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Review

Discharge communication practices and healthcare provider and patient preferences, satisfaction and comprehension: A systematic review

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Abstract

Purpose: To systematically review the available evidence about hospital discharge communication practices and identify which practices were preferred by patients and healthcare providers, improved patient and provider satisfaction, and increased patients' understanding of their medical condition.
Data sources: OVID Medline, Web of Science, ProQuest, PubMed and CINAHL plus.
Study selection: Databases were searched for peer-reviewed, English-language papers, published to August 2016, of empirical research using quantitative or qualitative methods. Reference lists in the papers meeting inclusion criteria were searched to identify further papers.
Data extraction: Of the 3489 articles identified, 30 met inclusion criteria and were reviewed.
Results of data synthesis: Much research to date has focused on the use of printed material and person-based discharge communication methods including verbal instructions (either in person or via telephone calls). Several studies have examined the use of information technology (IT) such as computer-generated and video-based discharge communication practices. Utilizing technology to deliver discharge information is preferred by healthcare providers and patients, and improves patients' understanding of their medical condition and discharge instructions.
Conclusion: Well-designed IT solutions may improve communication, coordination and retention of information, and lead to improved outcomes for patients, their families, caregivers and primary healthcare providers as well as expediting the task for hospital staff.

Key words: patient-provider communication, patient-centred care, hospital care, setting of care, primary care/general practice, patient satisfaction, measurement of quality

Introduction

Timely and accurate discharge communication is important in continuing patient care between hospitals and primary care physicians (PCP) [1]. The discharge summary is the most common method for documenting and communicating a patient's diagnostic findings, hospital management and planned follow-up to the post-hospital

care team [2]. It is a vital communication and information tool which can enhance the quality and continuity of patient care [3, 4]. Effective discharge summaries reduce adverse drug events, unplanned hospital readmission, post-discharge complications and mortality, and increase patient and carer satisfaction [2, 3, 5–11].

Delivery of discharge instructions is often rushed and patients frequently do not understand aspects of their discharge, particularly medication management [12, 13]. Patients who have poor comprehension of discharge instructions may have higher rates of emergency department (ED) visits, hospital readmissions [14] and medication errors [15]. They also lack knowledge about their diagnosis, follow-up care and treatment [16, 17]. Improving patients' understanding is likely to improve health outcomes and avoid unnecessary healthcare utilization and costs [18, 19].

Despite their importance, discharge summaries are often poorly constructed, incomplete, delayed, misdirected or unhelpful for the healthcare providers in the community [5, 6, 8, 20, 21]. Although they are one of the most commonly produced hospital documents, there is not a standardized process for providing discharge information [22], and little is known about healthcare providers' and patients' needs, preferences and satisfaction with processes.

The aim of this review was to identify evidence for the provision of information on transfer of a patient's care from hospital to the community. We sought to review methods used to provide appropriate, contextually sensitive and comprehensible information to a patient, their family, carer and healthcare providers; and to understand which discharge communication practices were: preferred by patients and healthcare providers, improved satisfaction and increased patients' understanding of their medical condition and treatment.

Method

We followed the PRISMA 'Preferred Reporting Items for Systematic Reviews and Meta-Analyses' procedure [23] of identification, screening, eligibility and material included in the review.

Search strategy

Searches were performed for papers published to August 2016 in relevant social science and medical science databases (OVID Medline, Web of Science, ProQuest, PubMed and CINAHL plus). Reference lists in the papers meeting inclusion criteria were also searched to identify further papers.

Inclusion criteria

Papers were included if they described empirical research and were written in English. Papers were excluded if they were conducted in 'low' or 'lower middle' income countries given the differences in availability, affordability, and accessibility of health services between 'higher' and 'lower' income countries [24].

Search terms

The search strategy included the medical subject heading terms and multiple synonyms and related keywords listed in Table 1.

SH conducted the initial search; all authors together made final decisions about inclusion.

Selection of articles

The selection process is outlined in Fig. 1.

Quality assessment

The methodological quality of each study was assessed by two authors (H.N. and S.H.) independently using the Standard Quality Assessment Criteria for Evaluating Primary Research Papers from a Variety of Fields (QualSyst tool) [25]. This tool was used as it is designed to appraise both qualitative and quantitative papers, using two scoring systems. The quantitative checklist included 14 criteria and qualitative checklist 10. Each criterion is scored as 'yes' (2), 'partial' (1) or 'no' (0). A summary score was calculated for each paper to produce an overall quality rating. For the quantitative studies, there is also the possibility to score 'not applicable', such items were excluded from the calculation of the summary score. The maximum total score for the quantitative studies is 28 and 20 for the qualitative studies (Table 1). Studies were excluded based on a minimum threshold of a summary score of 0.55 [25].

Data analysis

The review included papers reporting studies using qualitative or quantitative methods. We therefore undertook an aggregative synthesis in which the data were summarized with a narrative review of the evidence [26]. Quantitative synthesis (meta-analysis) was deemed not appropriate due to the variability in research design, populations, types of interventions, and outcomes of the studies identified.

The full text of included papers was reviewed by two authors (H.N. and S.H.) for: (i) all discharge communication practices used to provide information to a patient, their family and carer and their healthcare providers; and (ii) measures of patient and healthcare

Table 1 Search terms

MeSH terms	Synonyms and keywords
1. 'Patient discharge'	OR patient discharge summary* OR pre-discharge OR discharge OR handover OR summary OR information OR plan* OR instructions OR communication OR transfer
2. 'Patient care team'	
3.	Hospital to home OR transitions from ward to home OR care transition OR transitional care
4. 'Patients'	patient
5. 'Physicians'	OR healthcare provider
6. 'Medical informatics' OR 'video recording'	OR video OR audio-visual OR video recording OR USB OR DVD OR teleconferencing OR picture OR image OR internet OR letter OR electronic mail OR intervention
7. 'Hospitals'	OR hospital OR ward OR PCP OR bedside rounding OR ED
8. 'Comprehension'	OR understanding
9. 'Patient satisfaction'	OR satisfaction

