Deficits in Communication and Information Transfer Between Hospital-Based and Primary Care Physicians

Implications for Patient Safety and Continuity of Care

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As the specialty of hospital medicine expands, the transfer of responsibility for patient care between hospital-based physicians (hospitalists) and primary care physicians becomes increasingly common, creating an urgent need to improve communication and information transfer between inpatient and outpatient physicians at hospital discharge.1-3 Timely transfer of accurate, relevant data about diagnostic findings, treatment, complications, consultations, tests pending at discharge, and arrangements for post-discharge follow-up may improve the continuity of this handoff.4,5 By contrast, delayed communication or inaccuracies in information transfer among health care professionals, particularly during the early post-discharge period, may have substantial implications for continuity of care, patient safety, patient and clinician satisfaction, and resource use.6-10

The discharge summary is the most common method for documenting a patient's diagnostic findings, hospital management, and arrangements for post-discharge follow-up. The Joint Commission recommends that discharge summaries include specific information for continuity of care, including medications, follow-up plans, and patient education.11 Although discharge summaries are a critical tool for primary care physicians, they are often not available when needed, and when available, they may not contain all the necessary information.

Context Delayed or inaccurate communication between hospital-based and primary care physicians at hospital discharge may negatively affect continuity of care and contribute to adverse events.

Objectives To characterize the prevalence of deficits in communication and information transfer at hospital discharge and to identify interventions to improve this process.

Data Sources MEDLINE (through November 2006), Cochrane Database of Systematic Reviews, and hand search of article bibliographies.

Study Selection Observational studies investigating communication and information transfer at hospital discharge (n=55) and controlled studies evaluating the efficacy of interventions to improve information transfer (n=18).

Data Extraction Data from observational studies were extracted on the availability, timeliness, content, and format of discharge communications, as well as primary care physician satisfaction. Results of interventions were summarized by their effect on timeliness, accuracy, completeness, and overall quality of the information transfer.

Data Synthesis Direct communication between hospital physicians and primary care physicians occurred infrequently (3%-20%). The availability of a discharge summary at the first post-discharge visit was low (12%-34%) and remained poor at 4 weeks (51%-77%), affecting the quality of care in approximately 25% of follow-up visits and contributing to primary care physician dissatisfaction. Discharge summaries often lacked important information such as diagnostic test results (missing from 33%-63%), treatment or hospital course (7%-22%), discharge medications (2%-40%), test results pending at discharge (65%), patient or family counseling (90%-92%), and follow-up plans (2%-43%). Several interventions, including computer-generated discharge summaries and using patients as couriers, shortened the delivery time of discharge communications. Use of standardized formats to highlight the most pertinent information improved the perceived quality of documents.

Conclusions Deficits in communication and information transfer at hospital discharge are common and may adversely affect patient care. Interventions such as computer-generated summaries and standardized formats may facilitate more timely transfer of pertinent patient information to primary care physicians and make discharge summaries more consistently available during follow-up care.

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INFORMATION TRANSFER AT HOSPITAL DISCHARGE

Commission on Accreditation of Healthcare Organizations (JCAHO) requires that discharge summaries be completed within 30 days of hospital discharge and that they include the following elements: “the reason for hospitalization; significant findings; procedures performed and care, treatment, and services provided; the patient’s condition at discharge; and information provided to the patient and family, as appropriate.” Moreover, a standard approach to handoff communications is included among JCAHO’s national patient safety goals, as is the reconciliation of medications at care transitions. Despite the availability of these performance standards, the extent to which physicians successfully transfer timely and accurate patient information at hospital discharge is uncertain. We performed a systematic review of the literature to characterize the types and prevalence of deficits in communication and information transfer between hospital-based physicians and primary care physicians at hospital discharge, determine the efficacy of interventions to improve this process, and describe the association of information discontinuity with clinical outcomes.

METHODS

Data Sources

We initially searched MEDLINE (through November 2005) and the Cochrane Database of Systematic Reviews and hand searched bibliographies of relevant articles. Using the Boolean term “and,” we combined the following 3 groups of key words and Medical Subject Headings (MeSH) in our MEDLINE search: (1) hospitals, hospitalists, ambulatory care facilities, physicians’ offices, outpatient clinics, ambulatory care, primary care, family practice, family physicians, or physicians; (2) patient discharge, continuity of patient care, patient transfer, or discharge; and (3) discharge summary, discharge letter, discharge communication, telecommunication, electronic mail, tele-facsimile, telephone, medical records, medical record linkage, computerized medical records systems, hospital records, interprofessional relations, hospital-physician relations, or communication. We updated the literature search for interventions through November 2006.

