RESEARCH ARTICLE

Improving paper-based discharge process; a continuous full-cycle quality improvement project in low resource setting

[version 1; peer review: 1 not approved]

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Abstract

Background: The moment of hospital discharge is a time for vulnerability for many patients and might jeopardize their safety. We found that the current structure of the discharge card at Soba University Hospital (SUH) does not improve the quality of the discharge summary. This hinders the delivery of valid, relevant and adequate health information and can negatively affect outpatient care.

Methods: We implemented a new discharge card design with structured headings at the Department of Medicine at Soba University Hospital from the beginning of March to April 15th, 2017. This was coupled with educational sessions highlighting the problems that might occur if there were gaps in patient transition from inpatient to outpatient.

Results: There was a significant improvement in documentation of the majority (>90%) of the items, including name, age, source of admission treating doctor, diagnosis and medication, but there was a drop in documentation of comorbidities. We also noticed that the new discharge summary format significantly improved the documentation of the majority of the headings (all P values were <0.001), yet, there was a drop in documentation of comorbidities and dates for follow up.

Conclusions: Recording of paper-based health records like discharge summaries could be substantially improved by use of well-structured formats and practical training sessions. Improvement is a dynamic process. Some gaps might appear during execution, these need monitoring and continuous improvement to establish sustainability.

Open Peer Review

Approval Status

1

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view

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Any reports and responses or comments on the article can be found at the end of the article.

Keywords

discharge summary, audit, SCAR, Soba University Hospital

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Introduction

Hospital discharge describes the point at which inpatient hospital care ends, with ongoing care transferred to other primary, community or domestic environments. This transfer process requires documentation of the medical encounter to be sent to the receiving services, such as primary care providers and referral clinics. The discharge process is a complex one and requires coordination of several departments¹. The moment of hospital discharge is a real time of vulnerability for many patients. Missing important information or sharing inaccurate information might lead to unintended omission or delay of necessary treatment, or to duplication of work. A major concern is the negative effect on safety and quality of health care. In one study, 19% of patients had adverse events after discharge, 31% of them were preventable adverse events^{2,3}.

Hoyer *et al.* reported in a retrospective study that a delay in completion of the discharge summary was associated with higher rates of readmission⁴. In some healthcare settings the discharge card is sent directly to the primary care provider or the receiving facilities. In other settings, the discharge summary is handed to the patient following the discharge process, and subsequently most of the information will accompany the patient along with the transfer of medical care. This highlights the importance of effective, highly informative, and patient-centered discharge cards. The card serves as the main tool of communication between healthcare professionals in different healthcare facilities. Many interventions are suggested to ensure this safe transition of care⁵; including education and training of medical staff, designing universal discharge protocol and medication reconciliation; and involving patients and their relatives in the discharge process^{6,7}. Some facilities use an electronic discharge summary and computer-based innovations to improve the discharge process, which include notifications of pending tests at discharge. This has been challenged by the cost and ability of end-user to utilize⁸. Some organizations (like the Royal College of Physicians) created discharge cards with top level headings for medical records to help guiding clinicians in the discharge process.⁹ They are thought to improve doctors' performance and have a pronounced effect in patient outcome^{9,10}.

The audit team at Soba Center for Audit and Research (SCAR) conducted an audit evaluating the quality and content of discharge cards (11). We found that a significant proportion of the discharge summaries are not written in the structured-predefined format of the discharge card, which halts the delivery of valid, relevant and adequate health information. We concluded that the current structured format does not improve the quality of the discharge summary¹¹. We implemented a new discharge card design to improve the reporting of discharge summaries. In this report we aimed to assess the impact of the implemented interventions and compared the quality of the old cards to the new ones (old and new discharge cards can be found in [Supplementary File 1](#) and [Supplementary File 2](#) respectively).

Methods

We evaluated the quality of information documented in Soba University hospital discharge cards in two separate audit

cycles. The study was conducted at Soba University Hospital (SUH). The first cycle included 146 discharge summaries and was done in April 2014 and the second cycle included 65 summaries and was completed between March 1st and April 15th, 2017. The audit team consisted of residents from the department of internal medicine, medical officers from the Soba Center for Audit Research (SCAR), supervised by consultant physicians. The discharge summaries that were analyzed were written for patients discharged from the Department of Internal Medicine at the Soba University Hospital.