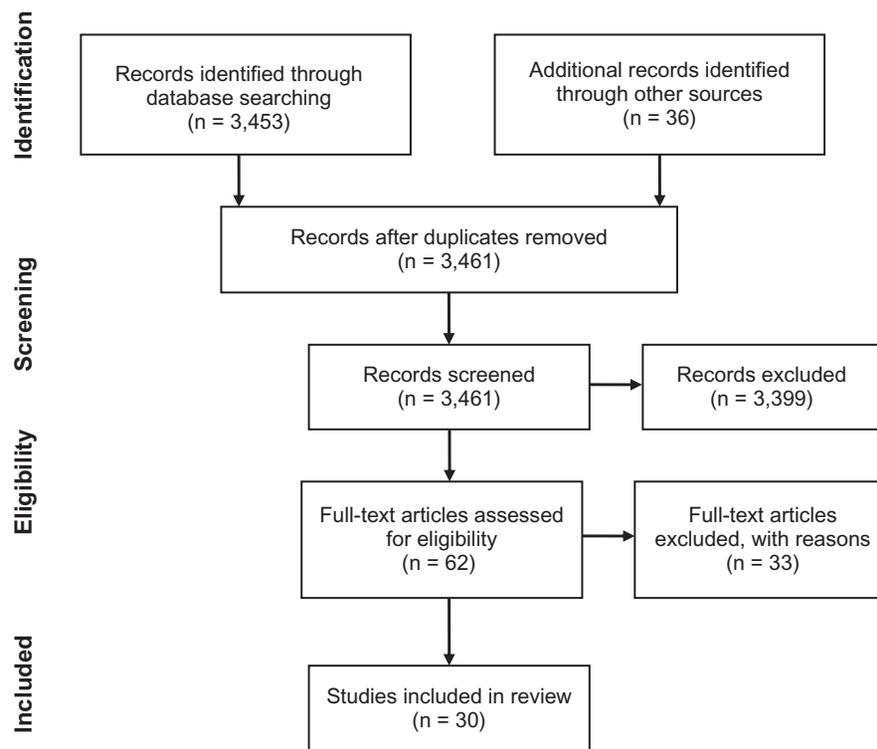Combined terms: 1 AND 2 AND 3 AND 4 AND 5 AND 6 AND 7 AND 8 AND 9.

Figure 1 PRISMA flow diagram of review process.

provider satisfaction and preferences, and patient comprehension. Reported practices were categorized into groups according to their format. All authors discussed and agreed on the final categories. For each paper, we identified and tabulated the year published, research aims, sample characteristics, methods, outcomes/measures and relevant findings.

We compared the effectiveness of the identified methods in terms of healthcare provider and patient preferences and satisfaction; and patient comprehension and knowledge.

Results

We included in the review 30 papers reporting 30 studies which described practices for transferring information about a patient's care from hospital to the community. Studies were conducted in 10 countries: and used quantitative (23 papers—13 randomized control studies, 7 surveys, 2 pre–post design, 1 record audit) or qualitative methods (2 papers: 1 in-depth interviews, 1 focus group). Five studies employed mixed-methods.

Analysis of the 30 papers revealed 3 methods used to provide discharge information: 1. Information technology (IT)-based methods (15 papers); 2. Person-based methods (13 papers); and 3. Written methods (11 papers). Multiple methods were identified in 9 papers [4, 10, 28, 29, 33, 38, 39, 47, 48].

These practices were evaluated in terms of the identified measures: healthcare provider and patient preferences (5 papers) and satisfaction (23 papers); and patient comprehension and knowledge (13 papers).

Overall the studies were of good quality with a summary score of 0.83 or higher indicating appropriate study design and research questions, definition of outcomes and exposures, reporting of bias and confounding, and sufficient reporting of results and limitations (Table 2a, 2b). No studies were excluded based on quality scores.

The study design and methods, sample characteristics and relevant categories of each reviewed paper are presented in Table 3. A summary of the studies and the discharge communication method(s) used and measures evaluated is given in Table 4.

Discharge communication practices

The most common practice for communicating discharge information was IT based methods which included both discharge information such as diagnosis, treatment and medication regimes generated by computer [4, 27–29, 33, 38, 39, 46, 51], and the use of a website [30], audio-visual recording of discharge information [17, 35, 37, 50] or video conferencing between hospital and primary care providers [40] in the discharge process.

Person-based methods were the second most common way of communicating discharge information to a patient, their family or healthcare provider. Discharge information was delivered verbally by a nurse [4, 10, 31, 32, 34, 43], pharmacist [36], ED staff [47], the attending physician [28, 41, 45, 48] and unspecified healthcare providers [42].

Written methods included printed or handwritten summaries [7, 10, 18, 29, 33, 38, 39, 44, 47–49] which were mailed, transferred electronically or hand delivered to the patient or primary healthcare provider.

Effectiveness of the identified discharge communication methods

It is difficult to synthesize the effectiveness of each discharge method in terms of the outcomes assessed given the variability in research design, populations, interventions and time-points of the studies

Table 2a Assessment of Study Quality using the QualSyst tool [25]—Quantitative Studies