Study Selection

Electronic citations, including available abstracts, were screened by at least 1 author (S.K., C.O.P., or P.B.) to select reports for full-text review. Using prespecified eligibility criteria, 2 authors (S.K., F.L.) then independently assessed each article for inclusion, resolving disagreements by consensus or with input from a third author (M.V.W.). The selection criteria for inclusion were as follows. For the first review objective, to characterize communication deficits at hospital discharge, eligible reports consisted of observational studies (ie, medical record audits and physician surveys) investigating communication and information transfer at hospital discharge between hospital-based physicians and physicians in adult primary care (ie, internal medicine, family medicine, and general practice). For the second review objective, controlled studies from any medical specialty testing an intervention to improve information transfer at hospital discharge were included if the intervention differed substantially from usual practice and if results pertaining to discharge communication were provided for intervention and control groups. Only English-language articles that appeared in peer-reviewed journals and were written in scientific format were eligible, including full-length articles, brief reports, and research letters.

Data Extraction

One author (S.K. or F.L.) extracted data for study design, population characteristics, sample size, setting, intervention specifics (if appropriate), and relevant outcome measures. All abstracted data were confirmed by a second author (S.K. or F.L.), and discrepancies were resolved by consensus.

RESULTS

Of the 1064 citations identified through the initial electronic search and screened for possible inclusion, 170 publications were judged to warrant full review (Figure). A hand search of references from relevant articles yielded an additional 43 articles for review, and the updated literature search identified 1 more intervention. After exclusion of 2 duplicate or similar publications, a total of 73 studies met inclusion criteria, including 55 observational studies (21 medical record audits, 15-35 23 physician surveys, 36-58 and 11 combined audit-surveys 59-69) and 18 trials of controlled interventions (3 randomized, 70-72 7 nonrandomized with concurrent control, 73-75 and 8 with prepost design 76-87). This literature, direct communication between hospital physicians and primary care physicians during the dis-
The charge process occurred infrequently. Only 3% of primary care physicians reported being involved in discussions about discharge, and 17% to 20% reported always being notified about discharges.

The most common formats for communicating information about the hospitalization were discharge summaries (physician-dictated, transcribed reports) and discharge letters (usually handwritten narratives but sometimes structured or typed, also called interim summaries). Similar types of deficits in information transfer were reported for each format of discharge communication, but rates of particular deficits differed between letters and summaries.

Discharge letters, which are often hand delivered by patients or posted by mail on the day of discharge, reached primary care physicians more quickly than did dictated and transcribed summaries (Table 1). For example, 1 week after discharge, a median of 53% (range, 30%-94%) of letters had arrived vs only 14.5% (range, 9%-20%) of summaries. Of concern, approximately 11% of discharge letters and 25% of discharge summaries never reached the primary care physician.

No patient or program characteristics consistently explained variations in the timeliness or availability of discharge communications. One study reported that patients’ comorbidity and hospital course did not affect the availability of discharge documents, whereas in another study, community physicians were more likely to receive discharge information if medications were changed during the hospitalization.

Primary care physicians generally rated the following information as most important for providing adequate follow-up care: main diagnosis, pertinent physical findings, results of procedures and laboratory tests, discharge medications with reasons for any changes to the previous medication regimen, details of follow-up arrangements made, information given to the patient and family, test results pending at discharge, and specific follow-up needs. Despite agreement from hospital physicians on the importance of this content, audits of hospital discharge documents demonstrated frequent lack of these important details, as well as other administrative and medical information (Table 1). For example, discharge summaries often did not identify the responsible hospital physician (missing from a median of 25%), the main diagnosis (17.5%), physical findings (10.5%), diagnostic test results (38%), discharge medications (21%), and specific follow-up plans (14%). The highest rates of missing information were observed with tests pending at discharge (65%) and counseling provided to patients or families (91%). Audits of discharge letters showed comparable problems with missing information (Table 1), and in addition, legibility was a concern in 10% to 50%, and nearly 10% of these results were meaning that patients or their families were often the first source of information about the hospitalization.

One study showed a nonsignificant trend toward higher hospital readmission rates when follow-up occurred without a discharge summary available, and they expressed dissatisfaction over these deficiencies. Primary care physicians reported greater satisfaction with discharge communications that arrived quickly, usually no later than 1 week after discharge.

