# Adherence to UK national guidance for discharge information: an audit in primary care

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## Summary

### Aims

Poor communication of clinical information between healthcare settings is associated with patient harm. In 2008, the UK National Prescribing Centre (NPC) issued guidance regarding the minimum information to be communicated upon hospital discharge. This study evaluates the extent of adherence to this guidance and identifies predictors of adherence.

### Methods

This was an audit of discharge summaries received by medical practices in one UK primary care trust of patients hospitalised for 24 hours or longer. Each discharge summary was scored against the applicable NPC criteria which were organised into: 'patient, admission and discharge', 'medicine', and 'therapy change' information.

### Results

Of 3,444 discharge summaries audited, 2,421 (70.3%) were from two teaching hospital and 906 (26.3%) from three district hospitals. Unplanned admissions accounted for 2,168 (63.0%) of the audit sample and 74.6% (2,570) of discharge summaries were electronic. Mean [95% CI] adherence to the total NPC minimum dataset was 71.7% [70.2-73.2]. Adherence to patient, admission and discharge information was 77.3% [77.0-77.7], 67.2% [66.3-68.2] for medicine information and 48.9% [47.5-50.3] for therapy change information. Allergy status, co-morbidities, medication history and rationale for therapy change were the most frequent omissions.

Predictors of adherence included quality of the discharge template, electronic discharge summaries and smaller numbers of prescribed medicines.

### Conclusions

Despite clear guidance regarding the content of discharge information, omissions are frequent. Adherence to the NPC minimum dataset might be improved by using comprehensive electronic discharge templates and implementation of effective medicines reconciliation at both sides of the health interface.

## What is already known about this subject?

- Previous research suggests that the quality of discharge medication information transfer is generally poor. However, limited research can be found about communication of patient, admission, discharge and therapy change information.
- There is no large UK report of the extent to which discharge summaries adhere to national guidance and no indication of the predictors of performance

## What this study adds

- Three years post issue of UK national standards, the majority of discharge summaries are failing to fulfil these requirements.
- The audit found that the use of an electronic template incorporating all recommended national standards increases the likelihood of adherence to the requirements and thus improves discharge communication.

## Introduction

Transition of patient care between settings presents an opportunity for errors and has been identified by the world health organisation as a cause of preventable morbidity [1].The Institute of Health Improvement suggested that poor information communication at healthcare transition is responsible for over 50% of all medication errors and up to 20% of adverse events [2].Similar rates have been reported in the UK [3], Australia [4] and Europe [5]. Lack of communication is not restricted to medication information; admission, discharge and patient information such as incomplete and in accurate allergy status, co-morbidities and hospital contact information have also been reported [6, 7].

Legibility has presented an additional opportunity for error at care transition. An estimated 40% to 75% of handwritten discharge summaries have been found to be completely or partially illegible [11, 13]. With advances in computer technology, the use of electronic discharge summaries has evolved and thus the relevance of legibility may have diminished. Evidence is, however, emerging that new types of errors maybe introduced with the use of IT systems[14]. Electronic discharge summaries can however improve the timeliness of information transfer between care settings. In 2009, the UK care quality commission reported that only 53% of discharge summaries were received in sufficient time to be of use in post-discharge management [8]. A recent USA report highlighted that less than 50% of discharged patients have their discharge letter prepared on the day of discharge and for one in four patients, the discharge team took over a week to complete the discharge summary [12]. The timeliness of the discharge information being received by the next health provider was not reported.

A systematic review of deficits in communication and information transfer performed in 2007 by Kripalani et al. reviewed 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). Kripalani et al. followed by a number of studies in later years, found that deficits in communication and information transfer at hospital discharge are common and may adversely affect patient care. The researchers were however unable to identify the factors associated with the deficits [10, 4, 5, 7, 11, 12].

Transfer of discharge summary information is a multi-factorial process and the relationships between these factors and the quality of discharge communication are unclear [9, 15]. Factors which influence discharge summary information might be system related such as discharge summary template content, whether the document used to transfer information is handwritten or electronic [11, 16, 17], time available to collect and communicate discharge information and whether the admission was planned or unplanned [5, 18]. Variations in discharge information may be related to the individual such as the medical training of the person completing the discharge summary, the complexity of the patient's care and discharge medication [5, 7, 19].

There is limited UK evidence evaluating the quality of information received in primary care following patient discharge which currently comprises one general practitioner (GP) survey [8], two large audits [3, 9] and one retrospective case-note review study [6].

