settings, providers and users [7], yet one of the greatest challenges remains the consistent communication of information [8]. According to the WHO, people-centered care adopts the perspectives of individuals, care

givers, families and communities relative to the comprehensive needs and social preferences of people, rather than individual diseases [7]. A person-centered (or patient-centered) approach is less encompassing, but still allows the person to be seen as a whole [9], with needs and goals derived from their own social determinants of health [7]. Such an approach should allow patients to share their health information at the appropriate time with the right person [10]. Despite the patient often being the only constant when healthcare teams change during transitions of care [11], differences in patient attitude [12] and patient ability can compromise the sharing of health information [13]. Mixed evaluations to date [14] and persistent problems with patient data interoperability means that personal health records are not yet commonplace [15]. Health information technology (IT) developments have the potential to improve communication [16] and collaboration [17] at the time of discharge. Yet despite the increased adoption of health IT, there is very little research that evaluates the effectiveness of these information and communication systems [10]. Furthermore, evidence of system incompatibility and security issues [11], suggest that health IT solutions do not yet support sufficiently detailed or timely communication to or from hospitals to enable primary care practitioners to coordinate patient care effectively [18]. Many gaps in the system remain, and one-way communication from hospital medical practitioners to primary care practitioners continues to be the mainstay of hospital discharge communication, even when multidisciplinary teams are internationally recognised as the preferred method of healthcare delivery [19].

Multidisciplinary teams are an integral component of improved health outcomes and collaboration between people, professions, systems and settings [20]. Within the multidisciplinary team, allied health professionals provide specialized patient support and contribute important information regarding patients' function, social situation, recovery goals and discharge needs, as an addition to nursing and medical care [21]. Variability in the way discharge information is transferred [2] suggests processes are not standardized, and anecdotally such information rarely encompasses the allied health view. Multidisciplinary teams should provide the necessary diversity of views for collaborative care planning, yet it is not known if hospital allied health perspectives are sufficiently represented nor how well communicated to primary care practitioners after hospital discharge [1].

Discharge communication remains a recognised problem area in spite of the international research [22, 23] and regulatory attention it receives [24]. In the most recent review of 30 trials of discharge planning [1], none reported on the quality of communication. Effective communication is essential for multidisciplinary collaboration within and between healthcare settings is, thus a key indicator of quality of care, yet it has not been systematically reviewed and synthesized. There is a particular gap in the knowledge base regarding communication between hospital allied health professionals and primary care practitioners. Therefore, this systematic review sought to answer the following research questions:

1. What are the effective methods and/or models of communication between hospital allied health professionals and primary care practitioners?
2. What are the enablers and barriers to effective communication between hospital allied health professionals and primary care practitioners?

For the purpose of the review, the '3C Collaboration Model' [25] is used to define 'communication' as the exchange of information to generate commitments that are then managed by 'coordination' so that individual care activities interact through shared spaces to work 'cooperatively' to ensure the success of the overall care process. These three components work together to comprise healthcare collaboration [17].

Methods

The protocol for this review was developed and prospectively registered with PROSPERO International Prospective Register of Systematic Reviews [PROSPERO CRD42019120410]. Using a systematic review process, the search was performed to identify both quantitative and qualitative studies published in English between January 2003 and January 2020. The 'SPIDER' (Sample, Phenomenon of Interest, Design, Evaluation, Research Type) tool [26] was used to define the inclusion and exclusion criteria to facilitate the identification and selection of studies in this review.

Design: We excluded protocols, abstracts, meeting summaries, theses, letters, editorials, opinions and conference papers. Qualitative research without thematic analysis was also excluded.

Evaluation: Since the review aimed to identify, analyze and synthesize the literature relating to all forms of communication between hospital allied health professionals and primary care practitioners, we considered any types of outcomes reported in the studies.

Research type: There were no restrictions of research type; qualitative, quantitative and mixed method were included, provided publications met the design inclusion criteria.

Identification and selection of studies

The search was conducted in the following databases: MEDLINE, PsycInfo, EMBASE, CINAHL and Proquest Nursing and Allied Health Source. To identify studies relating to the communication between hospital allied health professionals and primary care practitioners, the key search terms included: "communication", "interaction", "collaboration" "allied health", "primary care" and "general practice" [full search strategy available as Additional File 1]. We excluded studies published prior to 2003 to reflect the more recently evolved methods and models of communication within healthcare, including electronic discharge summaries. One author [JS] conducted the searches. Reference lists of included studies were also screened by one author [JS] to identify relevant studies, and authors were contacted for further information as required.

The search results from all databases were merged and all duplicate articles removed using EndNote software. The Covidence platform was used for screening and eligibility assessment of the retrieved citations. The citations from the search, after excluding duplicates using EndNote, were uploaded into Covidence by one author [JS]. Two authors independently assessed all retrieved citations meeting the inclusion criteria on the basis of title and abstract [involved authors JS, NAL, KL, AS]. Potentially eligible studies were then reviewed in full text independently by two authors [involved authors JS, MR, KL] and a third author was consulted in cases of disagreement [involved authors NAL, KL].

Data Extraction

A standardized data extraction form based on the SPIDER tool [26] was developed to collate the sample, phenomenon of interest, design, evaluation and research type of the included studies. One author [JS] extracted all data, with independent review from a second author [MR]. *Extraction tool available on request.*

Data synthesis

A narrative synthesis strategy was then used to organize, summarize and present the data, based on Guidance on the Conduct of Narrative Synthesis in Systematic Reviews [27]. This structured process thematically summarized studies based on Berlo's Model of Communication [28], which categorised findings where possible into components of communication by 'sender/source' and/or 'receiver' and/or 'message/channel'. As the included studies were diverse, this initial synthesis allowed a breakdown of the varied and complex characteristics of healthcare communication.

Following this classification, one author [JS] used an inductive approach to thematic analysis [29], coding the studies line-by-line to elucidate common patterns of meaning and areas of potential interest [30]. Data were coded by collating in columns, colours and concepts to identify potential themes, which were then reviewed across the full data set to map and further refine the specifics of each prevalent theme. Generated themes were then tabulated in word documents relative to the research questions to determine the effective methods and/or models of communication as well as the barriers and enablers to effective communication, between hospital allied health professionals and primary care practitioners. To further contribute to thematic analysis, full texts of included studies were uploaded to NVivo 12.2 software program [31], enabling word frequency and word mapping, for further data-driven exploration of the conceptual relationships.

Quality Appraisal

Given the heterogeneity of the included study designs, studies were appraised for reporting quality using the most appropriate tool for their design. Specifically, we used the Joanna Briggs Institute Critical Appraisal Checklist for Qualitative Studies [32], the McMaster Critical Review Form for Quantitative Studies [33] and the Mixed Methods Appraisal Tool [34] to assess risk of bias in qualitative, quantitative and mixed method designs respectively. Acceptable quality was pre-defined as $\geq 50\%$ of applicable criteria being met.

Results

A total of 24 studies were included in this systematic review. Of these studies, 13 were qualitative, 7 were quantitative and 4 used mixed method designs. Studies were conducted in The United States (n=9, 38%), Australia (n=5, 21%), Sweden (n=3, 13%), The Netherlands (n=2, 8%), The United Kingdom (n=2, 8%), Canada (n=1, 4%), New Zealand (n=1, 4%) and Norway (n=1, 4%). Health professionals in these studies included nurses, nurse practitioners, doctors, medical students, occupational therapists, dieticians,

physiotherapists, speech and language pathologists, social workers and case managers. Table 1 outlines the included study characteristics; Figure 1 presents the study PRISMA flow diagram [35].