The first audit cycle showed inadequate documentation of information in the discharge summary¹¹. The audit team reviewed the literature, conducted several meetings and assessed local environmental factors. This resulted in restructuring of the discharge card format with appropriate headings, based on a standard cards designed by NHS-UK, used as a benchmark⁹. As a result, we applied structured educational sessions and changed the format of the discharge summary as the primary interventions to improve documentation. The sessions were delivered in May 2017 and included demonstration and training on effective documentation in discharge summaries. The sessions were delivered by the audit team and candidates were Soba University hospital trainees (registrars and foundation doctors). After the interventions were applied, we reevaluated the quality of the discharge summary documentation in the second cycle.

The study was approved by Soba Center for Audit and Research SCAR at Soba University Hospital. Consent was waived by the research committee because the study is a quality improvement project that doesn't involve human subjects. Data was extracted from the discharge summaries using a structured preformat and formulated as present or absent. Incomplete data that needs seeking information outside the discharge summary were considered absent.

We used Microsoft excel 2016 for statistical analysis to compare between the two cycles. We calculated the frequencies and percentages of availability of mandatory information that should be available in the discharge summaries initially and after applying the intervention to assess the impact of intervention plan. We used **SPSS** v22 to calculate the P value by applying one sample t-test.

Ethical statement

The audit was approved by SCAR at Soba University Hospital. Consent was waived by the research committee because the study is a quality improvement project that doesn't involve human subjects.

Results

The results showed that there was universal improvement in all aspects of documentation of the discharge summary ([Table 1](#)). Age, date of discharge, drug name, duration, and investigations were documented in more than 90% of summaries. Drug-related data and in-patient management are illustrated in [Figure 1](#) and [Figure 2](#), respectively. [Table \(2\)](#) shows differences in follow-up data documentation between old and

Table 1. Improvement in documentation of patients and doctors' identifiers.

Heading	Old card percent	New card percent %
Patient's demography		
Name	98%	100%
Age	87%	96.6%
Gender	18.7%	100%
Address	1.4%	88.3%
Telephone	0.7%	51.6%
Discharging doctor		
Department	87%	100%
Consultant	81%	100%
Doctor name	NA	100%
Signature	38.8%	81.6%
Date of admission	74%	100%
Date of discharge	74%	96.6%

Figure 1. Difference in documentation of drug-related information. **Figure 2.** Difference in documentation of In-patient management.

Table 2. Pattern of change in Follow-up data documentation.

Heading	Old card percent	New card percent %
Follow up		
Further follow up required	76.3%	86.6%
Date of follow up	83%	65%
Name of follow up clinic	17%	78.3%
Advice recommendations or future plan	15.1%	58.3%

new cards. Although there was remarkable improvement in documentation of telephone numbers and action plans, only around half of the summaries contained this information. We also noticed that the new discharge summary format significantly improved the documentation of the majority of the headings (all P values were <0.001), yet, there was a drop in documentation of comorbidities and dates for follow up.

Dataset 1. Second cycle data and summary of the first cycle data

<http://dx.doi.org/10.5256/f1000research.13359.d195419>

Discussion

The aim of this study was to maintain patient safety at the time of transfer of care, by improving documentation in the discharge summary card. Previous research that we conducted (11) showed variability in documentation of different headings, with the majority being deficient. The variability of the card documentation made the interpretation of the card more difficult. In fact, the information on the headings, including gender, mode of admission, diagnosis, name of follow up clinician, future plans, drug duration, and drug route are absent in $>60\%$ of discharge cards. As a result, we concluded that the quality of the previous discharge summary format was not at an acceptable level.

Documentation of patient telephone numbers increased to 51.6% with the new discharge cards, compared to 0.7% with the old discharge cards. Although this shows a significant improvement, it does not meet our goals. It affects our ability to follow up those patients and to notify them about important issues. Claassen *et al.* reported that utilizing telephone-based follow-up procedures can maximize patient data retention in longitudinal studies¹².

The exact date of follow-up was not documented in 35% of the cards. We attribute this result to the fact that some patients were discharged at the end of the day or after hours. It might be difficult for the discharging doctor to set an appointment. This reflects gaps in communication between in-patient team and out-patient departments; making future plans of follow-up not clear at time of discharge. Corrective intervention will be explored in future plans. Previous studies have suggested that

adverse events complicate 1 out of every 5 hospital discharges, in the Medicare (a national social insurance program administered by the U.S. federal government) population alone, 19.6% of patients dismissed from the hospital will be readmitted within 30 days and 34.0% of patients will be readmitted within 60 days¹³. Good discharge planning and good communication tools between the healthcare facilities, healthcare providers and patients are needed to streamline a safe discharge process.