In response to patient safety concerns, in 2008, the UK National Prescribing Centre (NPC) stipulated a minimum dataset of information to be communicated at all transitions of patient care [20]. The NPC is now a part of the UK National Institute for Health and Care Excellence (NICE) which has therefore adopted the NPC guidance as a national standard for information communication at care transition. NICE is a government funded organisation that supports health professionals in providing the best possible healthcare. There are no large scale reports

of the extent to which discharge summaries adhere to these guidelines and thus no indication of their impact on the quality of practice.

## AIMS

The aims of this study were to report the magnitude of hospital discharge summary adherence to the NPC minimum dataset and to identify the extent of adherence to different elements within the dataset. Additionally, the study aimed to determine the factors affecting the likelihood of discharge summary adherence to the NPC minimum dataset.

## METHODS

### Setting and Study design

A retrospective review of a sample of discharge summaries received by medical practices from one primary care trust was conducted between January to March 2011 in the eastern region of the UK. As an audit, ethical approval was not required; however, appropriate authorisation to undertake the audit was obtained from the NHS Norfolk in August 2010.

An audit tool was developed to record either 'yes' or 'no' for the presence of each NPC minimum dataset item in a discharge summary. Table 1 describes the minimum dataset recommended by the NPC following hospital discharge.

### Sample selection

All medical practices (n=91) in one primary care trust were invited to participate and practices self-selected a member of the medical team to complete a piloted audit data collection form for each discharge summary. Each practice was allocated a target number of eligible discharge summaries to prospectively collect and a standardised procedure for data collection form completion was issued. Discharge summaries were selected consecutively

until the allocated number was collected. The allocation was based on the assumption that a sample representing 5% of the patients registered with a practice is a reasonable work load for GP practices to audit. List sizes of the GP practices ranged from 200 to 2,180, thus practice allocated numbers ranged from 10 to 109. A total sample of 3,761 discharge summaries was anticipated.

All discharge summaries of patients hospitalised for 24 hours or longer were included and those for patients transferred to another trust or deceased before discharge or data collection were excluded.

**Estimating discharge summary adherence to the NPC minimum dataset**

Discharge summaries were scored against all NPC criteria presented in Table 1, except for "procedures carried out" and "additional information related to corticosteroid record cards or anticoagulant books". Discharge summaries were scored one point when a criterion was successfully fulfilled (i.e. all information was provided and/or accurate as appropriate).For example, if a patient had three allergies and only one was documented the criterion was not fulfilled. Two points were scored for each criterion not fulfilled. Discharge summaries for patients with no medication history or where no medicines were changed, initiated or discontinued were scored only against the applicable criteria and therefore the extent of adherence to the NPC minimum dataset was estimated as a percentage using the equation below:

**Extent of adherence to NPC minimum dataset =** $[1-((S - T)/T)] \times 100\%$

- Discharge summary adherence score (S)= Sum of the point(s) assigned to each applicable criterion
- T= score representing complete adherence to all applicable criteria

NPC minimum dataset criteria were organised into three categories: 'patient, admission and discharge information', 'medication information' and 'therapy change information'. These are shown in Table 2.

**Audit quality assurance**

Variations between auditors were systematically evaluated to assess the quality of the audit data. All participating medical practices were stratified by list size into five strata; computerised random number generation was used to select five medical practices from each stratum to assess variations in audit data collection. Similarly, twenty discharge summaries were randomly selected from each of the selected practices and re-audited by the lead author (EH). Agreement for each audit question was calculated using the Kappa statistic. Kappa scores ranging from 0.01-0.40 were considered of slight to fair agreement, 0.41- 0.60 of moderate agreement, 0.061-0.80 good and > 0.81 of substantial agreement [22].

Twenty handwritten discharge summaries were randomly selected using a computerised random number generator and legibility rated by a GP independent to the medical practice from which the data were collected. Agreement between the GP assessment and auditors was assessed by weighted Kappa scores which was interpreted in a similar way to unweighted Kappa scores. Cells were weighted according to the magnitude of disagreement; the method used to weight cells is the absolute error weight [23].

**Data collection and outcome measurements**

In addition to data describing discharge summary adherence to the NPC minimum dataset, the following data were collected from each discharge summary: dates of admission and discharge, whether it was planned or emergency and the role of the professional responsible for discharge; patient medical and demographic information, clinical information related to

laboratory results and post admission complications and the number of working days between discharge and receipt of the discharge summary by primary care.