Communication of diagnostic test results presented another patient safety concern, with microbiological and radiologic studies posing the greatest problems. In one recent investigation, 41% of patients had test results pending on the day of discharge, and nearly 10% of these results were rated as potentially actionable, some requiring urgent attention. An earlier study found that 75% of patients had a laboratory report that returned after
hospital discharge and that 15% of the reports contained an abnormal result.31 Approximately 60% of hospital-based physicians and primary care physicians were unaware of the results.31,65 Had they known, patients' diagnoses or treatment would have changed in 1% to 2% of discharges.31,65

**Interventions to Improve Information Transfer at Hospital Discharge**

The 18 intervention studies were published during a wide period (1977 to 2005), and they varied considerably in their populations, interventions, and outcome measures (TABLES 2, 3, and 4).70-87 The most common intervention was a comparison of computer-generated and manually created discharge summaries.71,73,76-78,80,82 Other interventions involved changing the mode of delivery (eg, hand delivered, electronic, fax)70,74,84,86 or changing the format of the document.75,79,81,83,87

These studies most commonly reported outcomes of timeliness and, less commonly, quality of discharge communications. However, no standardized measures were used. Some investigations reported timeliness in terms of when discharge documents were completed by hospital physicians,71,76,77,83 whereas others noted when they were received by the primary care physician,70,74,75,82,84,85 and one study reported both.80 Results were presented either as the mean or median time to completion or receipt or as the percentage of documents completed or received by certain times. In assessing the quality of discharge communications, researchers examined the number or percentage of omitted items,73,77,80,85 or they devised a rating scale,71,72,78,81,87 No 2 studies used the same quality indicators. Many investigations also did not report statistical significance,70,73,76,77,80,84,85 thus limiting the ability to interpret observed differences between intervention and control groups.

Only 3 randomized studies were found (Table 2).70-72 Sandler and Mitchell70 found that hand delivery of the discharge letter by the patient to the primary care physician decreased the median time to receipt from 4 days to

### Table 1. Timeliness, Completeness, and Accuracy of Information Transfer at Hospital Discharge*

<table>
<thead>
<tr>
<th>Availability and timeliness</th>
<th>Discharge Letters</th>
<th>Discharge Summaries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Received by primary care physician</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Within 48-72 h</td>
<td>25.5 (8-75)²⁵,²⁸,⁴³,⁶¹</td>
<td>1³⁸</td>
</tr>
<tr>
<td>Within 1 wk</td>
<td>53 (30-94)²⁵,²⁸,³⁵,³⁶,³⁸,³⁹,⁶¹</td>
<td>14.5 (9-20)²⁵,²⁸</td>
</tr>
<tr>
<td>Within 2 wk</td>
<td>62 (42-80)²⁵,²⁸,⁶³</td>
<td>29³⁸</td>
</tr>
<tr>
<td>Within 4 wk</td>
<td>79.5 (43-90)²⁵,²⁸,³⁶,³⁹,⁶¹</td>
<td>52 (51-77)²⁴,²⁷,²⁸,³⁹</td>
</tr>
<tr>
<td>At all</td>
<td>89 (39-99)²⁵,²⁸,³⁶,³⁹</td>
<td>75 (27-90)²⁴,²⁷,²⁸,³⁹</td>
</tr>
<tr>
<td>Available in hospital medical record</td>
<td>82 (77-85)²⁵,³⁶,³⁹</td>
<td>85 (82-90)³⁵,³⁶,³⁹</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Content missing or incorrect</th>
<th>Discharge Letters</th>
<th>Discharge Summaries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Administrative information</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patient’s full name</td>
<td>1.5 (0-30)²⁵,²⁸,³⁵,³⁶,³⁹</td>
<td>5.5 (0-11)²⁵,²⁸</td>
</tr>
<tr>
<td>Patient’s age</td>
<td>17.5 (3-30)²⁵,²⁸,³⁵,³⁶,³⁹</td>
<td>26.5 (20-33)³⁵,³³</td>
</tr>
<tr>
<td>Dates of admission and discharge</td>
<td>31 (20-42)²⁵,²⁸</td>
<td>25 (23-27)³⁵,³³</td>
</tr>
<tr>
<td>Name of responsible hospital physician</td>
<td>17.5 (2-21)²⁵,²⁸,³⁵,³⁶,³⁹</td>
<td>25 (23-27)³⁵,³³</td>
</tr>
<tr>
<td>Name of physician preparing discharge summary</td>
<td>17 (8-48)²⁵,²⁸,³³</td>
<td>7³³</td>
</tr>
<tr>
<td>Name of primary care physician</td>
<td>17.5 (8-27)²⁵,³³</td>
<td>16 (7-58)³³,³³</td>
</tr>
<tr>
<td>Medical information</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Main diagnosis</td>
<td>13 (2-31)²⁵,²⁸,³⁵,³⁶,³⁹</td>
<td>17.5 (10-39)³³,³³</td>
</tr>
<tr>
<td>Other diagnoses</td>
<td>83²⁶</td>
<td>28 (7-37)³⁵,³³</td>
</tr>
<tr>
<td>Presenting symptoms</td>
<td>48.5 (28-69)³³,³³</td>
<td>20 (19-21)³³,³³</td>
</tr>
<tr>
<td>History of present illness</td>
<td>29²⁶</td>
<td></td>
</tr>
<tr>
<td>Medical history</td>
<td>48²⁶</td>
<td></td>
</tr>
<tr>
<td>Social history</td>
<td>84²⁶</td>
<td></td>
</tr>
<tr>
<td>Physical examination findings</td>
<td>45.5 (21-70)³³,³³</td>
<td>10.5 (1-20)³³,³³</td>
</tr>
<tr>
<td>Diagnostic test results</td>
<td>65 (20-75)³³,³³,³³,³³</td>
<td>38 (33-62)³³,³³</td>
</tr>
<tr>
<td>Consultant recommendations</td>
<td>33³⁷</td>
<td>52³⁵</td>
</tr>
<tr>
<td>Treatment/hospital course</td>
<td>29.5 (22-45)³³,³³,³³</td>
<td>14.5 (7-22)³³</td>
</tr>
<tr>
<td>Discharge medications</td>
<td>25 (7-48)³³,³³,³³</td>
<td>21 (2-40)³³,³³,³³,³³</td>
</tr>
<tr>
<td>Test results pending at discharge</td>
<td>88³⁵</td>
<td>65³⁵</td>
</tr>
<tr>
<td>Follow-up plans</td>
<td>30 (23-48)³³,³³,³³</td>
<td>14 (2-42)³³,³³,³³,³³</td>
</tr>
<tr>
<td>Patient or family counseling</td>
<td>92 (82-97)³³,³³</td>
<td>91 (90-92)³³,³³</td>
</tr>
</tbody>
</table>