Overall study quality was rated as acceptable across all appraisal checklists, with all relevant studies met at least minimal standards of adequacy in accordance with their respective quality appraisal tools. The summary of the results of quality appraisals for qualitative, quantitative and mixed method studies are presented in Tables 2a, 2b and 2c respectively. Findings were summarized to address the two research questions separately and narratively synthesized to develop the themes. The characteristics of the different communication methods for each study are categorized according to Berlo's Model of Communication [28] in Table 3, highlighting the roles and processes of different healthcare professions, healthcare teams and healthcare settings. Clear categorization was not possible where study samples included both hospital-based and community-based healthcare professionals but generally, hospitals were the senders or source of discharge communication to primary care practitioners, the intended receivers of patient information, using various messages and/or channels.

Effective methods and/or models of communication between inpatient allied health professionals and primary care practitioners

None of the included studies specifically investigated the methods of communication or evaluated the effectiveness of communication between hospital allied health professionals and primary care practitioners. Twelve of the 24 studies, however, described programs or processes that indirectly addressed components of communication between hospital allied health professionals and primary care practitioners [5, 8, 36-45]. Narrative synthesis of each study included exploration of these 12 interventions within the context of their relationship to some guiding theoretical models of care, namely the chronic care model [46], the collaborative care model [47] and the integrated care model [48]. The relevance of the theoretical underpinnings of each model of care will be briefly discussed in relation to evolving healthcare practice, based on our analyses of these 12 interventions from the included studies.

Chronic Care Model

A descriptive paper by Allen et al. in 2004 described the theoretical basis for a randomized trial of a comprehensive post discharge care management program, STEPS CARE [36]. The report included details of a clinical information system that allowed hospital care plans to be communicated directly to primary care. Within the descriptive paper, the authors ascribed what they termed a chronic care model to their program [36] however, has since become recognized as a proactive, person-centered, evidence-based approach with features more consistent with a collaborative care model [47].

Collaborative Care Model

Chronic care management has evolved to incorporate a collaborative care model, which includes the active engagement of hospital and primary care providers in the shared care of patients beyond usual discharge summaries [47]. All 12 of the interventions identified in the literature [5, 8, 36-45] included features

consistent with a collaborative model of care in their initiatives to improve hospital discharge planning and continuity of care, even though they did not all reference a theoretical basis.

A collaborative care model may have formed the theoretical framework for the 'Accountable Care in Transitions Program' [5] described by Hawes et al. (2017), however was not specifically named. A well-coordinated, multidisciplinary team approach was used within the outpatient transition setting to support patients in the community after hospital discharge, facilitated by direct communication between social workers acting as care managers in both the hospital and in the primary care setting [5]. Social workers too, were described as 'boundary spanners' to facilitate communication between a medical cancer centre and primary care in an intervention described by Flieger et al. in 2019 [37]. In this study, the payment and delivery system innovation adapted an identified chronic care management model to become a more collaborative model of care. The reform prompted the routine sharing of information between the hospital social workers and the primary care chronic care coordinators, allowing improved care coordination and communication across healthcare settings [37].

Improved communication between the hospital and primary care providers was also attributed to hospital allied health professionals, in a retrospective report by Holmes et al. in 2017, describing the trial of a new allied health service in an emergency department [39]. The pilot project indicated that the inclusion of a combined social work and physiotherapy service increased patient links to primary care after hospital discharge. Stakeholder and staff feedback via a questionnaire suggested communication had improved between the hospital and primary care [39], however objective data was not provided so the findings need to be interpreted with caution.

Early attempts to use information technology (IT) to improve the hospital-primary care interface were described by two earlier studies. An electronic data linking system evaluated by Massy-Westropp et al. in 2005 [41] allowed hospital access to a primary care data base and alerted primary care providers to patient discharge from hospital. A study by Wilson et al. in 2004 [45] indicated that using videoconferencing between the hospital multidisciplinary team and primary care providers provided a better patient management plan than telephone conferencing [45]. Unfortunately, both studies relied on the opinions of a small sample of staff rather than finding statistically significant measures of effect, so the findings are difficult to generalize.

Health IT developments have enabled more sophisticated programs to measure and improve care coordination such as those described by Thomas and Siaki (2017) [43] and Hsiao et al. (2018) [40]. Both interventions are comprehensive, multidisciplinary approaches to facilitate communication of hospital discharge plans with primary care through the integration of electronic health records, promotion of patient engagement and ongoing monitoring of patients to ensure timely follow up with primary care. Both studies concluded that more efficient IT systems are required to support improved communication across the healthcare continuum [40, 43]. Hsiao et al. suggested that access to hospital medical records (inclusive of allied health documentation) enhanced primary care outcomes and recognized the need for input from community-based organisations to address social and economic issues [40]. This integrated model of

care, which they identified as a 'care coordination approach', was reported to strengthen relationships between the hospital and community healthcare [40].

Integrated Care Model

Hesselink et al. [38] used an intervention mapping framework, commencing first with a systematic review of effective discharge interventions, to develop a comprehensive guide to improve communication between hospital and primary care. Integrated care was identified as one of the theory-based methods used to identify that discharge templates, a liaison person, reconciliation of medication and regular site visits were strategies to support high-quality discharge information, well-coordinated care, and direct and timely communication with primary care [38]. As mental healthcare and social services were not mentioned in the study, it would seem that these strategies were more closely aligned with a collaborative model of care than an integrated model of care.

As one component of an identified 'integrated program of services', McAiney et al. [42] described the role of an intensive geriatric service worker, developed to address the challenges faced by seniors transitioning from hospital to community care that place them at risk of poor outcomes including preventable hospital readmission. A theoretical model was not specifically mentioned however, the intensive geriatric service worker role was developed with the collaboration of a geriatric health services network and a community-based mental health service to help seniors navigate a complex and disjointed healthcare system [42].

In another example of the extension of a collaborative model of care, Trankle et al. [44] noted that integrated care aims to improve communication, not just between hospitals and primary care but also between physical care and mental healthcare, as well as between healthcare and social care. The authors evaluated a program, the Western Sydney Integrated Care Program, which enabled shared patient care plans to be developed and accessed by hospital and community healthcare providers and patients. Within this broader evaluation, it was concluded that the program improved patient and carer experience of healthcare and built capacity in primary care, acknowledging electronic communication across healthcare sectors remained difficult [44].

The 'Advanced Care Coordination Program' proposed by Miller et al. [8] seemed similarly to be based on an integrated model of care, to address the gaps in care during patient care transitions, although a theoretical framework was not discussed. Their social worker-led program focused on social determinants of health in a comprehensive and longitudinal care coordination intervention. The core components of care coordination were initial notification of patient hospital admission, a comprehensive needs assessment, clinical intervention as indicated and a phone call to the primary care providers [8]. The comprehensive needs assessment addressed access to health care, economic status, housing status, psychological status, and social support. The program included the development of a shared data base, as well as the provision of continuing education and outreach to bridge healthcare and social care communication after hospital discharge [8].

To summarise, while no specific methods or measures of communication between hospital allied health professionals and primary care practitioners were evaluated, elements of a collaborative care model [47] seemed to underpin the majority of studies describing interventions to improve discharge planning and communication between hospital settings and primary care settings. The more recent studies suggest that the collaborative model of care can evolve to become an integrated model of care, providing a theoretical framework for interventions to facilitate collaboration between healthcare and community services, including mental healthcare and social care services. There were some common concepts and components identified in the included studies which have helped and hindered general communication within and between hospital and primary care, which will be further discussed in relation to the enablers and barriers highlighted within each study.

Enablers and barriers to effective communication between hospital allied health professionals and primary care practitioners.

Coding of the literature allowed identification of the four most common themes in relation to components and processes of communication between hospital and primary care, allowing an insight into the factors affecting communication between hospital allied health professionals and primary care practitioners. The four emerging themes of 'multidisciplinary care plans', 'patient and caregiver involvement', 'health information technology' and 'follow up', are outlined in Table 4 as the enablers to communication, however they have their own barriers as described below and included in Table 5.