From each hospital represented in the audit, a copy of the discharge summary template was obtained. For some hospitals, more than one template was available and thus the template representing the majority of the discharge summaries from that hospital was selected for analysis.

Discharge summary legibility was assessed using a four point scale [21]: 'Illegible', 'most words are illegible', 'some words illegible' and 'legible'.

The audit tool was piloted and face validated by two primary care pharmacists and one GP before Trust-wide distribution.

Total adherence to the NPC minimum dataset was reported as the primary outcome. Extent of discharge summary adherence to the three categories of the NPC minimum dataset was the secondary outcomes.

**Data analysis**

Data were processed using the Statistical Package for Social Science (SPSS version 18). Descriptive statistics were reported as a mean [95% CI] and median (IQ) as appropriate. General linear models (GLM) were used to investigate the effect of factors such as, the number of prescribed medicines, type of discharge summary (handwritten or electronic) and discharge summary template on adherence to the NPC minimum dataset. Stepwise backward elimination was used to reach the most parsimonious GLM models.

Furthermore, GLM analysis was performed to determine the effect of ward speciality on discharge summary adherence to the NPC minimum dataset. Community and specialist care hospitals such as mental health hospitals were excluded from this analysis as they do not have

the breadth of different ward specialities demonstrated by general hospitals. Likewise, GLM analysis was employed to determine the effect of factors and ward speciality on discharge summary adherence to each of the three categories of the NPC minimum dataset.

All models presented were checked for assumptions of linearity, multicollinearity and homoscedasticity; none of these assumptions were violated.

## RESULTS

### Study sample

A small number of practices (n=7) did not complete the audit in the specified time window. These only represented 317 (8%) of the anticipated number of discharge summaries which were therefore excluded from analysis. A total of 3,444 discharge summaries representing 12 different hospitals were audited by 84 medical practices. Discharge summaries from two teaching hospitals accounted for 2,421 (70.3%), three general district hospitals accounted for 906 (26.3%), 21 (0.6%)were from a mental health trust52 (1.5%) were from community and 40 (1.2%) were from private hospitals or hospitals beyond the region surrounding the Trust. Table 3 summarises the audit sample characteristics. Discharge summaries were primarily electronic and arising from unplanned admissions. The audit was largely of older patients and with a relatively even gender distribution. The highest proportion of discharge summaries were from medicine for elderly wards. For more than 20% of discharge summaries there was no indication of the role of the healthcare professional responsible for preparing the discharge summary. Where profession type was provided, doctors represented the highest proportion of which 1113 (44.5%) were of an unknown training level and 853 (34.1%) were doctors in their first year of practice after qualification.

**Extent of adherence to total NPC minimum dataset**

Mean [95% CI] discharge summary adherence to the total NPC minimum dataset was 71.7% [70.2-73.2]. Table 4 illustrates the range of discharge summary adherence with different procedural characteristics. The adherence rates of discharge summaries arising from planned and unplanned admissions were similar. Electronic discharge summaries, however, were associated with notably higher adherence than handwritten. Variation was found between hospitals with H3 demonstrating the greatest adherence whilst H1 and community hospitals demonstrated substantially lower adherence rates than other hospitals.

Table 5 presents the content of the discharge summary templates used by the hospitals representing the majority of the audit sample. No two templates were identical and the extent of template adherence followed a similar pattern to discharge summary adherence to the NPC minimum dataset. The template of H3 exhibited greatest adherence to the NPC minimum dataset whilst the template of H1 and community hospitals demonstrated the lowest adherence.

With respect to ward specialities and profession types, discharge summaries from orthopaedic wards and those prepared by doctors demonstrated the lowest adherence rates.

**Adherence to NPC requirements relating to patient, admission and discharge information**

Figure 1 illustrates adherence rates to the NPC minimum dataset for patient, admission and discharge information. Mean [95% CI] discharge summary adherence was 77.3% [77.0-77.7] with allergy status, co-morbidities and medication history contributing to the most frequent omissions.

The majority of discharge summaries were electronic and thus legible, however, 374 (42.8%) 95%CI [39.5-46.1] of the handwritten discharge summaries were considered partially illegible with the clinical message deemed unaffected, 33 (8.8%) 95%CI [6.9-10.7] were considered mostly illegible with the meaning of the clinical message unclear and 13 (1.5%) 95%CI [0.69-2.3] were deemed completely illegible.

Table 4 presents the extent of discharge summary adherence to the NPC requirement for patient, admission and discharge information. Electronic discharge summaries were more likely to provide comprehensive patient, admission and discharge information compared to handwritten discharge summaries. Planned and unplanned admissions, however, demonstrated similar adherence rates.