Study	Question	Study design	Subject selection	Subject characteristics	Random allocation	Blinding investigators	Blinding subjects	Outcome measures	Sample size	Analytic methods	Estimate of variance	Confounding	Results	Conclusions	Summary score
Archbold *et al.* [27]	2	2	2	2	N/A	N/A	N/A	2	2	1	0	N/A	2	2	17/20 = 0.85
Atzema *et al.* [50]	2	2	2	2	2	2	2	2	2	2	2	2	2	2	28/28 = 1.00
Bloch and Bloch [17]	2	2	2	2	2	N/A	2	2	2	2	2	1	2	2	25/26 = 0.96
Branger *et al.* [38]	2	2	2	2	N/A	N/A	N/A	2	2	0	N/A	N/A	2	2	16/18 = 0.89
Braun *et al.* [42]	2	1	2	2	2	N/A	N/A	2	1	2	1	1	2	2	20/24 = 0.83
Cawthon *et al.* [36]	2	2	2	2	N/A	N/A	N/A	2	2	2	N/A	N/A	2	2	18/18 = 1.00
Choi *et al.* [37]	2	2	2	2	2	2	N/A	2	2	2	N/A	N/A	2	2	22/22 = 1.00
D'Amore *et al.* [43]	2	2	2	2	N/A	N/A	N/A	2	2	2	N/A	N/A	2	2	18/18 = 1.00
Dedhia *et al.* [7]	2	2	2	2	N/A	N/A	N/A	2	2	2	2	N/A	2	2	20/20 = 1.00
Graumlich *et al.* [28]	2	2	2	2	2	N/A	N/A	2	2	2	2	2	2	2	22/22 = 1.00
Grimmer & Moss [44]	2	2	2	2	N/A	N/A	N/A	2	2	2	N/A	N/A	2	2	18/18 = 1.00
Heng *et al.* [47]	2	2	2	2	N/A	N/A	N/A	2	2	2	0	N/A	2	2	18/20 = 0.90
Heyworth [30]	2	2	2	2	N/A	N/A	N/A	2	2	2	0	N/A	2	2	18/20 = 0.90
Hickey *et al.* [41]	2	2	2	2	N/A	N/A	N/A	2	2	2	0	N/A	2	2	18/20 = 0.90
Horwitz *et al.* [45]	2	2	2	2	N/A	N/A	N/A	2	2	2	N/A	N/A	2	2	18/18 = 1.00
Lin *et al.* [49]	2	2	2	2	2	2	N/A	2	2	2	2	N/A	2	2	24/24 = 1.00
Lindpaintner *et al.* [34]	2	2	2	2	2	N/A	2	2	2	2	2	2	2	2	26/26 = 1.00
Maslove *et al.* [33]	2	2	2	2	2	N/A	N/A	2	2	2	2	2	2	2	24/24 = 1.00
Mueller *et al.* [51]	2	2	2	2	N/A	N/A	N/A	2	2	2	N/A	N/A	2	2	18/18 = 1.00
Mutsch and Herbert [10]	2	2	2	2	N/A	N/A	N/A	2	2	2	0	N/A	2	2	18/20 = 0.90
Naylor *et al.* [31]	2	2	2	2	2	2	N/A	2	2	2	2	N/A	2	2	24/24 = 1.00
Naylor *et al.* [32]	2	2	2	2	2	2	N/A	2	2	2	2	N/A	2	2	24/24 = 1.00
Newnham *et al.* [35]	2	2	2	2	N/A	N/A	N/A	2	2	2	1	N/A	2	2	19/20 = 0.95
O'Leary *et al.* [39]	2	2	2	2	N/A	N/A	N/A	2	2	2	2	N/A	2	2	20/20 = 1.00
O'Leary *et al.* [46]	2	2	2	2	N/A	N/A	N/A	2	2	2	1	N/A	2	2	19/20 = 0.95
Preen *et al.* [4]	2	2	2	2	2	N/A	N/A	2	2	2	2	N/A	2	2	22/22 = 1.00
Spandorfer *et al.* [48]	2	2	2	2	N/A	N/A	N/A	2	2	2	0	N/A	2	2	18/20 = 0.90
van Walraven *et al.* [29]	2	2	2	2	2	N/A	N/A	2	2	2	2	N/A	2	2	22/22 = 1.00

2 = yes; 1 = partial; 0 = no; N/A = not applicable.

Table 2b Assessment of Study Quality using the QualSyst tool [25]—Qualitative Studies

Study	Question/ objective	Study design	Context	Theoretical framework	Sampling strategy	Data collection	Data analysis	Verification procedure	Conclusion	Reflexivity	Summary score
Choi [18]	2	2	2	2	2	2	2	2	2	1	19/20 = 0.95
Hickey et al. [41]	2	2	2	2	2	2	2	2	2	1	19/20 = 0.95
Hofflander et al. [40]	2	2	2	2	2	2	2	2	2	2	20/20 = 1.00
Mutsch and Herbert [10]	2	2	2	2	2	2	2	2	2	1	19/20 = 0.95
Spandorfer et al. [48]	2	2	2	2	2	2	2	2	2	1	19/20 = 0.95

2 = yes; 1 = partial; 0 = no.

reviewed. Instead we compared the effectiveness of the identified methods in response to our three identified measures: healthcare provider and patient preferences and satisfaction, and patient comprehension. We have framed this evaluation in terms of three questions we identified as practically important to healthcare providers.

1. Which discharge communication method(s) do healthcare providers and patients prefer and why?

   A survey of GPs in the UK aimed to determine their preference for standard dictated or computer-generated discharge summaries for acute coronary syndrome patients found that over two-thirds (69%) of GPs preferred the computerized summary for its comprehensive content, concise style, access to relevant information and clarity [27]. Hospital physicians in Canada also preferred computer-based systems for generating discharge summaries as they are faster and less burdensome to generate [29].

   A cluster randomized clinical trial in the USA measured physician and patient perceptions of a computerized physician entry discharge software versus usual care (handwritten) discharge and found the discharge software was rated more positively by patients and outpatient physicians [28]. Outpatient physicians perceived the communication generated by the software to be an improvement over the handwritten process. However, hospital physicians perceived the software to be more difficult to use as it did not integrate with the hospital electronic medical record. Consequently, hospital physician users had to re-enter patient demographic data and prescription data that already existed in the electronic record.

   A qualitative investigation of the concerns of Swedish primary healthcare nurses identified they were ambiguous about the use of video conferencing in the discharge planning session and found the process stressful and time-consuming [40].

   Collectively, physicians and patients preferred computer-generated summaries over those generated by other means as they provide information quickly in a structured, accessible format. However, discharge software needs to be easy to use and time efficient.