Multidisciplinary care plans

Multidisciplinary care plans were important components of the 12 interventions aiming to improve communication processes between hospitals and primary care [5, 8, 36-45]. The remaining 12 studies [49-60] assumed or suggested that multidisciplinary care plans were a means of facilitating healthcare communication, as outlined in Table 4. There were, however, multiple barriers to the practice and process of multidisciplinary care plans/planning mentioned in the 24 included studies, including ineffective relationships between health professions [49-55], junior doctors responsible for the discharge summary [53] and allied health reports and recommendations omitted from the care plan [49, 56].

Patient and caregiver involvement

According to the World Health Organisation, person-centered care takes into account the patient's values, beliefs and preferences while encouraging them to actively participate in their own individualized care plan [7]. Involving the patient and their caregiver in care planning and encouraging self-management was incorporated in 18 (75%) of the 24 included studies [5, 8, 36-40, 42-44, 50-55, 58, 59] as seen in Table 4. Several of the studies reported negative patient experiences of the discharge process where they did not feel sufficiently involved or informed [38, 42, 51, 53].

Despite theoretical models, healthcare policies and hospital guidelines, it seems barriers remain to the involvement of patients in their own care planning, preventing healthcare practice from being truly person-centered and compromising initiatives to become more people-centered. Two studies focused specifically

on unmet communication needs of patients and their caregivers leading to issues with continuity of care [51, 52]. Other studies found some patients do not dare to speak up [38] and/or are unable to comprehend information or be too medically unstable to contribute to discharge planning [53]. Furthermore, healthcare professionals may not feel equipped to broach certain topics with patients and caregivers [59]. Insufficient time and knowledge to allow effective communication with patients and caregivers [49, 53] could be further barriers to involving patients and their caregivers in the planning of care.

Health information technology

There was a general consensus in the literature with 17 (71%) of the 24 included studies suggesting that advances in health IT may offer a promising solution to the inconsistency of healthcare communication [5, 8, 36-38, 40, 41, 43, 44, 51-58], as seen in Table 4, but multiple barriers to its implementation were identified. Logistical barriers to health IT include the lack of staff access and training [41, 60], lack of appropriate technology [36, 40] and system incompatibility [8, 37, 38, 44].

Follow-up

In the absence of consistent, compatible health IT systems to share care plans and standardize communication across healthcare settings, the importance of a designated person to support the transition of care was highlighted by 19 (79%) of the 24 included studies [5, 8, 36-40, 42-44, 49, 50, 52-54, 56-59] as seen in Table 4. 'Care manager' and 'case manager' were the most common titles attributed to the healthcare professional identified to follow up patients after hospital discharge [5, 36, 43, 49, 54], however they were also referred to as 'chronic care coordinator [37], 'transition guide' [40], 'care facilitator' [44] 'health coach'[53], and 'intensive geriatric service worker' [42]. One study recommended that an occupational therapist and a geriatrician should provide post discharge follow up and communicate with primary care practitioner [50]. Other studies recommended various healthcare professionals could provide follow up and communication with primary care: a liaison nurse or pharmacist [38], nurse practitioner [60] advanced practice nurse [52] or social worker [39].

Four studies of the five studies that did not refer to a designated person to provide follow up suggested alternative processes to encourage patient follow up by primary care; two of them recommended primary care providers be involved in hospital discharge planning meetings [55, 60], another relied on an automated hospital discharge alert system [41] and one recommended patient provision of follow up service information, including whom to call if follow up does not occur [51]. Unlike the interventions recommending a designated person to provide follow up, these four studies [41, 51, 55, 60] did not include a process to ensure follow up had occurred after hospital discharge.

The main barrier to a designated person to follow up and ensure continuity of care appear to be ineffective relationships between healthcare organisations, due to and resulting in a lack of collaboration between healthcare providers [49] and between healthcare settings [38, 52-54, 56-58]. Siloed healthcare is clearly a contributing factor [38, 50, 53, 54], resulting in one-way communication [50], with hospital discharge summaries often not arriving in time to be relevant to primary care practitioners [52, 58] and without

establishing a shared understanding by determining if information is according to need and/or understood [53].

Multidisciplinary care plans that are collaborative and person-centered may be a common goal, however, there is little evidence in the literature to determine their quality, consistency or whether they support or are supported by effective communication between hospital allied health professionals and primary care practitioners. A word frequency search across all of the included studies using NVivo software [31] revealed that the term 'communication' was not one of the ten most frequent words, only appearing in the 50 most frequent words [see Figure 2], despite the accepted understanding that communication is one of the corner stones of collaborative healthcare [61].

In summary, enablers to effective communication between hospital allied health professionals and primary care practitioners are multidisciplinary care plans, made in collaboration with patient and relevant caregivers, and electronically communicated to primary care, with a designated person to follow up to ensure that there is continuity of care in the community. The barriers to such communication include that hospital discharge communication can remain disease focused and may not include allied health recommendations or the preferences of patients and their caregivers. Even when multidisciplinary care plans aimed to be collaborative and person-centered or ideally based on a people-centered integrated model of care [7], health IT systems were reported to be insufficiently compatible such that consistent, auditable, reciprocal communication between hospitals and primary care was not possible.

Discussion

Despite the wide-held assertion that hospital discharge processes and care transitions are improved through timely and accurate communication [1, 62], this narrative systematic review is the first to synthesize data on communication specifically between hospital allied health professionals and primary care practitioners. Given the paucity of research in the field, the review took a broad and inclusive approach to study across qualitative and quantitative research. In doing so, we have identified the lack of well-designed, intervention-based research in the area of communication between these key healthcare provider groups, which potentially suggests that hospital allied health professionals do not communicate effectively with primary care practitioners.

Previous systematic reviews investigating healthcare collaboration have highlighted the importance of effective multidisciplinary communication [20, 63]. While important to collaboration, there has been little recognition of the role of hospital allied health professionals from the perspective of primary care practitioners. Although the terms 'multidisciplinary' and 'interdisciplinary' are often used interchangeably to denote a healthcare team working together, it has been suggested that the terms are conceptually different, with only the latter allowing the coordination of a common and coherent approach to care [64] required for collaboration [46]. The teams mentioned in the included studies were comprised of various healthcare professionals, acknowledged at times to be poorly described, with some relying on a social worker as the only hospital allied health representative mentioned. The World Health Organisation recommends an interdisciplinary approach to healthcare [7], however differences in culture, resources and expectations of

healthcare professionals, systems and populations may result in different interpretations of definitions, theoretical models and guidelines. The heterogeneity of the included studies within this review, although deliberate to capture the scope of the issue, may be reflective of the ambiguity in terminology, suggesting a need to establish what constitutes effective multidisciplinary and/or interdisciplinary communication before they can be evaluated.

Despite the limitations of the literature, a number of key observations may be drawn from our data synthesis. Firstly, multi-component interventions using an integrated model of care could improve the success of communicating the multidisciplinary, person-centred care plan from the hospital setting to the primary care setting. Secondly, a designated person to provide follow up such as a case/care manager working across healthcare settings may be required to support the care plan [65]. Thirdly, standardization of health IT processes to include hospital allied health information regarding patients' function, social situation, recovery goals and discharge needs may facilitate multidisciplinary collaboration with greater consideration of individual patient needs and preferences, especially during transitions of care.

These findings are particularly relevant since the COVID-19 pandemic has put increased pressure on health and social systems, affecting hospital to home transitions on many levels and highlighting the particular vulnerability of older adults with complex health and social care needs [66]. Public health measures such as social distancing as well as shorter hospital stays to minimise infection, may have negative consequences for management of chronic conditions and mental health issues however they have also accelerated developments in virtual care [66]. Health IT developments such as telemonitoring, telehealth and web-based portals could facilitate communication between healthcare providers [67], patients and their caregivers [15]. While health IT has the potential to improve the quality and continuity of care [68], research findings on the impact of electronic communication on clinical practice and outcomes have been mixed [69] hence further development is needed to be able to leverage this potential.

