

QUALITY ASSESSMENT OF A DISCHARGE SUMMARY SYSTEM

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Abstract • Résumé

Objective: To assess the completeness of hospital discharge summaries and the efficiency of the discharge summary system in two urban teaching hospitals.

Design: Descriptive study, with follow-up telephone survey.

Setting: General internal medicine services at two urban tertiary care hospitals affiliated with the University of Ottawa.

Patients: A total of 135 patient charts, representing 10% of the patients discharged from the services between Aug. 1 and Dec. 31, 1993. Three charts were unavailable for review, and 26 were excluded because of patient death, early patient discharge (within 48 hours after admission) or lack of discharge summary; this left 106 summaries for analysis of completeness and 114 (including the charts without a summary) for analysis of efficiency.

Outcome measures: Completeness: proportion of summaries in which the following information was reported: admission diagnosis, drug allergies, physical examination, significant laboratory tests and results, discharge diagnosis, discharge medications and medical follow-up. Efficiency: time taken to generate the discharge summary and whether the patient's family physician received it.

Results: Of the 106 charts with a discharge summary, information was available from the dictation system database for all but one (99.1% complete). Information was missing on the admission diagnosis in 34.0% (36/106) of the summaries, the discharge diagnosis in 25.5% (27/106) and the discharge medications in 22.8% (23/101). Of the 268 significant laboratory tests and results noted in the charts 115 (42.9%) were not reported in the discharge summary. Of the 94 discharge summaries in charts with the patient's family physician listed on the facesheet, 38 (40.4%) were not received by the family physician.

Conclusions: Considerable deficiencies in the completeness of the discharge summaries and the efficiency of the discharge summary system were found in the participating hospitals. Replication of this study in other settings is indicated, and strategies to improve the process should be pursued.

Objectif : Déterminer dans quelle mesure les résumés à la sortie de l'hôpital sont complets et établir l'efficacité du système de résumés à la sortie dans deux hôpitaux d'enseignement urbains.

Conception : Étude descriptive, suivie d'un sondage téléphonique.

Contexte : Services de médecine interne générale de deux hôpitaux de soins tertiaires urbains affiliés à l'Université d'Ottawa.

Patients : Au total, on a examiné 135 dossiers de patients, ce qui représente 10 % des patients libérés entre le 1^{er} août et le 31 décembre 1993. Trois dossiers n'étaient pas disponibles et 26 ont été exclus parce que le patient est décédé, qu'il a été libéré rapidement (dans les 48 heures suivant l'admission) ou qu'il n'y avait pas de résumé à la sortie. Il est donc resté 106 résumés qu'on a analysés pour déterminer s'ils étaient complets et 114 (y compris les dossiers sans résumé) dont on a analysé l'efficacité.

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Mesures des résultats : On a mesuré l'état complet par la proportion des résumés contenant les renseignements suivants : diagnostic à l'admission, allergies aux médicaments, examen médical, tests et résultats de laboratoire importants, diagnostic à la sortie, médicaments à la sortie et suivi médical. Efficience : temps nécessaire pour produire le résumé à la sortie et communication de celui-ci au médecin de famille du patient.

Résultats : Sur les 106 dossiers contenant un résumé à la sortie, on a tiré des renseignements de la base de données du système de dictée dans tous les cas sauf un (renseignements complets à 99,1 %). Les renseignements sur le diagnostic à l'admission manquaient dans 34,0 % (36/106) des résumés, le diagnostic à la sortie manquait dans 25,5 % (27/106) des cas et la médication à la sortie manquait dans 22,8 % (23/101) des cas. Sur les 268 tests et résultats de laboratoire importants consignés dans les dossiers, 115 (42,9 %) n'étaient pas indiqués dans le résumé à la sortie. Sur les 94 résumés à la sortie contenus dans les dossiers où le nom du médecin de famille du patient figurait sur la page couverture, 38 (40,4 %) n'ont pas été reçus par les médecins de famille en cause.

Conclusions : On a constaté dans les hôpitaux participants des lacunes importantes aux niveaux de l'état complet des résumés à la sortie et de l'efficience de système de résumés à la sortie. Il est souhaitable de refaire cette étude dans d'autres contextes et il faudrait mettre en oeuvre des stratégies afin d'améliorer le processus.