Variation can be seen between wards with respect to patient, admission and discharge information with orthopaedic demonstrating the lowest adherence. The most notable deviations were in the recording of co-morbidities and medication histories which were only fulfilled for 79 (41.8%) and 87 (39.0%) discharge summaries respectively. Discharge summaries written by pharmacists and nurses demonstrated better adherence than those written by doctors. It was again in the recording of co-morbidities and medication histories that the main differences lay. Discharge summaries prepared by doctors reported full details of co-morbidities and medication histories for only 50.6% (1,266) and 41.7% (1,042) compared to 58.3% (21) and 50% (18) for pharmacists and 61.6% (90) and 43.8% (46) for nurses respectively.

**Adherence to NPC requirements relating to medication information**

Mean [95% CI] discharge summary adherence to medication information reporting was 64.0% [63.2-64.8]. Figure 1 illustrates adherence rates for medication information with deviations manifested particularly with medicine formulation and duration.

Table 4 presents the extent of discharge summary adherence to medication information reporting. It can be seen that electronic discharge summaries demonstrated higher adherence than handwritten discharge summaries. Variation can be seen between wards with general surgery wards demonstrating the lowest adherence rate. No discernible differences were seen between planned and unplanned admissions or profession types.

**Adherence to NPC requirements relating to therapy change information**

Discharge summary reporting of therapy change information demonstrated the lowest adherence among the three categories of the NPC minimum dataset with a mean adherence of 48.9% [47.5-50.3]. Figure 1 illustrates adherence rates for therapy change information; the rationale for medicines initiated, discontinued or changed was persistently omitted.

Table 4 presents the variation in discharge summary adherence to therapy change information reporting; electronic discharge summaries demonstrated better adherence than handwritten discharge summaries. Unplanned admissions were associated with a slightly higher adherence rate than planned admissions. Of the different types of ward, orthopaedic wards demonstrated the lowest adherence. Small variation can be seen between healthcare professions with discharge summaries prepared by doctors demonstrating lower adherence.

**Predictors of adherence to NPC minimum dataset**

Table 6 summarises the regression models for factors influencing discharge summary adherence to the total NPC minimum dataset, patient, admission and discharge information, medication information and therapy change information.

With respect to adherence to the total NPC minimum dataset ($R^2$ = 0.14, adjusted $R^2$= 0.14), Template 1 and community hospital templates contributed significantly to lower adherence whilst Template 3 contributed to higher adherence. Handwritten discharge summaries and an

increased number of medicines contributed to lower adherence. The effect of ward speciality on discharge summary adherence to the NPC minimum dataset adjusting for type of discharge summary and number of medicines ($R^2$=0.10, adjusted $R^2$=0.11) identified that orthopaedic wards contributed to the lowest adherence; B (SE) = -3.7 (1.1), p <0.001 followed by general surgery -2.36 (1.03), p=0.02.

Investigating factors influencing the three categories of NPC minimum dataset identified similar predictors. For patient, admission and discharge information ($R^2$=0.18, adjusted $R^2$=0.16), the community hospital template was the strongest predictor of poor adherence. For medicine information ($R^2$=0.13, adjusted $R^2$=0.11), a handwritten discharge summary was the strongest predictor of poor adherence. For therapy change information ($R^2$=.11, adjusted $R^2$=0.09), template3 was the only predictor of good adherence, the remainder were very strong predictors of poor adherence.

Similarly, investigating the influence of ward specialty adjusting for discharge summary template, the number of medications and type of discharge summary, identified orthopaedic wards as the strongest predictor of poor adherence; B [95% CI] -3.68 [-6.3- -1.06], p=0.01 for patient, admission and discharge details ($R^2$=0.14, adjusted $R^2$=0.14) whilst general surgery wards were the strongest predictor of poor adherence for medicine information ($R^2$=0.11, adjusted $R^2$=0.09); -8.90 (2.7) [-14.27- -3.52], p=0.001. For therapy change information, all wards demonstrated poor adherence with orthopaedic wards again being the strongest predictor of poor adherence ($R^2$=0.11, adjusted $R^2$=0.06); -22.4 (4.9) [-32.1- -12.7], p < 0.001.

**Quality assurance of audit data**

Ninety-five discharge summaries were re-audited and Kappa scores ranged between 0.61 and 1 with a mean [95%CI] of 0.83 [0.81-0.85] indicating good to substantial agreement. The

weighted kappa score [95% CI] for legibility assessment was 0.86 [0.59-1] (p=0.001) indicating substantial agreement.