Heterogeneity of the included studies prevented a meta-analytic synthesis of studies, and this remains a limitation of the review. In addition, the reliance of this review on qualitative and mixed method studies may reduce the representativeness of our findings. The majority of included studies originated from the United States and Australia, so the generalizability of their findings beyond these healthcare systems may be limited. We have also excluded relevant manuscripts in languages other than English, and by restricting our systematic evaluation to peer-reviewed literature we may have omitted additional publications of interest. Excluding studies from mental health and substance abuse settings prevented narrative synthesis of the integrated care model used in these care settings alongside the methods used in physical care, despite their relevance to WHO recommendations [7]. Truly person-centred and people-centred care cannot exclude mental health or the social determinants of health, however many healthcare systems do not yet integrate physical and mental healthcare with social care, hence the exclusion criteria for the purposes of this literature review. We also acknowledge that we excluded studies involving children. Pediatric healthcare also incorporates an integrated care model however it draws from other theoretical frameworks, most notably family-centred care, hence the associated research would not necessarily be applicable to an adult population.

Conclusions

In conclusion, despite the paucity of research investigating communication between hospital allied health professionals and primary care practitioners, our findings do offer a way forward. Further research is needed to understand how healthcare providers can collaborate across healthcare settings with patients and their caregivers to improve continuity of person-centred care and to strive for integrated people-centred care. Importantly, research must involve allied health professionals, to ensure the inclusion of all aspects of care, including full consideration of the social determinants of health, especially in response to the COVID-19 pandemic.

Health IT systems must be further developed and evaluated to facilitate the development, synchronized sharing and follow up of multidisciplinary person-centred care plans. Such developments could facilitate the eventual integration of all care systems and settings; combining public and private hospitals with primary care, as well as mental and physical healthcare with social care, allowing collaboration across the care continuum. Integrated people-centred healthcare will only move from theory into practice with more effective communication between hospital allied health and primary care.

Abbreviations

IT

Information Technology

COVID-19

Coronavirus Disease of 2019

Abbreviations used in Tables 1, 3, 4 & 5

PCP: Primary Care Practitioner

MDT: Multidisciplinary Team

OT: Occupational Therapist

PT: Physiotherapist

SLP: Speech & Language Pathologist

SW: Social Worker.

Declarations

The authors declare no conflicts.

Ethics approval and consent to participate - Not applicable

Consent for Publication - Not applicable

Availability of data and materials - All data generated or analyzed during this study are included in this published article [and its supplementary information file].

Competing interests - The authors declare that they have no competing interests.

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Authors' contributions - All authors made substantial contributions to the conception and design of the study; JS, KL, NAL and MR contributed to the acquisition, analysis and interpretation of data; JS drafted the work which was then revised by all authors; all authors read and approved the final manuscript. Each author has agreed both to be personally accountable for their own contribution and to ensure that related questions are investigated, resolved and documented.

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Tables

Table 1. Summary of included studies using SPIDER tool categories.

Study	Sample	Phenomenon or intervention	Design/Evaluation	Research type
Allen et al., 2004 United States	No sample described.	Comprehensive, MDT post-discharge care management model, includes self-management support for patient and PCP decision support.	Rationale and theoretical basis of a care management model.	Descriptive report
Baker & Wellman, 2005 United States	Case managers (n=84) based in non-profit hospital.	Identification of case manager's discharge planning concerns regarding nutritional needs of older patients and the degree to which registered dieticians were involved.	Survey with 86 questions and six case scenarios. SPSS used for descriptive data analysis.	Quantitative
Bleijlevens et al., 2008 The Netherlands	Outpatients (n=333) and primary care healthcare providers (n=8)	Process evaluation explaining the ineffectiveness of a primary care MDT falls prevention program.	Self-administered questionnaires, structured phone interviews, recording forms, face-to-face interviews and a plenary group discussion.	Mixed methods
Christie et al., 2016 United Kingdom	Outpatients (n=45), their carers (n=18) and their primary care healthcare providers (n=40).	Service provider and patient experiences and views about post-hospital care and the role of PCPs.	A multicentre longitudinal quantitative study with a nested qualitative element. Semi-structured interviews and phone interviews, thematically coded/analyzed.	Quantitative data not provided. Qualitative used grounded theory approach.
Dossa et al., 2012 United States	Outpatients (n=9) and their carers (n=9) after discharge from a Veteran Affairs hospital.	Patient/carers experiences and identification of breakdown areas with care transitions from hospital to home and community.	Convenience sample (identified by chart review) interviewed at two weeks, one month and two months post discharge. Data thematically coded and analysed.	Qualitative (longitudinal interview study using grounded theory approach)

Study	Sample	Phenomenon or intervention	Design/Evaluation	Research type
Fleiger et al., 2019 United States	Hospital and primary care healthcare providers, also policy leaders, IT and administration staff (n=18)	Exploration of a payment and delivery system reform to improve coordination and communication between PCP and oncology.	Semi structured in-depth interviews, thematically coded and analyzed.	Qualitative case study design
Hansson et al., 2018 Sweden	Hospital and primary care healthcare providers and a patient or a family member (n=24).	Health care professionals' experiences of the collaboration with elderly patients, their relatives & other healthcare providers.	Purposeful sample. Three focus group interviews.	Qualitative (grounded theory approach).

(Continued Table 1. Summary of included studies using SPIDER tool categories).

Study	Sample	Phenomenon/Intervention	Design/Evaluation	Research type
Hesselink et al., 2014 The Netherlands	Patients and their relatives, hospital and primary care healthcare providers (n=321)	Intervention Mapping Model to improve patient discharge and reduce hospital readmission.	Description of model, including qualitative study with 26 focus groups and 321 individual interviews.	Qualitative
Holmes et al., 2016 New Zealand	Emergency department inpatients (n=51) staff (n=42).	Allied Health Service introduced in Emergency Department, working in an interdisciplinary team	Descriptive retrospective report of a pilot study with staff and consumer survey	Quantitative
Hsiao et al., 2018 United States	Team leaders from Acute Care, Specialised Nursing Facility, Behavioural Care and Ambulatory Care (n=8).	John Hopkins Community Health Partnership Program created to improve coordination of hospital, nursing home and primary care.	Description of the design and implementation of a complex program to improve care coordination for high-risk patients in an urban setting	Qualitative
Ivanoff et al., 2018 Sweden	Hospital and primary care physician, SW, OT, PT and nursing staff (n=46).	Different professionals' views on and experiences of a comprehensive geriatric assessment of frail older people.	Ten focus groups interviews using purposeful sampling.	Qualitative (grounded theory approach)
Johannessen & Steilhaug, 2013 Norway	Hospital transition unit OT, PT plus nursing and medical staff (n=24). Community healthcare providers (n=14) Total (n=38)	An exploration of the significance of professional roles in collaboration on patient's transitions from hospital to home via an intermediate care unit.	Snowball sampling for semi-structured interviews and observations in six MDT meetings, six report meetings and four discharge meetings. Data analyzed by systematic text condensation.	Qualitative (grounded theory approach)
Kind et al., 2011 United States	Adult inpatients, who received dysphagia evaluation from 2003 to 2005 (n=187).	An examination of the rate of dysphagia recommendation omissions in discharge summaries for high risk subacute care patients.	Dysphagia recommendations from final SLP hospital notes and from hospital (physician) patient discharge summaries were abstracted, coded, and compared.	Quantitative (Retrospective cohort study)

Massy-Westropp et al., 2005 Australia	Convenience (mixed) sample of hospital and primary care medical, nursing and allied health staff (n=82).	Effectiveness of electronic data linking tools to assist in the transfer of information between and hospital and home-based care.	Staff satisfaction questionnaires with SPSS analysis of survey responses. Content analysis of two staff focus groups with independent facilitator.	Mixed methods: Quantitative (survey) Qualitative (grounded theory approach)
Mc Ainey et al., 2016 Canada	All clients referred during first 18 months of the Intensive Geriatric Service Worker program (n=692).	Description of the Intensive Geriatric Services Worker role and its impact on clients, caregivers and the broader health system.	Chart audit analyzed with descriptive statistics. Data from telephone interviews with clients, caregivers and key informants, inductively analyzed.	Mixed methods: Quantitative (chart audit). Qualitative (naturalistic inquiry approach)

(Continued Table 1. Summary of included studies using SPIDER tool categories).