2. Which discharge communication practices increase healthcare provider and patient satisfaction, and why?

   An observational study (record audit) of paper and IT-based discharge methods in the Netherlands reported electronic communication increased GP satisfaction due to its increased accuracy and speed of reporting [38]. Satisfaction with quality and timeliness of discharge summaries also improved with the use of the electronic discharge summary in a pre–post evaluation of a new electronic discharge summary conducted in the USA [39]. Similarly, although Canadian hospital physicians found an electronic discharge summary program to be easier to use than conventional dictation there was no significant improvement in their satisfaction [33]. Improvements in satisfaction may increase as physicians become more familiar with the program and it is incorporated into routine practice.

   Patients in a mixed-methods study in the USA which investigated the use of a web portal based medication reconciliation tool also reported positive experiences including ease of use, rapid access and ability to communicate easily with healthcare provider after discharge [30]. An Australian intervention study using computer-generated discharge summaries showed patients had improved involvement in discharge planning, health service access, confidence with discharge procedures and opinion of discharge based on previous experiences [4]. However, a cluster randomized controlled trial in the USA found no improvement in patient satisfaction with medication information received at discharge with a computerized physician entry discharge software [28].

   Overall, computer-generated discharge methods improve the extent and speed of hospital and primary care provider communication yielding increased satisfaction for healthcare providers and patients.

   Patients also expressed satisfaction in an Australian pilot study of an audio-visual recording summarizing their diagnosis and treatment plan given to the patient at the time of discharge [35]. A randomized control trial in Canada which evaluated the effect of viewing an online video of diagnosis-specific discharge instructions also found that patients who viewed the videos felt they were a helpful addition to care [50]. In another randomized control trial in the USA, caregivers of children who attended an ED expressed greater satisfaction with video than with written discharge instructions [17]. Evaluation of the effectiveness of mobile discharge instruction videos (MDIVs) in communicating discharge instructions to patients with lacerations or sprains attending a Korean ED found that patients were highly satisfied with the MDIVs and they appeared to improve patients' comprehension of their discharge instructions [37].

   The use of video in the provision of discharge summaries and instructions appears beneficial to patients and their carers providing them with clear and simple information which assists them to comprehend and remember key components of the patient's discharge.

   Significantly higher satisfaction with discharge communication processes was also reported by patients and family caregivers in Switzerland receiving a discharge management intervention using nurse care managers compared with those receiving usual care [34]. In a mixed-methods study in the US patients who received a

Table 3. Study characteristics and discharge practices and outcomes identified in papers included in the review

Authors (date) Country	Discharge Practice	Aim	Method	Sample	Outcomes (measure)	Results
Archbold *et al.* (1998) [27] UK	Computer-generated Dictated 3 = IT based	To determine the preferences of GPs for standard dictated or computer-generated discharge summaries for patients with acute coronary syndromes	Questionnaire	N = 147; GPs	GP preference (study-specific measure)	Majority (68.5%) of GPs preferred the computerized summary and most (66.9%) thought it provided the clearer management plan and 70.8% recommended its use for other specialities
Atzema *et al.* (2013) [16] Canada	Online video 3 = IT based	To evaluate the effect of viewing an online video of diagnosis-specific discharge instructions on patient comprehension and recall of instructions	Prospective, single-centre, randomized controlled trial	N = 133; patients discharged from ED. N = 58; viewed online video of diagnosis-specific discharge instructions. N = 75; usual care	Patient comprehension. Patient satisfaction (study-specific measures)	Patient comprehension was higher in the video group, compared to the control group. (OR 3.5, 95% CI, 1.7–7.2) Patients who viewed an online video of their discharge instructions scored higher on their understanding of key concepts around their diagnosis and subsequent care and found them to be a helpful addition to standard care
Bloch & Bloch (2013) [17] USA	Video 3 = IT based	To determine if adding video discharge instructions affects caregivers' understanding of their child's ED visit, plan and follow-up	Randomized controlled trial	N = 436; N = 220 (written instructions). N = 216 (video instructions) Caregivers of patients, aged 29 days–18 years, with a diagnosis of fever, vomiting or diarrhoea, and wheezing or asthma Recruited from ED	Patient comprehension Patient satisfaction (study-specific measures) In ED and 2–5 days post-discharge	Brief video discharge instructions improved caregiver knowledge both in the ED and 2–5 days after discharge compared with written discharge instructions alone. Caregiver satisfaction with video discharge instructions was also greater than with written discharge instructions
Branger *et al.* (1992) [38] The Netherlands	Paper-based electronic 1 = written 3 = IT based	To study the effects of the introduction of electronic data interchange between primary and secondary care providers on speed of communication, efficiency of data handling, and satisfaction of general	Comparison of traditional paper-based communication for laboratory reports and admission-discharge reports between hospital and general practitioners and electronic data interchange	N = 27; GPs 2 Hospitals	GP satisfaction (study-specific measure)	Most GPs (15/24) reported that the use of electronic admission-discharge reports provided more accurate and complete information about the care delivered to their patients

Table continued

Table 3. Continued

Authors (date) Country	Discharge Practice	Aim	Method	Sample	Outcomes (measure)	Results
		practitioners with communication				
Braun *et al.* (2009) [42] Israel	TFU 2 = person based	To investigate whether TFU would increase patient satisfaction, improve compliance and reduce re-hospitalization rate	Randomized control trial	N = 400	Patient satisfaction (study-specific measure)	Satisfaction was increased in the TFU group compared with control group by 6–12% in most fields. Most TFU patients reported that they performed the tests that were recommended at discharge and received explanations regarding their medications (86.9% (P = 0.02) and 96.7% (P < 0.0001), respectively). 93% of the patients in the TFU group as compared to 84% in the control group reported improvement in their symptoms. A non-significant trend towards fewer readmission was observed in the TFU group (26% vs. 35% P = 0.062)
Cawthon, *et al.* 2012 USA	Intervention: pharmacist-assisted medication reconciliation, counselling, and post-discharge phone follow-up 2 = person based	To investigate a care transition intervention to reduce medication errors and patients' assessment of the intervention	Randomized control trial	N = 125	Patient satisfaction (study-specific measure)	The majority of patients indicated that it was 'very helpful' to speak with a pharmacist about their medications before discharge (72.8%). Receiving an illustrated medication list (69.6%) and a follow-up phone call after discharge (68.0%) were also considered very helpful. Patients also reported feeling more comfortable speaking with their outpatient providers about their medications after receiving the intervention
Choi (2013) [18]USA	Pictograph discharge instructions 1 = written	To examine the acceptability and comprehension of pictograph discharge instructions	Focus groups	N = 15; low-literate older adults hip replacement surgery recruited from community hospital	Patient comprehension (study-specific measure)	Participants perceived that the pictograph-based discharge instructions helped them understand the intended healthcare messages,