## DISCUSSION

This study highlights that three years after the UK minimum dataset for discharge information transfer being stipulated, the requirements are not consistently met. The deviations identified reflect those of previous studies which have also cited allergy status, co-morbidities, medication history, details of medicines prescribed and rationale for therapy changes as common omissions [4-7, 12, 30,31, 40-41].

Incomplete allergy status, omissions regarding medicines prescribed before admission and co-morbidities have been demonstrated to contribute to patient harm associated with unintended discontinuation or unsafe prescribing [26, 27]. Additionally, incomplete information regarding therapy changes and discharge medications might confuse primary care providers and contribute to time wastage while attempting to establish whether change was intentional.

The lack of progress with discharge information communication is of concern. This study has identified predictors of non-adherence plus characteristics associated with increased adherence to NPC requirements. Recommendations to enhance discharge information transfer have therefore been proposed.

Considerable variations were seen between hospitals; H3 demonstrated the greatest adherence. Notably, deviations between hospitals followed a similar pattern to the extent of discharge summary template adherence to the NPC minimum dataset. This is consistent with

previous research outlining that the use of a standardised discharge summary form resulted in more comprehensive and accurate communication of discharge information [11, 17].Similarly, this has been advocatedby the Health Informatics Unit at the UK Royal College of Physicians since 2008 [28].

Electronic discharge summaries demonstrated better adherence to all NPC requirements compared to handwritten discharge summaries. Similar findings have been reported in previous studies with electronic discharge summaries reducing hand transcription and allowing faster and uniform recording of discharge information [5, 10]. However, they have been associated with increased errors due to incorrect selection or user entry [14, 29]. This present study design did not allow for such errors in recording to be captured.

The inverse relationship between adherence to the NPC minimum dataset and the number of prescribed medicines is intuitive and consistent with previous reports [30, 31]. When a patient is prescribed a medication there is an increased opportunity for communication errors.

The poor performance of orthopaedic and general surgery wards is consistent with previous studies [3, 7, 24, 32]. Discharge summaries from these wards persistently recorded no rationale for therapy changes and provided incomplete information related to medicine and co-morbidity history. Patient short stay admissions for minor risk procedures within these care areas might contribute to a hospital team perception that the GP will decipher changes and continue patient care from the clinical history provided [33]. However, without comprehensive notification about post discharge treatment and full details of patient medicines, the GP might feel unable to continue patient care and maintain clinical responsibility [34]. Additionally, inattention to secondary conditions could explain these frequent deficits, this has been also suggested in a recent report in 2012 highlighting that errors occurred on discharge were more likely attributed to medicines unrelated to the

primary diagnosis [35]. Inattention to secondary conditions and consequently medicines which are unrelated to the primary diagnosis might be of significant implication to patient care and safety; a national review in the USA including over 11 million discharged patients from 2003-2004 highlighted that among patients who were readmitted within 30 days after a surgical discharge, 70.5% were for unrelated condition[36]. Thus, it is important to devote equal attention to all patient medicines.

Further exploration of the factors contributing to variations in ward performance is warranted. This may be achieved through interviews with care providers at health transition points to enhance our understanding of the reasons underlying persistent deviations within individual wards and the contributors to good adherence within others. Such information might guide future intervention development and resource prioritisation.

This study found no difference between profession types with respect to discharge summary adherence to the NPC minimum dataset or risk of discrepancy. This is, however, inconsistent with two large UK reports [15, 37] and smaller studies in USA and Europe [38, 39]which have indicated that trainee doctors are a contributing factor to increased risk of admission error. The absence of effect of profession type in the present audit could reflect the high proportion of discharge summaries with an unspecified profession or training level resulting in a limited number of data points for this factor. Thus, no firm conclusion can be drawn on this regard warranting further work.

Our study is the first to report adherence levels to the NPC minimum dataset across an entire primary care trust. Whilst not generalisable to the whole of the UK, the audit has presented a large dataset representing various hospitals and specialities. This study is also the first to investigate a number of process, system and patient related factors predicting adherence to the NPC minimum dataset.