The discharge summary is sometimes the only method of communication between the hospital and the primary care practitioner. Although there is no consensus on the appropriate content of these summaries¹⁻⁴ the Joint Commission on Accreditation of Hospitals has specified the data it considers to be essential.⁵ Primary care physicians have been polled regarding the content of consultation notes in the ambulatory population,^{3,6} but this content may not necessarily be applicable to patients being discharged from hospitals. Problems with the way discharge summaries are generated¹ and distributed^{7,8} have been documented in the medical literature. In one study Stevenson, Boyle and Alexander¹ noted the unnecessary lengthiness and content deficiencies of discharge summaries. In another study Penney⁷ found that 25% of discharge summaries were never received by family practitioners when the summaries were sent by mail. Elsewhere, Mageean⁸ noted considerable delay (median 3 weeks) in the delivery of discharge summaries to primary care physicians and no receipt of a summary in 11% of cases.

There is also much anecdotal evidence that discharge summaries are often less than ideal communication tools. Although a discharge summary has many uses in the teaching hospital (it condenses information for ease of readmission to hospital and consultation, it allows house staff to view the hospital admission in its entirety, and it eases data extraction for research) its main function is to serve as a liaison between the hospital and the patient's primary care practitioner. Poor communication between hospitals and the periphery could result in inefficient patient care and inappropriate utilization of health care resources.

Despite the importance of the discharge summary, there has been relatively little research in this area of interprofessional communication in North America. We describe the results of an audit of the discharge summary

system used on the wards of the internal medicine services in two teaching hospitals. We wanted to test the hypothesis that the summaries were complete and efficient methods of communication.

METHODS

STUDY SAMPLE

We systematically selected every tenth medical chart of patients discharged between Aug. 1 and Dec. 31, 1993, from the general internal medicine services in two tertiary care hospitals affiliated with the University of Ottawa. Charts were excluded if the patient died during the admission, no discharge summary was done because of early patient discharge (within 48 hours after admission) or the chart was unavailable after three requests. Charts with no discharge summary were excluded from the assessment of summary completeness but were included in the assessment of summary system's efficiency.

ASSESSMENT OF COMPLETENESS

Information in the charts and discharge summaries of each patient was reviewed with the use of a structured form developed previously for this project. (The form is available from the corresponding author upon request.) Information items on the form included those felt to be important for discharge summary content, modified from recommendations regarding content from the Joint Commission on Accreditation of Hospitals⁵ to ensure relatively simple chart abstraction. All summaries were evaluated for the presence or absence of the following key items: admission diagnosis, drug allergy, physical examination, significant laboratory tests and results, discharge diagnosis, discharge medications (including dosage and duration, if pertinent [e.g., for antibiotics or

anticoagulants]) and medical follow-up. A patient was defined as having a drug allergy if the allergy was listed on the patient's admission write-up or if a "drug alert" was marked in the chart. The discharge medication list in the summary was compared with that in the discharge progress notes, discharge orders or the handwritten short report to the family physician. Medical follow-up was considered absent if no mention of medical attention for the patient was listed but the patient had a discharge diagnosis that the chart reviewer felt was significant enough to merit follow-up.

To assess the completeness of laboratory investigation reporting, all tests were divided into six categories: hematologic, biochemical, electrocardiographic, microbiologic, imaging and pathological. In each category extreme results were defined as "significant." For hematologic tests, these included a leukocyte count of less than 1.0 or more than $15.0 \times 10^9/L$, a hemoglobin level of less than 100 or more than 180 g/L, or an international normalized ratio of more than 4.0 . For biochemical tests, significant results were serum levels of sodium less than 125 or more than 150 mmol/L, bicarbonate less than 15 mmol/L, creatine kinase more than 500 U/L and calcium more than 3.0 mmol/L. All electrocardiograms were considered significant. For microbiologic tests, any positive blood culture result (except for coagulative negative staphylococci), a urine culture yielding more than 10^9 colony forming units per millilitre of urine, a positive sputum culture result (except for normal oral flora) or any growth in a culture of cerebrospinal fluid was considered significant. Imaging results considered significant included any chest radiographs, ultrasounds, echocardiograms, computer tomograms, magnetic resonance images or endoscopic examinations. For pathological results, any pathology or cytology report was considered significant. The charts were reviewed for significant laboratory tests and results, and then the discharge summary was checked to determine whether it mentioned these tests and results.