*Values represent the median percentage and range reported across studies (superscript citations). Results for the interval 5 to 9 days since discharge were accepted to accommodate variable reporting across studies.
1 day. Van Walraven et al\textsuperscript{71} reported that generation of the discharge summary from a hospital database resulted in a higher percentage of summaries completed at 4 weeks compared to dictated summaries. The database-generated summaries also were more likely to include many of the items judged important by primary care physicians, including the main discharge diagnosis (100% vs 65%; \textit{P} = .001), pertinent physical findings (99% vs 87%; \textit{P} = .001), radiology test results (47% vs 39%; \textit{P} = .08), laboratory test results (30% vs 17%; \textit{P} = .01), discharge medications (100% vs 93%; \textit{P} = .006), medical follow-up (99% vs 95%; \textit{P} = .57), and test results pending at discharge (41% vs 9%; \textit{P} = .001). Dictated summaries were significantly more likely to include social history (37% vs 6%) and information about consultations (47% vs 19%; \textit{P} = .001 for each).

The third randomized study, by Marks et al\textsuperscript{72}, tested a multimodal "enhanced discharge planning" intervention on patients with asthma, including a telephone call to the primary care physician, a follow-up appointment scheduled for the patient, and educational booklets for the patient and primary care physician. Compared with usual care, the intervention resulted in higher ratings for their understanding of the hospital management, quality of hospital communication, and involvement in posthospital care. This was the only intervention study to evaluate the impact of their intervention on clinical outcomes. During 3 months, no significant differences were observed between groups in the frequency or severity of asthma symptoms, bronchodilator usage, number of emergency department visits, or hospital readmissions.\textsuperscript{72}

Among all the interventions aimed at improving the timeliness of discharge communication,\textsuperscript{70,71,74-77,80,82-86} all except 1\textsuperscript{83} reported improvements associated with the intervention, although not all of these differences were statistically significant. Of note, several of these studies, including the trial by van Walraven et al\textsuperscript{71}, tested database- or computer-generated summaries against handwritten or dictated summaries, using relatively basic information systems that merged patients' administrative and clinical data into a structured template.\textsuperscript{71,76,77,80,82,86} Results often indicated large improvements in discharge summary completion rates or timeliness of delivery, although the performance of the control group and magnitude of change in the intervention group varied substantially across studies. Only 1 investigation, by Kendrick and Hindmarsh,\textsuperscript{73} noted the timing of discharge communications relative to patient follow-up visits, reporting that intervention patients were slightly more likely to be treated by primary care physicians who had received discharge information (86% vs 77% in the control group; \textit{P} = .20).