						especially for step-by-step procedures of discharge actions
Choi *et al.* (2009) [37] Korea	MDIVs 3 = IT based	To evaluate the effectiveness of MDIVs in communicating discharge instructions to patients	Prospective controlled study	N = 161; N = 77 (printed instructions: P group) N = 84 (mobile video instructions: M group) patients with lacerations or sprains in a quaternary emergency centre	Patient comprehension Patient satisfaction 48 h post-discharge (study-specific measures)	The mean of the correct answers on wound care in the questionnaire was 2.7 ± 0.7 in the M group and 2.4 ± 0.8 in the P group ($P < 0.05$). The rate of satisfaction was 90.5% in the M group and 90.9% in the P group ($P < 0.05$)
D'Amore *et al.* (2011) [43] USA	Telephone call (nurse) 2 = person based	To examine patients who received TFU for response differences on a mail satisfaction survey and 30-day readmission rates	Observational study	N = 10 559; patients from a large health system in southeast Texas	Patient satisfaction (study-specific measure)	Completion of a nursing call with a patient who reported a physician appointment was a significant predictor ($P < 0.04$) of lower 30-day readmissions
Dedhia *et al.* (2009) [7] USA	Facsimile ('Fast Fact Fax' form, a single-page communication to the primary healthcare provider, highlighting key details of the admission.) Printed (Written discharge information and instructions for patient. Printed with larger font and used only simple language) 1 = written	To study the feasibility and effectiveness of a discharge planning intervention	Quasi-experimental pre–post study design N = 185 intervention	N = 237; patients ≥65 years admitted to general medicine wards at three hospitals	Patient satisfaction (Activities of Daily Living [38]; Care Transition Measure [39])	Return to the ED within 3 days of discharge was lower in the intervention period (10% vs. 3%, OR = 0.25, 95% CI = 0.10–0.62). At 30 days, there was a lower rate of readmission (22% vs. 14%, OR = 0.59, 95% CI = 0.34–0.97) and fewer visits to the ED (21% vs. 14%, OR = 0.61, 95% CI = 0.36–1.03) ($P = 0.06$). Patient satisfaction increased from 68 to 89% in the intervention group (OR 3.49, 95% CI 2.06–5.92)
Graumlich *et al.* (2009) [28] USA	Computerized discharge software 2 = person based 3 = IT based	To measure patient and physician perceptions after discharge with computerized physician order entry software	Cluster randomized controlled trial	N = 631; inpatients discharged to home with high risk for readmission	Patient and physician perceptions (B-PREPARED questionnaire, Modified Physician-PREPARED scale, Satisfaction with Information About Medicines Scale, and study-specific measures)	When comparing patients assigned to discharge software vs. usual care, patient mean (standard deviation [SD]) scores for discharge preparedness were higher (17.7 [4.1] vs. 17.2 [4.0]; coefficient = 0.147; 95% CI = 0.005–0.289; P = 0.042), patient scores for satisfaction with medication information were unchanged (12.3 [4.8] vs. 12.1 [4.6];

Table continued

Table 3. Continued

Authors (date) Country	Discharge Practice	Aim	Method	Sample	Outcomes (measure)	Results
						coefficient = -0.212; 95% CI = −0.937–0.513; P = 0.567), and their outpatient physicians scored higher quality discharge (17.2 [3.8] vs. 16.5 [3.9]; coefficient = 0.133; 95% CI = 0.015–0.251; P = 0.027). Hospital physicians found mean effort to use discharge software was more difficult than the usual care (6.5 [1.9] vs. 7.9 [2.1]; P = 0.011)
Grimmer & Moss (2001) [44] Australia	Written survey 1 = written	To describe the development, validity and application of a new instrument (PREPARED) for obtaining feedback from community consumers of discharge planning activities	Iterative qualitative and quantitative investigations	N = 834; patients aged over 65 years, with a range of conditions, recently discharged from hospital, and their carers	Patient satisfaction (patient and carer versions of PREPARED)	The instrument performed well when compared with interview data, the process and outcome domains were largely independent of each other, as were responses to PREPARED and SF-36
Heng et al. (2007) [47] Singapore	Printed (Advice leaflet) Verbal instructions 1 = written 2 = person based	To evaluate patients' and caregivers' compliance to discharge instructions and their ability to recall minor head injury advice	Prospective study Telephone survey conducted within 48 h of discharge	N = 110; patients at ED Aged 7–109 years	Patient comprehension/ knowledge (study-specific measure)	29% of respondents reported non-compliance to discharge advice. Recall scores were not statistically different regardless of whether the discharge advice was given verbally, in printed form, or a combination of both methods
Heyworth (2014) [30] USA	Website ('Secure Messaging for Medication Reconciliation Tool' (SMMRT) - patient web portal) 3 = IT based	To pilot an ambulatory medication reconciliation tool	Pilot study Survey In-depth interviews	N = 60; recently discharged patients from Veteran Affairs Hospital	Patient satisfaction (study-specific measures)	Overall, participants were enthusiastic about SMMRT; 90% said they would use SMMRT again
Hickey et al. (1996) [41] USA	Concierge service 2 = person based	To improve patients' satisfaction with discharge planning	Mixed-methods study: data from the hospital's Patient Satisfaction Survey, and phone interviews with patients	N = 134 Cycle 1 N = 105 Cycle 2 General medicine patients from one hospital	Patient satisfaction (study-specific measures)	Improvement cycle 1: 83% of patients that received the improvement strategy rated discharge planning as excellent or very good, compared to 63% of control patients.