Although we were able to induce substantial change by implementing a new well-structured format and effective educational session, maintenance of satisfactory level of documentation may be challenging especially in a dynamic hospital environment. The service at the department of medicine at SUH is led by consultants. Most of the work is done by registrars (residents in postgraduate training) and house staff (interns who just graduated). Central bodies assign registrars and house staff to hospitals; registrars are assigned by the Sudan Medical Specialization Board and interns by the Federal Ministry of Health. Interns usually stay in service for 3 months and registrars for 4–8 months. These are temporary workers, by the time they master the game they move to another facility or service with different structure and processes. This creates uncertainty regarding the reproducibility and transferability of activities and improvements related to working practices and calls for a universal or national implementation. We will continue to educate and monitor, and future plans may consider electronic records. However, electronic health records as the sole mode of communication in hospitals may be costly and impractical, particularly in low resource settings⁸.

Conclusions

Documentation of paper-based health records like discharge summaries could be substantially improved by use of well-structured formats and practical training. These structured formats should be tailored according to the hospital discharge plan. Monitoring, continuous education and proactive solutions are needed to achieve safe care and establish sustainability.

We recommend that managers and heads of departments at SUH as well as other faculties should be informed about the results of this work, and that deficiencies should be addressed by appropriate interventions. Moreover, we strongly encourage the program to be transferred to other departments, and advocate for other facilities to be designed.

Data availability

Dataset 1: Second cycle data and summary of the first cycle data [10.5256/f1000research.13359.d195419](http://dx.doi.org/10.5256/f1000research.13359.d195419)¹⁴

Competing interests

No competing interests were disclosed.

Grant information

The author(s) declared that no grants were involved in supporting this work.

Supplementary material

Supplementary File 1: Old style discharge card.

[Click here to access the data.](#)

Supplementary File 2: New style discharge card.

[Click here to access the data.](#)

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Summary:

The article builds on an important recognition that current paper-based discharge forms do not contain information required for expected quality of post-discharge care and its coordination. The authors have designed an intervention to improve documentation in discharge forms, which includes a re-design of the form, and educational sessions for physicians who fill the forms. While the intention is clear, the study has some significant limitations in its executions and/or reporting:

1. The theory of change for their implementation of "a new discharge card design to improve the reporting of discharge summaries" is not clear - how and why were the changes made (both the restructured form and the educational sessions) expected to improve reporting?
2. Introduction/referencing: The approach for the redesign is not adequately described.
3. Ethical issues: Discharge forms can and often contain identifiable patient information. The authors should describe how the data was collected, stored and analysed while ensuring safety and confidentiality of the data.
4. Methods: How did the old and new forms differ? The forms are central to the study, but the authors do not describe how they differed.
5. Methods: The data appear to be from two samples (old and new discharge cards), but comparisons were analysed using a one sample t-test. This appears wrong.
6. Methods: Details on the intervention (dates and numbers of cards analysed, etc) provided are inadequate.
7. Results: Different parts of the form (demographics & identifiers, drug-related information, in-patient management, follow-up) are presented in separate tables and figures. The reader does not get an overview of how the old and new forms were compared, under which categories, and how what numbers of cards were analysed for each category. Ideally the numbers of discharge summaries analysed and the p-values of the differences should be presented along with the percentages.
8. Discussion: The authors present results from a previous study in the first paragraph, which is confusing.

9. Discussion: The statement "Although this shows a significant improvement, it does not meet our goals" refers to a goal that is not described or justified.

10. Discussion: The negative results (decrease in documentation of co-morbidities and date of follow up) are not discussed. These are clearly important information that can affect quality of follow-up.

Is the work clearly and accurately presented and does it cite the current literature?

Partly

Is the study design appropriate and is the work technically sound?

Partly

Are sufficient details of methods and analysis provided to allow replication by others?

No

If applicable, is the statistical analysis and its interpretation appropriate?

Partly

Are all the source data underlying the results available to ensure full reproducibility?

No

Are the conclusions drawn adequately supported by the results?

Partly

Competing Interests: No competing interests were disclosed.

I confirm that I have read this submission and believe that I have an appropriate level of expertise to state that I do not consider it to be of an acceptable scientific standard, for reasons outlined above.

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