To assess intrarater reliability 16 charts (representing 15.1% of the selected charts with a summary discharge) were randomly chosen using random number tables. They were analysed by the same reviewer more than 4 months after the original data abstraction.

ASSESSMENT OF EFFICIENCY

Efficiency was defined as the time taken to generate the discharge summary and whether the patient's family physician received it. The dictation system database records information on each discharge summary such as when the summary was dictated, who dictated it, when it was transcribed and how long it took to be transcribed. This database was used to determine essential

efficiency data for each discharge summary. The family physician listed on the hospital chart's facesheet was contacted by telephone and the office chart reviewed to determine if and when the patient's discharge summary had been received. Family physicians of patients whose charts were excluded because of death or early discharge or because no summary was dictated were not contacted. Family physicians of patients whose summary dictator did not request that a copy of the summary be sent to the physician were contacted by phone in the event that the medical records staff sent a copy anyway.

We classified the fate of all summaries into one of seven categories: summary not done (the discharge summary was not done despite the patient staying in hospital for more than 48 hours); no family physician on chart (the family physician was not listed on the facesheet of the patient's chart); summary not requested to be sent and not received (the person who dictated the summary did not request that a copy be sent to the family physician listed on the facesheet and the summary was not received by the physician); summary not requested to be sent but received (the person who dictated the summary did not request that a copy be sent to the family physician listed on the facesheet but a copy was received by the physician regardless); patient not known to family physician (the family physician listed on the facesheet did not recognize the patient's name and did not have the discharge summary); summary sent but not received (the person who dictated the summary requested that a copy be sent to the family physician listed on the facesheet, who knew the patient but had not received the summary); summary sent and received (the person who dictated the summary requested that a copy be sent to the family physician, who both knew the patient and had received the summary).

STATISTICAL ANALYSIS

Data were stored and analysed with the use of the GB-STAT program (Dynamic Microsystems Inc., Silver-springs, Md., 1988). Standard deviations were calculated for binomial variables. When pertinent, 95% confidence intervals (CIs) were calculated.

RESULTS

We originally selected 135 patient charts, 3 of which were unavailable for review; this left 132 charts (97.8%). Information from the dictation system database was available for all but one summary. Of the 132 charts reviewed, 18 were excluded because the patient died (7) or was discharged within 48 hours after admission (11). There was no discharge summary done for eight charts. Therefore, there were 106 charts available for the com-

pleteness assessment and 114 for the efficiency assessment. The overall intrarater reliability for data abstraction was good, with agreement 86.4% of the time (kappa 0.728).

Table 1 shows the frequency with which the discharge summaries were dictated by house staff at various levels of training. Almost 75% of the summaries were dictated by medical students and interns.

Table 1 : Source of 106 discharge summaries from the general internal medicine services at two urban tertiary care hospitals affiliated with the University of Ottawa, by house-staff position

Position*	No. (and %) of summaries
Medical student	22 (20.7)
Intern/PGY1	57 (53.8)
Resident/PGY2	9 (8.5)
Staff physician	18 (17.0)

*PGY = postgraduate year.

The proportion of discharge summaries missing particular pieces of vital data ranged from less than 1% (no mention of a physical examination) to 35.0% (no mention of drug allergy) (Table 2). Of the summaries that mentioned discharge medications the drugs did not match those listed elsewhere in the chart in 11 (14.1%) (95% CI 6.4% to 21.8%).

Overall, 115 (42.9%) of the 268 significant laboratory tests and results noted in the patient charts were not reported in the discharge summaries (Table 3). The results, or even the actual performance, of 38.8% (95% CI 29.4% to 48.2%) of the imaging studies were not reported.