Study	Sample	Phenomenon/Intervention	Design/Evaluation	Research Type
Miller et al., 2019 United States	No sample described.	Protocol for an advanced care coordination program to address gaps in care between different hospitals and primary care services, with focus on social determinants of health.	Program database will be developed to allow continuous evaluation of SW-led longitudinal care coordination.	Descriptive Report
Rowlands et al., 2012 Australia	Hospital doctors (n=22) and PCP (n=8).	Perceptions of quality, format and timeliness of patient information sent from hospital to PCP.	In depth interviews of a convenience sample.	Qualitative (grounded theory approach)
Rydeman & Tornkvist, 2006 Sweden	Hospital and primary care nurses and SW (n=31).	Experiences of the discharge process among different healthcare professionals.	Eight focus-group interviews. Analyses followed a phenomenological approach.	Qualitative (phenomenological approach)
Tang et al., 2017 United Kingdom	Hospital and primary care doctors, nurses, OT and PT (n=17).	Identifying gaps in care for patients with memory deficits after stroke.	Face to face or telephone semi-structured interviews thematically analyzed and coded.	Qualitative (grounded theory approach)
Thomas & Siaki, 2017 United States	Hospital and primary care nurses, case managers, data analysts, unit secretaries, pharmacists, PCPs (n=?).	Evaluation of the discharge process and analysis of the rehospitalization rate to create action plans directed at reducing risks.	'Healthcare Failure Model and Effects Analysis' and 'Project Re-engineered Discharge' tool kits were used to target risk priorities. All healthcare stakeholders had input.	Mixed method (Process evaluation).
Trankle et al., 2019 Australia	Care facilitator, patients, carers, nurses, doctors, allied health, PCP (n=83).	Investigation of the effectiveness of an integrated care program.	Qualitative evaluation using a framework analysis, with 125 in-depth interviews over 12 months.	Qualitative (descriptive)
Wilson, K. et al.,	Nurse practitioners	Nurse practitioners experience of	Purposive sample and semi-structured	Qualitative (descriptive)

2005 Australia	(n=9).	collaboration with allied health and PCPs	interviews. Data coded and thematically analyzed.	exploratory design)
Wilson, S. et al., 2004 Australia	Inpatients (n=100), hospital staff (n=14) including medical specialists and registrars, nurses, SLP, OT, SW and medical students.	Videoconferencing compared to audioconferencing for multi-disciplinary case conference.	Patients were randomized to either videoconferencing group (n=50) or audioconferencing group (n=50). Results analyzed using SPSS. Hospital staff satisfaction survey analysis process not described.	Mixed methods: Quantitative (Two group comparison with random allocation) and qualitative (staff survey)

PCP - Primary Care Practitioner; MDT - multidisciplinary team; OT - Occupational Therapist; PT - Physiotherapist; SLP - Speech & Language Pathologist; SW - Social Worker.

Table 2a Summary of quality of qualitative studies using JBI appraisal tool

Study	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
Christie et al., 2016	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
Dossa et al., 2012	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes
Hansson et al., 2018	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
Fleiger et al., 2019	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Hesselink et al., 2014	Yes	Yes	Yes	Yes	Yes	Yes	Yes	N/A	Yes	Yes
Hsiao et al., 2018	Yes	Yes	Yes	Yes	Yes	Yes	Yes	N/A	Yes	Yes
Ivanoff et al., 2018	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Johannessen & Steilhaug, 2013	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
Rowlands et al., 2012	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Rydeman & Tornkvist, 2006	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Tang et al., 2017	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
Trankle et al., 2019	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Wilson K et al., 2005	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes
Q1	Is there congruity between the stated philosophical perspective and the research methodology?									
Q2	Is there congruity between the research methodology and the research question or objectives?									
Q3	Is there congruity between the research methodology and the methods used to collect data?									
Q4	Is there congruity between the research methodology and the representation and analysis of data?									
Q5	Is there congruity between the research methodology and the interpretation of results?									
Q6	Is there a statement locating the researcher culturally or theoretically?									
Q7	Is the influence of researcher on research, and vice versa addressed?									
Q8	Are participants, and their voices, adequately represented?									
Q9	Is the research ethical according to current criteria or, for recent studies, and is there evidence of ethical approval?									
Q10	Do the conclusion drawn in the research report flow from the analysis, or									

interpretation of data?

Table 2b Summary of quality of quantitative studies using McMaster appraisal tool

Study	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12
Allen et al., 2004	Yes	Yes	N/A	N/A	N/A	N/A	N/A	Yes	Yes	Yes	N/A	Yes
Baker & Wellman, 2005	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	No	N/A	N/A	Yes
Hawes et al., 2017	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Holmes et al., 2016	Yes	Yes	Yes	Yes	No	N/A	N/A	Yes	No	N/A	N/A	Yes
Kind et al., 2010	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
Miller et al., 2019	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	N/A	Yes	Yes	Yes
Thomas et al., 2017	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	N/A	Yes	N/A	Yes
Q1	Was the purpose stated clearly?											
Q2	Was relevant background literature reviewed											
Q3	Was the design appropriate for the study question?											
Q4	Was the sample described in detail?											
Q5	Was sample size justified?											
Q6	Were the outcome measures reliable?											
Q7	Were the outcome measures valid?											
Q8	Intervention was described in detail?											
Q9	Results were reported in terms of statistical significance?											
Q10	Were the analysis method(s) appropriate?											
Q11	Clinical Importance was reported?											
Q12	Conclusions were appropriate given study methods and results?											

Table 2c Summary of quality of mixed methods studies using Mixed Method Appraisal Tool (MMAT) Version 2018.

Study	Q1	Q2	Q3	Q4	Q5
Bleijlevens et al., 2008	Yes	Yes	Yes	Cannot tell	Cannot tell
Massy-Westropp et al., 2005	Yes	Yes	Yes	Yes	Yes
McAiney et al., 2017	Yes	Yes	Yes	Cannot tell	Yes
Wilson S. et al., 2004	Cannot tell	Yes	Yes	Cannot tell	Yes
Q1	Is there an adequate rationale for using a mixed method design to address the research question?				
Q2	Are the different components of the study effectively integrated to answer the research question?				
Q3	Are the outputs of the integration of qualitative and quantitative components adequately interpreted?				
Q4	Are divergences and inconsistencies between quantitative and qualitative results adequately addressed?				
Q5	Do the different components of the study adhere to the quality criteria of each tradition of the methods involved?				

Table 3. Categorization of studies based on Berlo's Model of Communication

Study and intervention or phenomenon	Sender/source	Receiver	Message/Channel (content/process/format)
<p>Allen et al., 2004</p> <p>'Strategies to Enhance Post Stroke Care and Recovery (STEPS CARE)'</p> <p>A comprehensive post-discharge stroke care management model.</p>	<p><i>Communication skills, attitudes, knowledge, system and culture of sender or source</i></p> <p>Poststroke consultation core team made up of hospital and primary care health providers: PT, geriatrician, care manager, a primary care general internist, a stroke unit clinical nurse specialist and</p> <p>Post stroke consultation extended team experts, who participate in the development and implementation of care plan as needed included: neurologist, pharmacist, medical rehabilitation specialist, SLP, psychologist, SW, OT and dietitian.</p> <p>(Both post stroke consultation team and care manager acts as sender, receiver and channel)</p>	<p><i>Communication skills, attitudes, knowledge, system and culture of receiver</i></p>	<p><i>Message/Channel (content/process/format)</i></p> <p><i>Method of communication between hospital allied health and primary care</i></p> <p>Copy of MDT care plans, evidence-based guidelines, pertinent references and patient specific details given to patient's PCP in writing and by telephone if necessary.</p> <p>Care manager performs in-home assessments and 6-month follow-up to implement and/or adjust care plan, provides frequent phone call follow-up and further home visit if needed to identify potential problems and arrange treatment required.</p>
<p>Baker & Wellman, 2005</p> <p>Discharge planning for nutrition needs.</p>	<p>Hospital case managers identified medical practitioners, nurses, SW and PT as very important in discharge planning but not registered dietitians.</p>	<p>Not addressed</p>	<p>Not addressed</p>
<p>Bleijlevens et al., 2008</p> <p>Multidisciplinary falls prevention program.</p>	<p>Reported medical risks and other risk factors for falls, such as hazards in the home and patients' risk behaviour are not systematically addressed by hospital medical practitioners.</p>	<p>Patients told to contact their PCP for details</p>	<p>Geriatrician & OT sent a written summary to PCP with recommendations and/or referrals.</p>
<p>Christie et al., 2016</p>	<p>Not addressed</p>	<p>PCP felt they had a limited range of options and not always able to provide the information and support</p>	<p>Not described</p>