						Improvement cycle 2: patients who received the intervention rated satisfaction with discharge higher than the control group (83% vs 73%)
Hofflander *et al.* (2013) [40] Sweden	Video conference 3 = IT based	To investigate the experiences of primary healthcare nursing staff regarding discharge planning sessions and to identify their concerns regarding the use of video conferencing in the discharge planning session	Qualitative study Interviews	N = 10; nursing staff from a primary healthcare centre	Healthcare provider preferences (study-specific measure)	Nursing staff in primary healthcare regarded the planning session as stressful, time-consuming and characterized by a lack of respect between nursing staff at the hospital and nursing staff in primary healthcare. They also described uncertainty and hesitation about using video conferences where patients might probably be the losers [patients do not attend video conference] and nursing staff the winners
Horwitz *et al.* (2013) [45] USA	Standard discharge practice 2 = person based	To conduct a multifaceted evaluation of transitional care from a patient-centred perspective	Prospective observational cohort study	N = 395; patients 65 years and older discharged home after hospitalization for acute coronary syndrome, heart failure or pneumonia	Patient comprehension Patient satisfaction (CTM-3, and study-specific measures)	Although 349 patients (95.6%) reported understanding the reason they had been in the hospital, only 218 patients (59.6%) were able to accurately describe their diagnosis in post-discharge interviews. Patient perceptions of discharge care quality and self-rated understanding were high, and written discharge instructions were generally comprehensive although not consistently clear. However, follow-up appointments and advance discharge planning were deficient, and patient understanding of key aspects

Table continued

Table 3. Continued

Authors (date) Country	Discharge Practice	Aim	Method	Sample	Outcomes (measure)	Results
						of post-discharge care was poor
Lin *et al.* (2014) [49] Australia	Patient-directed discharge letter 1 = written	To test whether a brief patient-directed discharge letter delivered during a brief discussion prior to discharge would improve patient understanding of their diagnosis and treatment plan	Prospective randomized controlled trial	N = 67 cardiology, endocrinology and respiratory patients N = 35 (control group) N = 32 (intervention group)	Patient knowledge (study-specific questions)	Participants receiving the letter had an increase to almost full understanding of tests performed (P < 0.001) and to full understanding of post-discharge recommendations. This increase did not persist at 3 or 6 months
Lindpaintner *et al.* (2013) [34] Switzerland	Nurse care managers 2 = person based	To test a discharge management intervention using nurse care managers	Single-blind, randomized, controlled interprofessional pilot	N = 30 (intervention group) N = 30 (control group) Patients from two internal medicine wards	Healthcare provider and patient satisfaction (study-specific measure)	In the intervention group, satisfaction was higher among patients (P = 0.027) and caregivers (P = 0.008), and PCP rated discharge information higher (P = 0.031)
Maslove *et al.* (2009) [33] Canada	Electronic and dictated discharge summaries 1 = written 3 = IT based	To assess PCP satisfaction with an electronic discharge summary program as compared to conventional dictated discharge summaries	Cluster randomized trial	N = 209; patient discharges from an academic general medical service	Healthcare provider satisfaction (study-specific measure) Patient comprehension (Care Transition Model)	No difference in PCP-reported overall quality was observed between the two methods (86.4 for EDS vs. 84.3 for dictation; P = 0.53). Housestaff found the EDS significantly easier to use than conventional dictation (86.5 for EDS vs. 49.2 for dictation; P = 0.03), but there was no difference in overall housestaff satisfaction. There was no difference between discharge methods for the combined endpoint for adverse outcomes (22 for EDS [21%] vs. 21 for dictation [20%]; P = 0.89), or for patient understanding of discharge details (CTM-3 score 80.3 for EDS vs. 81.3 for dictation; P = 0.81)
Mueller *et al.* (2015) [51] USA	Electronic discharge instructions 3 = IT based	To examine the impact of the use of electronic, patient-friendly, templated discharge instructions on the readability of discharge	Retrospective cohort study	N = 233; patients discharged from a large tertiary care hospital	Patient comprehension (Flesch Reading Ease Level test, and Flesch–Kincaid Grade Level test)	Templated discharge instructions had higher Flesch Reading Ease Level scores (71 vs. 57, P < 0.001) and lower Flesch–Kincaid