As for the efficiency of the discharge summary system, the median time from patient discharge to summary dictation was 8.0 (interquartile range 1.6 to 24.0) days. The mean time taken to dictate the summary (not including the time taken to peruse the chart for summary content) was 8.1 (95% CI 0 to 16.7) minutes. The median time from dictation to transcription of the summary was 4.9 (interquartile range 3.2 to 6.2) days, and the me-

Table 2: Frequency with which vital data were missing from discharge summaries

Data	No. of charts with data	No. (and %) of summaries missing data	95% CI*
Admission diagnosis	106	36 (34.0)	25.0-43.0
Drug allergy	40	14 (35.0)	20.2-49.8
Physical examination	106	1 (0.9)	0.01-2.9
Significant tests and laboratory resultst	268‡	115§ (42.9)	37.0-48.8
Discharge diagnosis	106	27 (25.5)	17.2-33.8
Discharge medications	101	23 (22.8)	14.6-31.0
Dosage	78	7 (9.0)	2.4-15.6
Duration (if pertinent)	49	13 (26.5)	13.6-40.1
Medical follow-up	106	6 (5.7)	1.3-10.1

*CI = confidence interval.

†See Methods section for description of significant tests and results.

‡Number of significant laboratory tests and results; number is higher than that of charts since one chart could have mentioned more than one test.

§Number of significant tests or results not reported in the summary.

Table 3: Frequency with which significant laboratory tests and results were missing from discharge summaries, by type of laboratory test

Test	No. of charts with data	No. (and %) of summaries missing data	95% CI
Hematologic	40	11 (27.5)	13.7-41.3
Biochemical	24	7 (29.2)	11.0-47.4
Electrocardiogram	78	49 (62.8)	52.1-73.5
Microbiologic	14	3 (21.4)	0.01-42.8
Imaging	103	40 (38.8)	29.4-48.2
Pathological	9	5 (55.6)	23.2-88.0

dian time taken to transcribe the summary after dictation was 29.2 (interquartile range 18.3 to 44.4) minutes.

Less than half (49.1%) of the summaries were received by the patients' family physicians (Table 4). The reasons for the summaries not being received included the following: the summary was not done (in 7.0% of cases), the family physician's name was not on the facesheet of the patient's chart (in 10.5%), the person who dictated the summary had not requested that a copy be sent to the family physician despite that physician's name being present on the facesheet (in 10.5%), or the family physician specified on the facesheet could not be located, did not know the patient in question or was unable to locate the patient's chart (in 9.6%). More than 95% of the family physicians were unable to determine the date the discharge summary had been received, so the time from summary transcription to physician receipt was unknown.

DISCUSSION

To our knowledge, this is the first Canadian study to show considerable deficiencies in both the completeness of discharge summary content and the efficiency of the system used to generate and distribute summaries in tertiary care teaching hospitals. When the summary was actually received by the primary care physician (which occurred less than half the time in our study), it was often missing important information regarding diagnosis and treatment, and its dictation and transcription were delayed a median time of about 2 weeks after patient discharge.

Table 4: Fate of discharge summaries

Variables	Fate; no. (and %) of summaries*	
	Received by FP†	Not received by FP
FP on facesheet of chart; summary sent; patient known to FP	55 (48.2)	15 (13.2)
FP on facesheet; summary sent; patient not known to FP‡	—	7 (6.1)
FP on facesheet; summary not requested to be sent;§ patient known to FP	1 (0.9)	12 (10.5)
FP on facesheet; summary not requested to be sent;§ patient not known to FP‡	—	4 (3.5)
No FP on facesheet; summary not requested to be sent§	—	12 (10.5)
Summary not done	—	8 (7.0)

*Denominator is the 114 charts for which a discharge summary was required.

†FP = family physician.

‡FP did not know patient or knew patient but could not locate chart for variety of reasons, or FP could not be located.

§Person who dictated summary did not request to have it sent to FP.

The generation of discharge summaries consumes a considerable amount of time and resources. In our study it took a mean of 8.1 minutes to dictate a summary and a median of 29.2 minutes to transcribe it. Despite this time and use of resources, why did the documented incompleteness and inefficiencies exist? This may have been due to who actually dictated the summaries. As Table 1 indicates, most of the dictating duties fall on the shoulders of medical students and interns — two groups of people for whom the efficient generation of a complete discharge summary may be relatively low on a list of priorities. Any intervention attempting to improve discharge summary systems in teaching hospitals should be directed toward the more junior house staff.