<p>Post hospital care and the role of PCP.</p>		<p>patients needed or expected after injury. PCP wanted information from hospital about likely prognosis to manage patient expectations.</p>	
<p>Dossa et al., 2012</p> <p>Patient and family caregiver's experiences of care transitions home from hospital.</p>	<p>Patients reported hospital did not provide sufficient information about safety equipment, leading to dissatisfaction and potential adverse outcomes.</p>	<p>Despite the common electronic medical record shared by facilities, patients did not feel that the hospital had communicated with their PCP.</p>	<p>Hospital would telephone patient a day or so after discharge.</p> <p>Electronic medical record between hospital and PCP</p>

(Continued Table 3. Categorization of studies based on Berlo's Model of Communication)

Study and intervention or phenomenon of interest	Sender/source <i>Communication skills, attitudes, knowledge, system and culture of sender or source</i>	Receiver <i>Communication skills, attitudes, knowledge, system and culture of receiver of information</i>	Message/Channel <i>(content/process/format)</i> <i>Method of communication between hospital allied health and primary care</i>
<p>Fleiger et al., 2019</p> <p>A Chronic Care Management Model - The Vermont Oncology Pilot (VOP).</p>	<p>Person-to-person communication between the hospital SW and the chronic care coordinators helped transmit information to and from PCP visits, such as changes in treatment regime, and information about hospital admission.</p>	<p>Chronic care coordinators facilitated communication between hospital and PCP but there remains a lack of clarity about exactly what information each PCP wants and needs, and for what purpose.</p>	<p>Chronic care coordinators were the channel of communication between hospital and PCP</p> <p>by faxing PCP visit notes to hospital, where it is scanned into the medical record.</p>
<p>Hansson et al., 2018</p> <p>Health professionals' collaboration in the care of frail elderly patients.</p>	<p>Hospital staff (inclusive of allied health) had insufficient time to communicate with patients and their families. Medical practitioners (residents) with least experience often handled the discharge. Hospital staff did not discuss patient with PCP.</p> <p>Ingrained patterns of behaviour and professional boundaries hamper initiatives to overcome communication obstacles.</p>	<p>PCP may take over care of patients without full patient information.</p>	<p>Hospital nurse checks IT system, contacts hospital OT, PT and care planning nurse.</p> <p>Sends nursing report to primary care assistance officer who contacts primary care OT, PT, care planning unit, hospital and PCP.</p>
<p>Hawes et al., 2018</p> <p>Accountable care in transitions (ACTion) in a patient centred medical home.</p>	<p>Care manager met with patient for 15 minutes to address psychosocial concerns, barriers to care, behavioural health needs, medical equipment, potential palliative care needs, education on community resources and plans for continuity of care.</p>	<p>The post-discharge MDT visit was scheduled within 7 days of hospital discharge with PCP.</p> <p>The visit was structured and coordinated using a standardized checklist to address new diagnoses, changes in care plans, goals of care, follow-up tests, "red flag" symptom management, coordination of care, and</p>	<p>Hospital nurse phoned patients to assess medication adherence and adverse events, review "red-flag" symptom management, identify barriers to care using a standardized checklist, and reminded patients of their follow-up appointment.</p> <p>Hospital pharmacist and care manager communicated directly</p>

		self-management strategies.	with the primary care pharmacist and care manager via the electronic medical record.
Hesselink et al., 2018 Intervention Mapping.	Writing a complete, accurate and timely discharge letter by the hospital medical practitioner resulted in a step-by-step checklist of what needs to be done to obtain desired outcomes.	The relationships between providers are lacking (no formal meeting between hospital and PCP).	Patients are, if capable, expected to participate in the discharge process by giving discharge letter to their PCP and by being well aware of their health status (eg., medical and medication history) and care plan.

(Continued Table 3. Categorization of studies based on Berlo’s Model of Communication)

Study and intervention or phenomenon of interest	Sender/source	Receiver	Message/Channel (content/process/format)
Holmes et al., 2016 Allied health team in emergency department.	Hospital SW linked patients with PCP, facilitated hospital MDT meetings and helped develop hospital care plans.	Hospital allied health team (PT and SW) received referrals from hospital triage nurse	SW facilitated MDT meetings and care plan
Hsiao et al., 2018 John Hopkins Community Health Partnership (J-ChiP).	Hospital risk screening, MDT care planning, pharmacist-driven medication management, patient and caregiver education.	The Transition Guides met regularly with the hospital MDT care coordination team, to discuss patients to be discharged with moderate and high post-discharge needs.	<ol style="list-style-type: none"> 1. Personal post-discharge care plan 2. Post-discharge follow up telephone calls 3. Care coordination protocols 4. Patient access telephone line
Ivanoff et al., 2018 Comprehensive Geriatric Assessment (CGA).	<p>Experience-based knowledge and competence were used to assess more than standardized tests.</p> <p>Professional groups tended to stick to the problem areas they can “fix”; reluctant to encroach onto each other’s territory so certain questions were not asked due to awareness nothing could be done.</p> <p>Reported that resources and organizational conditions set agenda more than person’s real needs.</p> <p>(above factors related to both senders and receivers of communication)</p>		Not addressed
Johannessen & Steihaug, 2013 Interprofessional collaboration.	<p>The hospital PT and OT sought interprofessional collaboration whereas nurses said that they strived to achieve this but were unsuccessful, claiming that an “us and them” attitude pervades in the unit.</p> <p>The medical practitioner was satisfied with the collaboration and described it as inter-professional.</p>		<p>Members of all the professions attend the hospital MDT meetings, while nurses participate in the report meetings.</p> <p>Patients and healthcare providers from hospital and primary care attend discharge meetings.</p>

Patients and healthcare providers from hospital and primary care attend discharge meetings.

Kind et al., 2010	SLP recommendations were not included in hospital discharge summaries.	Not addressed	Discharge summaries averaged 3.6 pages from various hospital services. Nearly all were dictated by a medical resident but 96% ultimately reviewed, edited, and signed by senior medical staff.
Omission of dysphagia therapies in hospital discharge summary.	SLP recommendations included rehabilitation, dietary, postural and compensatory techniques, meal pacing, medication delivery (eg., crushed pills), and assistance required.		