Interventions to improve the quality of discharge communications showed improvements in most\textsuperscript{72,77,80,83} but not all

### Table 2. Interventions to Improve Physician Communication at Hospital Discharge: Randomized Controlled Trials

<table>
<thead>
<tr>
<th>Source (Location)</th>
<th>Participants</th>
<th>Intervention</th>
<th>Control</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sandler and Mitchell\textsuperscript{70}</strong> 1987 (England)</td>
<td>294 Patients admitted to a medical ward during 4 mo</td>
<td>Hand delivery of discharge letter by patient to GP</td>
<td>Mail delivery of discharge letter to GP</td>
<td></td>
</tr>
</tbody>
</table>
- Time to receipt, median, d | 1 | 4 | NR |
- Received by 2 d, %\textsuperscript{*} | 66 | 22 | NR |
- Received by 7 d, %\textsuperscript{*} | 85 | 72 | NR |
- Received by 28 d, % | 97 | 96 | NR |
- Completed by 4 wk, % | 80 | 57 | <.001 |
- Overall quality\textsuperscript{†} | 73 | 75 | NS |
- Overall completeness\textsuperscript{†} | 73 | 78 | NS |
- Overall organization\textsuperscript{†} | 76 | 78 | NS |
- Overall timeliness\textsuperscript{†} | 66 | 70 | NS |

| **van Walraven et al\textsuperscript{71}** 1999 (Canada) | 371 Patients admitted to the medical service at 1 hospital during 9 mo | Database-generated discharge summary | Dictated discharge summary | 
- Time to receipt, median, d | 1 | 4 | NR |
- Received by 2 d, %\textsuperscript{*} | 66 | 22 | NR |
- Received by 7 d, %\textsuperscript{*} | 85 | 72 | NR |
- Received by 28 d, % | 97 | 96 | NR |
- Completed by 4 wk, % | 80 | 57 | <.001 |
- Overall quality\textsuperscript{†} | 73 | 75 | NS |
- Overall completeness\textsuperscript{†} | 73 | 78 | NS |
- Overall organization\textsuperscript{†} | 76 | 78 | NS |
- Overall timeliness\textsuperscript{†} | 66 | 70 | NS |

| **Marks et al\textsuperscript{72}** 1999 (Australia) | 60 Children with asthma and a regular GP admitted to 1 hospital | Enhanced discharge planning\textsuperscript{†} | Usual discharge planning\textsuperscript{†} | 
- Time to receipt, median, d | 1 | 4 | NR |
- Received by 2 d, %\textsuperscript{*} | 66 | 22 | NR |
- Received by 7 d, %\textsuperscript{*} | 85 | 72 | NR |
- Received by 28 d, % | 97 | 96 | NR |
- Completed by 4 wk, % | 80 | 57 | <.001 |
- Overall quality\textsuperscript{†} | 73 | 75 | NS |
- Overall completeness\textsuperscript{†} | 73 | 78 | NS |
- Overall organization\textsuperscript{†} | 76 | 78 | NS |
- Overall timeliness\textsuperscript{†} | 66 | 70 | NS |

### Notes

Abbreviations: GP, general practitioner; NR, not reported; NS, reported as nonsignificant.

\textsuperscript{*}Results extrapolated from Figure.

\textsuperscript{†}Rated on visual analog scale (0-100).

\textsuperscript{‡}Enhanced planning consisted of (1) telephone call to GP at or before discharge, (2) individualized easy-to-read treatment orders and asthma action plan, (3) patient education booklets given to patient and GP, and (4) follow-up appointment made before discharge. Usual care included (1) handwritten discharge letter given to patient, (2) typed discharge summary mailed to GP, (3) information package given to parents, and (4) asthma action plan.

\textsuperscript{§}Percentage replying good to extremely good.

\textsuperscript{∥}Percentage replying moderately to very involved.
studies. In reports by Lissauer et al and Janik et al, the omission rate for essential items decreased with the use of computer-generated summaries. In another study of computer-generated summaries, approximately 70% of physicians expressed a preference for this format, observing that the structured summaries were shorter and more clear than dictated summaries. Van Walraven et al also found a preference for dictated summaries that followed a standardized format with clear subheadings, compared to narrative summaries. The standardized format was significantly shorter (P<.005), and physicians indicated that it provided easier access to the information most relevant for follow-up care (P<.001). Rao et al developed a standardized template for discharge dictations and reported that the quality and efficiency of dictations improved significantly (P<.001). Overall, however, improvement in measures of quality was not as consistent as seen for timeliness.

**COMMENT**

Deficits in communication and information transfer between hospital-

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**Table 3. Interventions to Improve Physician Communication at Hospital Discharge: Nonrandomized Studies With Concurrent Control Group**