As discussed in the introduction, there is some variability as to what is considered ideal content of a discharge summary. In a related study that is currently under way, we are surveying primary care physicians in our region for their preferences as to the content. Their responses will allow us to develop a more standard summary. We chose the elements specified in Table 2 both for their importance and for the ease with which the data could be extracted from the patient charts, as attested to by the good intrarater reliability. Although we did not assess the completeness of the discharge summary with regards to other important information (e.g., treatment given, therapeutic procedures performed and complications in hospital) we believe that the incomplete reporting of the easily identified "hard" data shown in Table 2 may well extend to other important information.

The incomplete reporting of laboratory tests and results deserves special mention. We chose test results that we felt were extreme enough to deserve mention in the summary because they would likely play an important role in explaining the patient's admission and hospital stay. In addition, we felt that the reporting of all imaging investigations was important because results of both routine investigations (e.g., electrocardiograms or chest radiographs) and more intensive investigations would, even if the findings were normal, affect the choice and interpretation of future investigations. The sometimes large number of investigations performed during the hospital stay may overwhelm the memory of the dictating physician, resulting in many tests not being mentioned. The consistent lack of reporting of between 25% to 50% of these tests is of concern because it could result in an incomplete synopsis of the patient's hospital stay and cause resource overutilization from unreported tests being repeated by the family physician. The extent of inappropriate duplication of services due to poor interprofessional communication requires further investigation.

Discharge summaries may not be received by family physicians for several reasons: the summary has not been

completed, the patient's family physician is not listed in the chart, the person who dictates the summary does not request that a copy be sent to the family physician, and the summary is sent to the wrong physician or address. Any attempt to improve the efficiency with which summaries are delivered to family physicians should address these possible breaks in communication.

Our study had some possible limitations. First, the method of selecting the patient charts was not random and therefore may have been subject to bias. However, it is unlikely that the chosen charts were systematically of worse quality than the unchosen ones. The original list of chart numbers for all patients discharged from the internal medicine service during the study period was indexed by physician and date of discharge dictation. The systematic selection of charts from this list ensured a proportionally equal representation of all staff who dictated summaries.

Second, since only one of us reviewed all of the charts for data extraction, this may have resulted in a systematic bias affecting the assessment of discharge summary completeness. Since a standardized form developed *a priori* was used to abstract the data and the data were of a quantitative nature, we feel the risk of bias was minimized.

Third, we assessed the discharge summary system used by the general internal medicine services in two teaching hospitals. Although the results were comparable between the two hospitals (data not shown), we are unsure whether similar results would be found in other services within our hospitals, or in other teaching or community hospitals. Discharge summaries may be more complete and their generation more efficient in smaller, nonacademic centres, where the responsibility of producing summaries does not fall on physicians in training.

Fourth, we did not set out to determine whether a discharge summary had all the information needed to result in an "ideal" summary. We did not attempt to determine the accuracy of the abstracted data or the accuracy and completeness of other important components of the discharge summary (e.g., various diagnoses, the patient's course in hospital and the patient's living arrangements on discharge) because such information is difficult to abstract from the patient's chart.

Finally, although we originally chose to analyse the charts of 10% of the patients discharged during the study period, only 8% were available for assessment because of exclusion criteria. However, we feel that this sample was still large enough to draw conclusions, as evidenced by the relatively narrow confidence intervals of most outcomes of interest.

Some possible methods to solve the problem of incomplete discharge summaries and poor efficiency in

generating them have been previously explored. Stevenson and associates¹ proposed a summary generated from the prioritization and dictation of problem lists in the progress notes, with brevity being stressed. Although this method was never tested, the use of problem lists instead of a narrative, letter-style format in consultation notes was preferred by 93% of family physicians in a study by Lloyd and Barnett.⁹ Flyer and collaborators,¹⁰ in an unblinded study, assessed discharge summaries dictated by house staff at a teaching hospital before and after an education session and found significant improvement in clarity, brevity and completeness. Smith and Holzman,¹¹ who also used a before-after design, found that the use of a computer database to generate narrative discharge summaries decreased the time from patient discharge to summary dictation from 21 to 3.8 days on average. In a similar but less technologic approach we are currently preparing a clinical study to evaluate the effectiveness of a standardized discharge summary form.

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