(Continued Table 3. Categorization of studies based on Berlo's Model of Communication)

Study and intervention or phenomenon of interest	Sender/source <i>Communication skills, attitudes, knowledge, system and culture of sender or source</i>	Receiver <i>Communication skills, attitudes, knowledge, system and culture of receiver of information</i>	Message/Channel <i>(content/process/format)</i> <i>Method of communication between hospital allied health and primary care</i>
<p>Massy-Westropp et al., 2005</p> <p>Electronic data linking across the hospital-primary care interface.</p>	<p>Upon admission to hospital, automated checking process determined if patient was under primary care service and provided details of any current issues. Hospital staff able to access the report (source) with a password.</p>	<p>Primary care staff were advised of existence of the hospital report system with instructions of how to access the reports and a short cut icon placed on desktop of each personal computer.</p>	<p>Automated email alert sent to primary care at discharge with details of patient's admission and ward details to prompt the primary care case coordinator to contact hospital.</p>
<p>McAiney et al., 2016</p> <p>Intensive Geriatric Service Worker.</p>	<p>Intensive Geriatric Service Worker used an integrated and collaborative manner to work with primary care support services and geriatric emergency management nurses in hospitals.</p> <p>Intensive Geriatric Service Worker was both sender and receiver, as well as channel of communication between hospital and primary care.</p>		<p>Intensive Geriatric Service Worker support post discharge PCP appointments by reviewing patient questions before and after to ensure they were asked, answered and that the answer is understood by the patient.</p>
<p>Miller et al., 2019</p> <p>Protocol for the Advanced Care Coordination (ACC) Program.</p>	<p>Hospital emergency department will notify SW from Advanced Care Coordination Program of patient admission.</p> <p>SW will complete biopsychosocial assessments, conduct regular in-person and phone interview and connect patients with primary care team.</p>	<p>A survey will assess the perceived frequency, timeliness and accuracy of communication, the extent of problem-solving communication and mutual respect between and among health care providers engaged in the program.</p> <p>(system of receiver)</p>	<p>SW will make a phone call to the primary care team (SW as channel).</p> <p>A one-page fact sheet will be provided to other healthcare facilities to inform them of the Advanced Care Coordination Program and referral process.</p>
<p>Rowlands et al., 2012</p> <p>Perceptions of quality, format and</p>	<p>Doctors were the main professionals from the hospital who communicated with PCPs. Nurses reported limited or no communication with PCPs as thought this was not their role.</p>		<p>MDT was a process of communication.</p>

<p>timeliness of patient information from hospital to primary care.</p>	<p>The cancer care coordinator communicated with PCPs on behalf of the MDT Meeting.</p> <p>Hospital allied health did not communicate with PCPs at all and did not know if medical practitioners communicated information regarding their interventions to PCPs but considered if they did so it would be limited, eg., "patient seen by a dietitian".</p> <p>The majority of hospital medical practitioners did not know if hospital allied health communicated with PCPs and had varying views if it was necessary.</p> <p>(Systems, cultures, knowledge and attitudes affecting senders and receivers)</p>	<p>One PCP had to make a phone call to have information faxed through during a patient consultation.</p>
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(Continued Table 3. Categorization of studies based on Berlo's Model of Communication)

Study and intervention or phenomenon of interest	Sender/source <i>Communication skills, attitudes, knowledge, system and culture of sender or source</i>	Receiver <i>Communication skills, attitudes, knowledge, system and culture of receiver of information</i>	Message/Channel <i>(content/process/format)</i> <i>Method of communication between hospital allied health and primary care</i>
Rydeman & Tornkvist, 2006 Different professionals' experiences of the discharge process.	Mainly the nurses in the geriatric-care units and hospital SW discussed the patient's discharge.	The primary care nurses felt that they were seldom involved in the discharge process. PCPs often lacked the necessary patient information when they assumed responsibility.	Patient care management plan developed in weekly MDT meeting.
Tang et al., 2017 Gaps in care for patients with memory deficits.	Not addressed	Not addressed	Not addressed
Thomas & Siaki, 2017 Evaluation of Project Re-Engineered Discharge and Health Care Failure Mode Effects Analysis.	Evaluation identified need to improve communication of plan of care with primary care and care management for high risk patients. (hospital sender system improved)	Not addressed	1. Electronic reports 2. Post discharge phone calls & documentation 3. Inter-professional huddles
Trankle et al., 2019 Evaluation of Western Sydney Integrated Care Program.	Specialist action plans provided at hospital discharge to inform patients and PCP about complex and changing care needs	Care facilitator communicates with hospital MDT, patient & PCP (Care facilitator is sender, receiver and channel of communication)	PCP support phone line allows faster access to hospital specialists. Shared care plans developed by PCP, shared electronically with hospitals, community health providers and patients
Wilson, K. et al., 2005 Nurse practitioners' collaboration	Nurse practitioners considered that successful quality health care environments were influenced by collaborative practices among MDT members. (Nurse practitioners as senders, receivers and channel of communication between hospital allied health and PCP)		Telephone call to PCPs

with allied health and PCPs.		
Wilson, S. et al., 2004	All 14 staff interviewed thought that MDT videoconferencing should continue.	Videoconferencing as a replacement for thrice weekly telephone conference between hospital and hospital in the home.
Case conference by video link compared with telephone case conference.	All respondents preferred face-to-face to videoconference or telephone conferencing. All but one of the 14 indicated that videoconferencing provided a better patient management plan than telephone conferencing. (attitude of senders and receivers in mixed MDT)	

PCP-Primary Care Practitioner; MDT-multidisciplinary team; OT-Occupational Therapist; PT-Physiotherapist; SLP-Speech & Language Pathologist; SW - Social Worker.

Table 4. Enablers to communication between hospital allied health and primary care

Study	MDT care plans	Follow up	Involve patient & carer	Health IT	Other
Allen et al., 2004	Yes	Yes	Yes	Yes	MDT decision support and evidence-based protocols for PCP.
Baker & Wellman, 2005	Yes	Yes	No	No	Allied health (dietician) as care managers and contributing more to discharge planning.
Bleijlevens et al., 2008	Yes	Yes	Yes	No	Investigate if PCP agrees with hospital recommendations and check if patient calls PCP.
Christie et al., 2016	Yes	No	Yes	Yes	Provide PCP a range of 'normal' post-surgical consequences to help them support patient.
Dossa et al., 2012	Yes	Yes	Yes	Yes	Primary care allied health can support patient & PCP communication.
Fleiger et al., 2019	Yes	Yes	Yes	Yes	Allied health (SW) as 'boundary spanners' across healthcare organisations.
Hansson et al., 2018	Yes	Yes	Yes	Yes	'Project leader' to direct care plan.
Hawes et al., 2017	Yes	Yes	Yes	Yes	MDT outpatient transition program based in a primary care practice.
Hesselink et al., 2014	Yes	Yes	Yes	Yes	Patient coaching to assert a more active role in own care plan.
Holmes et al., 2016	Yes	Yes	Yes	No	Allied health service (SW and PT) in an Emergency Department.
Hsiao et al., 2018	Yes	Yes	Yes	Yes	Telephone call from hospital team to PCP. Patient access telephone line.
Ivanoff et al., 2018	Yes	Yes	Yes	Yes	Clear guidelines & care plans built by MDT, family and all caregivers, not just hospital team.
Johannessen & Steilhaug, 2013	Yes	No	Yes	Yes	Patients and primary care providers attend hospital discharge meetings
Kind et al., 2011	Yes	Yes	No	Yes	Shift in the medical-focus of discharge summary.
Massy-Westropp et al., 2005	Yes	No	No	Yes	Automated information access and discharge alert system.
Mc Ainey et al., 2016	Yes	Yes	Yes	No	Supported PCP appointment to ensure patient questions were asked and answers understood.

Miller et al., 2019	Yes	Yes	Yes	Yes	Longitudinal care coordination by SW-led team focusing on social determinants of health.
Rowlands et al. 2012	Yes	Yes	No	Yes	Communication guidelines for how, when & by whom communication happens.
Rydeman & Tonkvist, 2006	Yes	Yes	Yes	Yes	Identification of shared care team values and purpose.
Tang et al., 2017	Yes	Yes	Yes	No	PCP education regarding memory deficits after stroke.
Thomas & Siaki, 2017	Yes	Yes	Yes	Yes	Script and algorithm to frame follow up phone calls with patients and carers.
Trankle et al., 2019	Yes	Yes	Yes	Yes	Evidence-based guidelines & support phone line for PCP. IT training. Information update alert.
Wilson, K et al. 2005	Yes	Yes	No	No	Nurse practitioner collaborating with PCP and allied health.
Wilson, S et al. 2004	Yes	No	No	No	Videoconferencing for discharge planning with hospital & community teams.
Total agreement	100%	83%	75%	71%	

PCP-Primary Care Practitioner; MDT-multidisciplinary team; OT-Occupational Therapist; PT-Physiotherapist; SLP-Speech & Language Pathologist; SW - Social Worker.