						instructions provided to patients at discharge	Grade Level scores (5.6 vs. 7.6, $P < 0.001$), compared to clinician-generated discharge instructions
Mutsch & Herbert (2010) [10] USA	Written (printed booklet) and verbal instructions 1 = written 2 = person based	To determine whether a written educational resource used by nurses at discharge could improve patient knowledge of cardiovascular medications	Cross-sectional, descriptive mixed-method study: pre- and post-intervention, focus groups, Interviews	N = 50 (interviews) N = 24 (focus groups) Cardiovascular patients	Patient comprehension (study-specific measure)	More patients were able to verbalize correct medication, dose, schedule, and purpose post-intervention than pre-intervention (30% vs. 58%, chi-square = 7.955, df = 1, P-value = 0.005)
Naylor et al. (2004) [31] USA	Discharge planning and home follow-up protocol. 2 = person based	To examine the effectiveness of a transitional care intervention delivered by APNs to elders hospitalized with heart failure	Randomized, controlled trial	N = 239; patients aged ≥ 65 and hospitalized with heart failure. Six hospitals	Patient satisfaction	For intervention patients, only short-term improvements were demonstrated in patient satisfaction (assessed at 2 and 6 weeks, $P < 0.001$)
Naylor et al. (1999) [32] USA	Comprehensive discharge planning Home follow-up protocol 2 = person based	To examine the effectiveness of an APN-centered discharge planning and home follow-up intervention for elders at risk for hospital readmissions	Randomized clinical trial Intervention group patients received a comprehensive discharge planning and home follow-up protocol implemented by APNs	N = 363; patients aged >65 years N = 177 Intervention N = 186 Control group	Patient satisfaction (study-specific measure)	There were no significant group differences in patient satisfaction
Newnham et al. (2015) [35] Australia	Audio-visual recording 3 = IT based	To assess the feasibility and patient acceptance of a personalized interdisciplinary audio-visual record (CareTV)	Descriptive pilot study	N = 20; general medical patients	Patient satisfaction Patient comprehension (recall of diagnosis, medication changes and post-discharge review arrangements) (study-specific questions)	Participants had good understanding of the video content and recall of their diagnosis, medication changes and post-discharge plans. Patient feedback was overwhelmingly positive
O'Leary et al. (2009) [39] USA	Electronic discharge summary Dictated 1 = written 3 = IT based	To evaluate the effect of a newly-created electronic discharge summary	Pre–post evaluation Record audit Physician survey	N = 226 (baseline survey) N = 256 (post-implementation survey)	Healthcare provider satisfaction (study-specific measure)	Satisfaction with quality and timeliness of discharge summaries improved with the use of the electronic discharge summary (mean quality rating 3.04 versus 3.64; $P < 0.001$, mean timeliness rating 2.59 vs. 3.34; $P < 0.001$). A higher percentage of electronic discharge summaries were completed within 3 days of discharge as compared with dictated discharge

Table continued

Table 3. Continued

Authors (date) Country	Discharge Practice	Aim	Method	Sample	Outcomes (measure)	Results
						summaries (44.8% vs. 74.1%; $P < 0.001$)
O'Leary et al. (2006) [46] USA	Electronic discharge summary 3 = IT based	To evaluate satisfaction with current discharge summaries, perceptions of preventable adverse events related to suboptimal information transfer, and the perceived need for the electronic discharge summary we plan to design	Physician survey	N = 226 physicians	Healthcare provider satisfaction (study-specific measure)	Only 19% of the participants were satisfied or very satisfied with timeliness, and only 32% were satisfied or very satisfied with the quality of discharge summaries. Overall, 41% believed that at least 1 of their patients hospitalized in the previous 6 months had experienced a preventable adverse event related to poor transfer of information at discharge
Preen et al. (2005) [4] Australia	Discharge care plan Computer-generated Person-based (research nurse) 2 = person based 3 = IT based	To determine the impact of a hospital co-ordinated discharge care plan	Prospective, randomized, controlled, clinical trial	N = 189; patients with chronic cardiorespiratory diagnoses recruited from respiratory, cardiovascular, and general medical wards at two tertiary hospitals	Patient and GP satisfaction (study-specific measure)	Significant improvements in discharge planning involvement, health service access, confidence with discharge procedures, and opinion of discharge based on previous experience were seen for patients who received the discharge care plan. Length of stay showed no difference between groups. Extent and speed of hospital–general practitioner communication were significantly improved via the intervention
Spandorfer et al. (1995) [48] USA	Printed (instruction sheets) Verbal (instructions given by physician) 1 = written 2 = person based	To assess patients' comprehension of their ED discharge instructions	Prospective, observational study Record audit interviews	N = 217; ED patients	Patient comprehension (study-specific measure)	Overall comprehension rates were judged to be good, although 23% of patients exhibited no understanding of at least one component of their discharge instructions. Verbal instructions given by the discharging physician

likely have a significant effect on patients' comprehension of instructions

Database discharge summaries were created more quickly than those dictated (113 (79.6%) vs. 86 (57.0%), $P < 0.001$).
Summary quality and assessments of completeness, organization and timeliness were similar.
Housestaff preferred the database system for summary generation

Healthcare provider preference (study-specific measure)

$N = 193$; patients discharged from general internal medical service at a tertiary teaching hospital

Randomized clinical trial
$N = 151$ voice dictation
$N = 142$ database

To compare discharge summaries created by voice dictation with those generated from a clinical database

Voice
Database
1 = written
4 = IT based

van Walraven et al. (1999) [29] Canada

Discharge practice: 1 = written; 2 = person-based; 3 = IT based.

discharge concierge service reported greater satisfaction than those who received standard care [41]. Telephone follow-up (TFU) from the hospital one week and one month after discharge also increased patient satisfaction in a randomized control trial in Israel as well as improving patients' understanding of their discharge recommendations [42]. A pharmacist-led care transition intervention in the US provided patients with easy-to-understand instructions and strategies to manage their post-discharge medication. The majority of patients reported that it was a 'very helpful' intervention and felt more comfortable discussing their medications with their primary care providers as a result of the intervention [36]. A transitional care intervention in the USA for elderly heart failure patients hospitalized which included home visits and telephone availability by advanced practice nurses (APNs) showed a short-term (2 and 6 weeks) improvement in patient satisfaction [31].

However, no difference in patient satisfaction was found in the intervention study by Naylor et al. [32] in which patients received a comprehensive discharge planning and home follow-up protocol implemented by APNs. Similarly, TFU by a nurse was not a significant predictor of patient satisfaction in a large US study [43]. Patients in both the intervention and control groups in these studies were highly satisfied with the care received and this may explain why little improvement in patient satisfaction was identified as a result of the nurse follow-ups.

There is mixed evidence that post-discharge support, such as TFU, increases patient satisfaction. However, the individualized care provided in such interventions does appear to improve communication between the hospital, the patient, their carers and primary healthcare providers.

3. Do any discharge methods improve patient comprehension and knowledge?

There was conflicting evidence about the impact of delivery method on patient comprehension of their medical condition and discharge instructions.