<table>
<thead>
<tr>
<th>Source (Location)</th>
<th>Participants</th>
<th>Intervention</th>
<th>Control</th>
<th>Outcomes</th>
<th>Intervention</th>
<th>Control</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jelovsek et al, 1977 (United States)</td>
<td>382 Infants admitted to nursery during 3 mo, each with discharge summary in 2 formats</td>
<td>Computer-generated discharge summary</td>
<td>Manual discharge summary</td>
<td>Omitted diagnoses, range, %</td>
<td>2.4-9.4</td>
<td>0-6.8</td>
<td>NR</td>
</tr>
<tr>
<td>Dover and Low-Beer, 1984 (England)</td>
<td>207 Patients cared for by 1 of 2 house physicians</td>
<td>Hand delivery of discharge letter by patient to GP</td>
<td>Mail delivery of discharge letter to GP</td>
<td>Time to delivery, median, d</td>
<td>2.5</td>
<td>7.5</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Kendrick and Hindmarsh, 1989 (England)</td>
<td>110 Emergency hospital admissions from 2 group practices during 1 y</td>
<td>Discharge letter combined with medication prescriptions*</td>
<td>Medication prescriptions and discharge letter on separate forms*</td>
<td>Time to receipt of discharge letter, median, d</td>
<td>2.1†</td>
<td>3.1</td>
<td>.03</td>
</tr>
<tr>
<td>Llewelyn et al, 1988 (England)</td>
<td>147 Admissions to 3 hospital physicians during 3 mo</td>
<td>Computer-generated discharge summary, edited by physician</td>
<td>Handwritten discharge summary</td>
<td>Completed at 7 d, %</td>
<td>80</td>
<td>33</td>
<td>NR</td>
</tr>
<tr>
<td>Lissauer et al, 1991 (England)</td>
<td>133 Infants admitted to intensive and special care during 6 mo, each with discharge summary in 2 formats</td>
<td>Computer-generated discharge summary</td>
<td>Dictated discharge summary</td>
<td>Completed, %</td>
<td>98</td>
<td>71</td>
<td>NR</td>
</tr>
<tr>
<td>Archbold et al, 1998 (England)</td>
<td>Paired example discharge summaries rated by 147 GPs</td>
<td>Computer-generated discharge summary</td>
<td>Dictated discharge summary</td>
<td>Preferred format, %</td>
<td>69</td>
<td>28</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>van Walraven et al, 1998 (Canada)</td>
<td>9 Paired example discharge summaries rated by 160 family physicians</td>
<td>Discharge summary in standardized format</td>
<td>Discharge summary in narrative format</td>
<td>Overall rating (0-7 scale), mean (95% confidence interval)</td>
<td>4.28 (3.99-4.57)</td>
<td>3.84 (3.55-4.13)</td>
<td>.04</td>
</tr>
</tbody>
</table>

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**Abbreviations:** GP, general practitioner; NR, not reported.

*Typed discharge summaries were used in both groups.

†As reported in the article.
based physicians and primary care physicians are substantial and ubiquitous. The traditional methods of completing and delivering discharge summaries are suboptimal for communicating timely, accurate, and medically important patient data to the physicians who will be responsible for follow-up care. Urgent improvements are needed in the processes and formats used for transferring information to primary care physicians at hospital discharge.

### Table 4. Interventions to Improve Physician Communication at Hospital Discharge: Nonrandomized Studies With Pre-Post Design

<table>
<thead>
<tr>
<th>Source (Location)</th>
<th>Participants</th>
<th>Intervention</th>
<th>Control</th>
<th>Outcomes</th>
<th>Intervention</th>
<th>Control</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jank et al,80 1978 (United States)</td>
<td>68 Infants with discharge summaries 1 mo before and after intervention</td>
<td>Computer-generated discharge summaries</td>
<td>Manual discharge summaries</td>
<td>Time to completion, range, d</td>
<td>4-5</td>
<td>16-180</td>
<td>NR</td>
</tr>
<tr>
<td>Flyer et al,81 1988 (United States)</td>
<td>11 Second-year medical residents who dictated 142 discharge summaries</td>
<td>30-min Educational intervention teaching residents standardized format</td>
<td>Nonstandardized format</td>
<td>Overall rating, mean (SD)*</td>
<td>4.1 (0.94)</td>
<td>3.7 (1.1)</td>
<td>&lt;.05</td>
</tr>
<tr>
<td>Smith and Holzman,82 1989 (United States)</td>
<td>207 Patients discharged from gynecology services of 1 hospital during 2 separate 1-mo periods</td>
<td>Computer-generated discharge summary</td>
<td>Typing discharge summary</td>
<td>Time to receipt, median, d</td>
<td>2</td>
<td>5</td>
<td>NR</td>
</tr>
<tr>
<td>Kenny,83 1991 (England)</td>
<td>239 Patients randomly sampled before and after change in policy</td>
<td>Discharge letter combined with medication prescriptions</td>
<td>Medication prescriptions and discharge letter on separate forms</td>
<td>Completed by 2 d, %</td>
<td>71</td>
<td>71</td>
<td>NS</td>
</tr>
<tr>
<td>Branger et al,84 1992 (the Netherlands)</td>
<td>27 GPs at 2 hospitals participating in new electronic records program</td>
<td>Electronic notification and summary of discharge</td>
<td>Mailed discharge summary</td>
<td>Time to receipt, hospital 1, median, d</td>
<td>&lt;1</td>
<td>2</td>
<td>NR</td>
</tr>
<tr>
<td>Curran et al,85 1992 (Ireland)</td>
<td>149 Patients discharged from geriatric medical unit during 4 mo</td>
<td>Written and verbal instructions to hand deliver discharge letter to GP</td>
<td>Verbal instruction to hand deliver discharge letter to GP</td>
<td>Time to receipt, median, d</td>
<td>2</td>
<td>4</td>
<td>NR</td>
</tr>
<tr>
<td>Mant et al,86 2002 (Australia)</td>
<td>122 GPs who participated in at least 1 QI workshop</td>
<td>QI workshops intended to improve hospital-GP communication</td>
<td>GPs receiving discharge summary by fax, %</td>
<td>27</td>
<td>2</td>
<td>&lt;.001</td>
<td></td>
</tr>
<tr>
<td>Rao et al,87 2005 (United States)</td>
<td>150 Discharge summaries randomly selected from a medical unit during 3 y</td>
<td>Standardized dictation template, educational sessions for residents performing dictation</td>
<td>Discharge summaries dictated without standardized template</td>
<td>Overall quality score†</td>
<td>34</td>
<td>28</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>