Table 5. Barriers to communication between inpatient allied health and primary care

Allen et al., 2004	Greatest hurdle has been clinical information systems as few health systems have one computer system that stores all patient encounters.
Baker & Wellman, 2005	Case managers did not have sufficient knowledge of community services. Nurses rarely detailed patient's previous level of function or home circumstances in medical record, making decisions about post-discharge requirements more difficult.
Bleijlevens et al., 2008	Poor compliance with PCP follow-up and data not collected directly from PCPs (one-way communication).
Christie et al., 2016	Patients experience gaps in support, services and information post discharge.
Dossa et al., 2012	Poor communication between patients and hospital providers regarding ongoing care and whom to contact post discharge; poor provider response to phone calls; poor provider to provider communication.
Fleiger et al., 2019	Inability to create a technologically feasible electronic care plan.
Hansson et al., 2018	Short lengths of stay so patient too unstable to comprehend information. Insufficient communication and collaboration with patients and care givers; Absence of an overarching person responsible beyond organisational borders. Obstacles are (a) societal – political ambitions and government actions (b) organisational - managerial procedures and economics and (c) individual - professional issues and personal interests are important determinants.
Hesselink et al., 2018	Attitudinal and behavioural factors (e.g. not understanding needs of counterpart, lack of relationship/collaborative attitude between hospital & PCP), organisational factors (e.g. lack of guidelines), technical factors (no shared IT system) or patient factors (e.g. patients are less skilled or unwilling).
Hsiao et al., 2018	Siloed health system and the lack of appropriate technology to collect standardize and track data so not possible to share data with other community hospitals. Due to Federal and State regulation and laws, there were restrictions in the availability of potentially sensitive data.
Ivanoff et al., 2018	Ineffective collaboration between health professionals and the people who work closely with the older person so can be difficult to assess hidden need. Communication and structural barriers within and outside each organization. Health and social care are complex organisations.
Johannessen & Steihaug, 2013	The hospital PT, OT and medical practitioner had no formalised collaboration with their colleagues in primary care. Healthcare providers have different understandings of interprofessional collaboration with some considering it an inappropriate working method.
Kind et al., 2010	Hospital allied health recommendations omitted from medically focused discharge summaries, so PCP not aware of allied health recommendations.
Massy-Westropp et al., 2005	Staff lacked access to integration tools for electronic data management system and needed more training.
Miller et al., 2019	The program will rely upon receiving notifications from other hospitals - not guaranteed that their staff will incorporate this process. No access to admission utilization readmission rates data at non-veteran hospitals could limit evaluation of adverse outcomes.

Rowlands et al., 2012	Quality of communication influenced by the length of time patients were being treated by MDT and if there was a change in treatment modality. Communication may be delayed by hospital procedures, such as the typing of the specialist letter.
Rydeman & Tornkvist, 2006	Professionals often lacked necessary patient information when assumed care. Ambiguity in who responsible for what in different organizations.
Tang et al., 2017	Gaps, either in structure or communication between hospital & primary care teams. Reduced time in PCP consultation was felt a significant barrier.
Thomas et al., 2017	No standard process for 48-hour phone call post discharge. No identified staff member identified to conduct the call-backs & no standard script used.
Trankle et al., 2019	Poor functionality of shared health records and minimal IT between hospitals and PCP. IT services under-resourced and training in use inadequate.
Wilson K. et al., 2005	Ineffective collaborative relationships between healthcare providers.
Wilson S. et al., 2004	Staff not knowing how to take advantage of available technology.

PCP-Primary Care Practitioner; MDT-multidisciplinary team; OT-Occupational Therapist; PT-Physiotherapist; SLP-Speech and Language Pathologist; SW - Social Worker

Figures

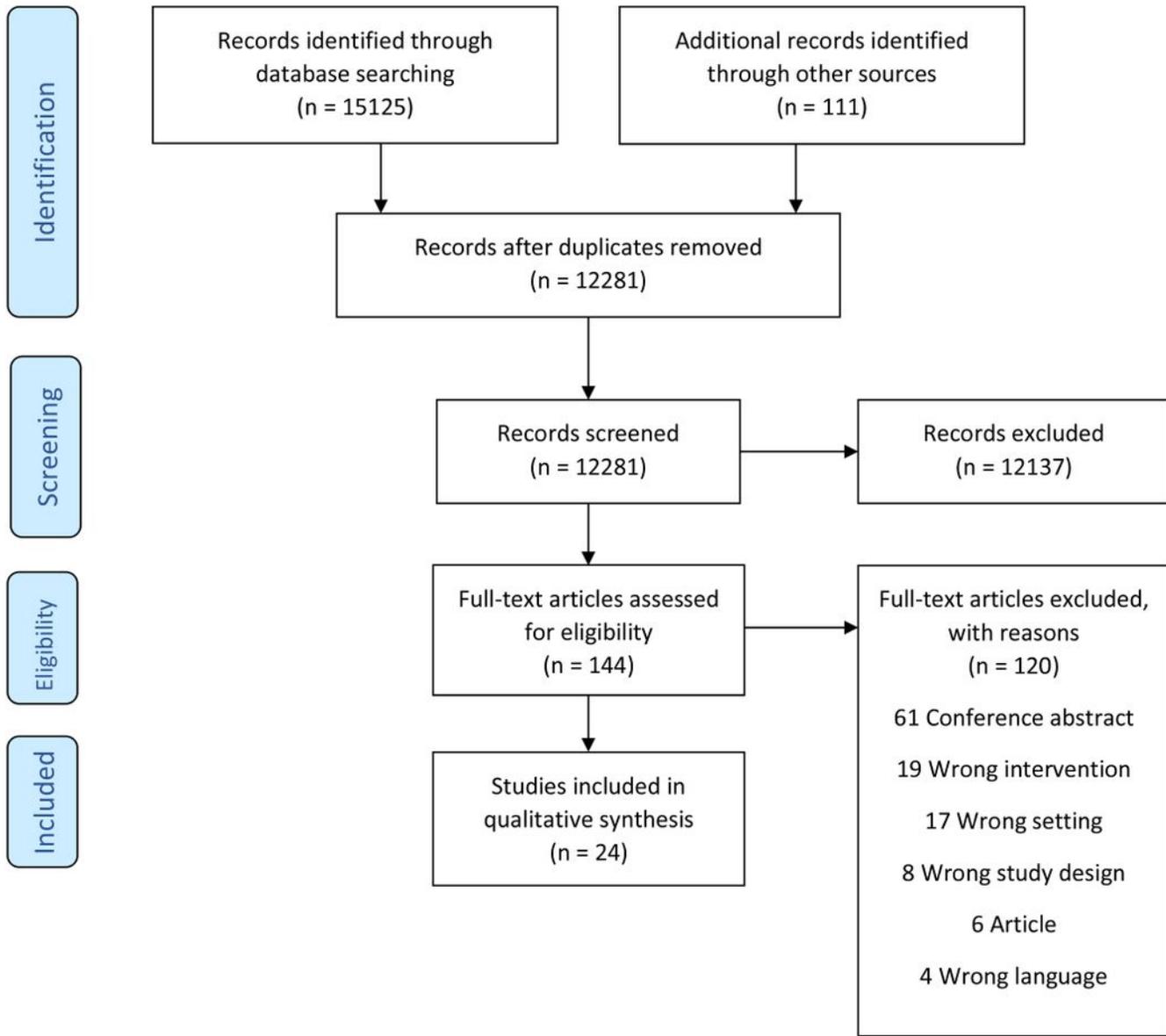


Figure 1

PRISMA Flow Diagram