A printed information booklet given to patients in the US improved knowledge of their medications (correct medication, dose, schedule and purpose) [10]. Pictograph-based discharge instructions also increased patient understanding especially for patients with low literacy skills and immigrants [18]. An Australian study found that a simple patient-directed letter delivered during a brief discussion with the clinician at discharge improved patient understanding of their hospitalization and post-discharge recommendations [49].

Another Australian study reported an audio-visual recording of the discharge summary (CareTV) improved patient recall of their diagnosis, medication and follow-up treatment plans [35]. Similarly, a randomized control trial in Canada found that patients who viewed an online video of their discharge instructions had better understanding of their diagnosis and subsequent care [50]. Another RCT in the USA found that brief video discharge instructions improved caregiver knowledge compared with written discharge instructions [17]. MDIVs were also found to improve Korean patients' comprehension of their discharge instructions [37].

In a US study, Spandorfer et al. [48] found that patient comprehension improved when instructions were given verbally by the discharging physician whereas in Singapore Heng et al. [47] found no difference regardless of whether discharge advice was given verbally, in printed form, or a combination of both. Possible reasons for this finding are that the caregivers did not understand the discharge advice or did not bother to review the instructions.

Table 4 Summary of discharge communication methods and outcome measures by study

Study	Discharge communication method			Outcome measure				Patient comprehension
				Preference		Satisfaction		
	Written	Person-based	IT based	Healthcare provider	Patient	Healthcare provider	Patient	
Archbold *et al.* [27]			✓	✓				
Atzema *et al.* [50]			✓				✓	✓
Bloch and Bloch [17]			✓				✓	✓
Branger *et al.* [38]	✓		✓			✓		
Braun *et al.* [42]		✓					✓	
Cawthon *et al.* [36]		✓					✓	
Choi [18]	✓							✓
Choi *et al.* [37]			✓				✓	✓
D'Amore *et al.* [43]		✓					✓	
Dedhia *et al.* [7]	✓						✓	
Graumlich *et al.* [28]		✓	✓	✓	✓	✓	✓	
Grimmer and Moss [44]	✓						✓	
Heng *et al.* [47]	✓	✓						✓
Heyworth *et al.* [30]			✓					✓
Hickey *et al.* [41]		✓					✓	
Hofflander *et al.* [40]			✓	✓				
Horwitz *et al.* [45]		✓					✓	✓
Lin *et al.* [49]	✓							✓
Lindpaintner *et al.* [34]		✓				✓	✓	
Maslove *et al.* [33]	✓		✓			✓		✓
Mueller *et al.* [51]			✓					✓
Mutsch and Herbert [10]	✓	✓						✓
Naylor *et al.* [31]		✓					✓	
Naylor *et al.* [32]		✓					✓	
Newnham *et al.* [35]			✓				✓	✓
O'Leary *et al.* [39]	✓		✓			✓		
O'Leary *et al.* [46]			✓			✓		
Preen *et al.* [4]		✓	✓			✓	✓	
Spandorfer *et al.* [48]	✓	✓						✓
van Walraven *et al.* [29]	✓		✓	✓				

Overall, findings suggest utilizing technology to deliver information to patients and their caregivers improves their understanding of the patient's condition and discharge instructions. Technology, in particular audio-visual technology, allows patients and carers to easily access information about their diagnosis and treatment when and as often as required.

Discussion

Effective communication between hospitals and primary healthcare providers that also meets the needs of their patients is important for providing continuity of care [5, 38]. This systematic review found variability in the way information is transferred to patients and primary care providers at hospital discharge. Three main methods were identified: 1. IT based; 2. Person-based and 3. Written. In the reviewed studies, IT-based methods were the most commonly used and included computer-generated information, website or video-based summaries, followed by person-based methods with the discharge information delivered by a healthcare provider. Written methods were the least used.

The patient and healthcare provider preferences and satisfaction results for each method were consistent across all study designs evaluated. Both patients and providers preferred discharge practices that provided relevant, concise, and personalized information, and were easily accessible and efficient. In particular, computer-generated summaries were preferred by physicians and patients due their structured format and time efficiency, and resulted higher levels of satisfaction for both healthcare providers and patients. Video-based discharge summaries and instructions were also beneficial in improving patients and caregiver comprehension of patient's diagnosis and discharge instructions. These findings suggest that utilizing technology to deliver information improves patient understanding of their condition and discharge instructions.

The primary limitations of this review relate to the variability in research design, populations, types of interventions and time-points of the studies reviewed. This impeded the synthesis of their findings. Further, many of the outcome measures were only assessed by a few studies. The studies reviewed were conducted in 10 countries with different national health systems which may also make comparisons difficult. These limitations restrict the generalizations that can be made from the findings.

Directions for future research

The findings of this review indicate the need for further research to inform the development of innovative tools to provide information at hospital discharge. The use of IT has been proposed as a way of enhancing the quality and transmission of discharge summaries [2]. Yet only a few studies have assessed the effectiveness of IT solutions such as video-based discharge summaries despite evidence that the provision of information with video is helpful in patient comprehension and decision-making [52–56]. The personalized interdisciplinary

audio-visual record (CareTV) designed to facilitate effective communication with patients, family, carers and other care team at hospital discharge also improved patient knowledge and satisfaction [35]. Redesigning discharge practices in combination with IT solutions has the potential to improve communication; make discharge summaries more accessible and transparent for patients, their families, carers and healthcare providers; and achieve higher quality of care and outcomes for patients [40, 57]. This study suggests that a single format of discharge summary is unlikely to fulfil all expectations and needs of patients and healthcare providers. A combination of discharge communication tools may be required and further research should seek the most effective combinations of tools for particular categories of patients.

Conclusion and implications for clinical practice

Improvements are needed in the processes used for transferring information to patients and their primary healthcare providers at hospital discharge. Well-designed IT solutions may improve communication, coordination and retention of information, and lead to improved outcomes for patients, their families, caregivers and primary healthcare providers as well as expediting the task for hospital staff. Further research is required to inform the development of processes for provision of information at the time of transfer of care that meet the needs of both patients and their healthcare providers.

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