Abbreviations: GP, general practitioner; NR, not reported; NS, reported as nonsignificant; QI, quality improvement.

*Average of subscores on 7 domains rated by faculty members on 0- to 5-point Likert scale.
†Total score on 0- to 41-point scale, compiling 4 subscales: (1) inclusion of relevant information, (2) exclusion of extraneous information, (3) clarity, and (4) consistency of material with main diagnosis.
Box. Suggestions to Improve Communication and Information Transfer Between Inpatient and Outpatient Physicians at Hospital Discharge

On the day of discharge, a summary document should be sent to the primary care physician by e-mail, fax, or mail. If a complete discharge summary cannot be sent on the day of discharge, then an interim discharge note should be sent. At minimum, it should include the diagnoses, discharge medications, results of procedures, follow-up needs, and pending test results.

Discharge summaries should include the following:

- Primary and secondary diagnoses
- Pertinent medical history and physical findings
- Dates of hospitalization, treatment provided, brief hospital course
- Results of procedures and abnormal laboratory test results
- Recommendations of any subspecialty consultants
- Information given to the patient and family
- The patient’s condition or functional status at discharge
- Reconciled discharge medication regimen, with reasons for any changes and indications for newly prescribed medications
- Details of follow-up arrangements made
- Specific follow-up needs, including appointments or procedures to be scheduled, and tests pending at discharge
- Name and contact information of the responsible hospital physician

Discharge summaries should be structured with subheadings to organize and highlight the information most pertinent to follow-up care and to ensure that all essential topics are addressed.

To the extent possible, hospitals should use information technology to extract information into discharge summaries to ensure accuracy (eg, medication names and doses) and to facilitate rapid completion of summaries.

If possible, patients should be given a copy of the discharge summary or note and told to bring it to their follow-up visit.

Historically, the discharge summary was used mainly for documentation of acute hospital care, and there was little need for information transfer because the same physician often provided inpatient and outpatient care. The advent of hospitalists, however, has created a division of labor in the spectrum of patient care and inherent discontinuity between acute hospitalization and community management. In this new model of care, the discharge summary becomes a vital tool for communication and information transfer. The current JCAHO performance standard that discharge summaries be completed within 30 days of hospitalization is insufficient from a patient safety perspective and does not meet the needs of primary care physicians and patients, who commonly follow up much sooner.11

Unless the timeliness and accuracy of hospital discharge communication are improved, patients who have complex medical problems and require early postdischarge follow-up often will be treated by their primary care physician before the physician’s receipt of information about the hospitalization, pending test results, and specific follow-up needs. Research is beginning to show that poor information transfer and discontinuity are associated with lower quality of care on follow-up, as well as adverse clinical outcomes. Moore et al10 found that errors related to discontinuity of care occurred for about 50% of patients and that lapses in communication related to diagnostic evaluations were associated with a significantly higher risk of readmission. Van Walraven et al66 demonstrated a trend toward greater risk of readmission among patients who were treated in follow-up by a physician who had not received a discharge summary. Conversely, in a population-based cohort study in Canada, patients following up with the same physician who provided inpatient care had a 5% decrease in the relative risk of death or readmission.9 Other studies have highlighted concerns about potential adverse events related to discontinuity, including a report by Roy et al,64 which showed that about 40% of patients have test results that return after hospital discharge and that physicians are commonly unaware of these results, even though about 10% of them require some action. Finally, erroneous information sometimes enters into discharge communications, and it is rarely questioned once documented as part of the medical record.13 Incomplete or inaccurate information about the hospitalization can contribute to faulty medical decision-making or failure to adequately monitor a patient’s condition during follow-up care. To promote patient safety at transitions of care, the timeliness, accuracy, and relevance of discharge communications must be improved.

According to the results of this review, we suggest several steps to improve communication between inpatient and outpatient physicians at hospital discharge (Box). The delivery and perhaps quality of discharge summaries can be improved substantially through health information technology. Such technology offers the potential to quickly extract information about diagnoses, medications, and test results into a structured discharge document that can be reviewed for accuracy by the hospital physician and augmented with specific instructions to outpatient physicians about pending test results and other follow-up needs. An electronic medical record can ensure integrity and speed in the data capture process. It could be configured to deliver information through fax or e-mail to designated outpatient physicians on the day of discharge, or outpatient physicians

References 11, 16, 36-39, 47, 49-52, 54-56, 60.
could be allowed to access the information on their own.90-96

In addition to computer-based solutions, a number of other interventions proved effective in improving aspects of information transfer. For example, giving a copy of the most pertinent data to newly discharged patients should increase the likelihood that this information will be available to the primary care physician at the first follow-up visit.70,74,75,83 Multifaceted approaches, using a combination of technology and simple paper-based solutions, may be needed to overcome potential barriers, as well as provide backup mechanisms to ensure timely, accurate communication of discharge information.

The primary limitations of this review relate to the consistency and quality of this body of evidence. First, interpretation and synthesis of the findings are restricted by the high degree of variability among studies in their patient populations, outcome measures, and types of interventions tested. Second, interventions to improve the quality of discharge summaries were more difficult to interpret and synthesize because the available trials contained limited outcomes data and used different metrics for their outcomes, some of which had unclear clinical significance.71,77,79,81 Third, there was a relative lack of high-quality investigations, with only 3 randomized controlled trials identified. The nonrandomized studies are subject to numerous biases, including the possible noncomparability of groups at baseline, and pre-post studies may also be affected by the confounding effects of secular time trends. Many studies did not include an appropriate analysis of outcomes, lacking statistical testing for example, and few investigations made attempts to measure and control for potential confounding variables. Fourth, the generalizability of these results is uncertain. Most of the included studies were conducted outside the United States in countries with a single-payer or national health system. There may be substantial differences in the feasibility and impact of interventions if implemented in a heterogeneous medical system as found in the United States. Even within a single medical system, differences in logistics and efficiency across hospitals may create unique challenges and opportunities that need to be addressed at the local level.

Despite these methodologic limitations, we believe that the conclusions of this report reflect the general state of affairs for the majority of medical practices. Although the precise rates of specific communication deficits may vary across sites, the delays and omissions reported in the summarized observational studies are consistently large. As for the interventions, the consistent improvement observed across investigations highlights the potential for reducing deficits in information transfer even while the optimal approach or the comparative effectiveness of these interventions cannot be determined from the existing literature. Furthermore, these results have high face validity. Deficits in communication are commonly encountered by practicing physicians, and anecdotal examples of poor communication are widespread.

We chose to focus this review on discharge communications, but other aspects of communication between inpatient and outpatient physicians may also require improvement. Many primary care physicians are not routinely notified about patient admissions or complications during the hospital course.52 Conversely, some primary care physicians may not provide sufficient information to hospitalists at admission, visit or call hospitalized patients, participate in discharge planning, or contact patients who have missed postdischarge follow-up appointments.5,97-100 Lee and Garvin101 have stressed the need to “move beyond traditional practices of information transfer (based on a 1-way monologue) and toward a more useful and appropriate notion of information exchange (based on 2-way dialogue).” In moving forward, interested readers may also wish to consult a number of noteworthy articles describing uncontrolled interventions to improve hospital discharge communication,102-115 complementary literature on emergency department discharge,116-124 an effective patient-centered approach to improve care transitions,125 and recent research abstract presentations126-133 that did not meet the inclusion criteria for the present review.

In conclusion, with the rapid growth in hospitalists and development of the specialty of hospital medicine, it has become increasingly important for hospital-based physicians and primary care physicians to communicate relevant patient information at hospital discharge. Delays and omissions in discharge communications are common and may lower the quality of posthospital care. A number of interventions appear effective in improving the timeliness and perhaps quality of discharge summaries, and application of health information technology bears particular promise. The baton of responsibility for patient care must be passed with confidence and certainty while ensuring that important information is not dropped during patient transitions from acute hospital care to the community.

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Drafting of the manuscript: Kripalani, LeFevre, Phillips.

Critical revision of the manuscript for important intellectual content: Kripalani, LeFevre, Phillips, Williams, Basaviah, Baker.

Obtained funding: Kripalani.

Administrative, technical, or material support: LeFevre, Phillips, Williams, Basaviah.

Study supervision: Kripalani, Baker.

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