However, the sampling strategy could have resulted in more than one discharge summary being received from the same hospital doctor which could in turn lead to less discrimination within the study results. The methodological approach of data collection by multiple people whilst affording a large sample size, introduced the potential for variations in quality. The audit process required the whole discharge summary to be reviewed to identify changes in therapy and rationales; it is possible that the reasons for change and additional information included in the body of the discharge summary may have been missed due to human error. Additionally, discharge summary adherence in our study was not graded on a discrete scale and therefore variation in quality might not have been fully captured by the simplistic yes/no criteria. Nevertheless, the quality assurance process demonstrated good to substantial agreement thus provides confidence in the presented data.

This study has reported the magnitude of discharge summary adherence to the NPC minimum dataset but it is not possible to comment on the accuracy of information provided. Therefore, further work to capture the accuracy of information communication is necessary.

This study has identified clear predictors of good adherence and thus allows recommendations to be developed. However, the amount of variance explained by the regression model was small and thus a substantial proportion remains unexplained warranting further work to explore other predictors which might contribute to the quality of discharge communication.

Discharge summary template was identified as a significant predictor of the quality of discharge information. This valuable finding might help to promote the implementation of a standardised pro-forma across all NHS trusts. However, there were variations in the templates employed between wards within each hospital and the template representing the majority of discharge summaries generated from each hospital was audited. The lack of standardisation

and use of multiple templates may indicate variation in care standards and patient management between hospitals or wards. Therefore, it is impossible to determine from the present study design, the extent to which variation in template affected discharge summary adherence; future work capturing these other variables may therefore be beneficial.

Although the NPC is a government funded agency responsible for improving the quality of prescribing, there is no mandate for hospitals to adhere to thisguidance and the extent to which the guidance is utilised is unknown. There might be a need to widely publicise and mandate the use of the NPC minimum dataset by hospitals and UK health institutions. Of note is that the NPC criterion for discharge summaries to be received within two days post discharge was fulfilled by 70% of discharge summaries. Recent recommendations however, have placed greater emphasis on discharge summaries being sent within 24 hours of the patient being discharged [42].

## CONCLUSIONS

The completeness of discharge information communication in one primary care trust was found to be inadequate three years post issue of national standards. Comprehensive electronic pro-forma incorporating all NPC minimum dataset requirements may improve the quality of discharge communication.

Adherence to the NPC minimum dataset varies across care areas, identifying wards demonstrating poor adherence as well as good adherence is necessary to guide future interventions. Patients prescribed higher numbers of medicines need greater care whilst completing their discharge summary and communicating information upon care transition. However, such recommendations might be difficult to implement in an environment of multiple competing demands, thus it would be of value to identify the optimum method to implement and prioritise MR service provision to patients most likely to benefit.

## Statement of conflicts of interest

All authors have completed the Unified Competing Interest form at http://www.icmje.org/coi_disclosure.pdf (available on request from the corresponding author) and declare: no support from any organisation for the submitted work; no financial relationships with any organisations that might have an interest in the submitted work in the previous 3 years and no other relationships or activities that could appear to have influenced the submitted work.

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**Table 1 The NPC minimum dataset of information recommended in primary care following discharge from hospital***

1. Complete and accurate patient details, i.e. full name, date of birth, weight if under 16 year, NHS/unit number, consultant, ward, date of admission, date of discharge.
2. The diagnosis of the presenting condition plus co-morbidities
3. Procedures carried out
4. A list of all medicine prescribed for the patient on discharge from hospital (and not just those dispensed at the time of discharge)
5. Dose, frequently, formulation and route of all the medicine listed
6. Medicine stopped and started, with reasons
7. Length of courses where appropriate (e.g. antibiotics)
8. Details of increasing, or decreasing dose regimens (e.g. insulin, warfarin, oral corticosteroids)
9. Known allergies, hypersensitivities and previous drug interactions
10. Any additional patient information provided such as corticosteroid record cards, anticoagulant books
11. This information should be clear, unambiguous and legible and should be available to the GP as soon as possible. Ideally, this should be within two working days of the patient's discharge

*All the NPC minimum dataset criteria listed above were included in the audit standards except "procedures carried out" and "additional information related to corticosteroid record cards or anticoagulant books". This was because it was not possible to identify whether procedures were carried out when thisinformation was not recorded in the discharge summary andthe audit was conducted retrospectively so it was not possible to identify whether a patient was provided with the relevant record card or logbook.

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**Table 2 The audit scoring criteria**

| | |
|---|---|
| Patient, admission & discharge details | 1. Correct patient name<br>2. Correct date of birth<br>3. Consultant name<br>4. Ward<br>5. Date of admission<br>6. Date of discharge<br>7. Presenting diagnosis<br>8. Complete past medical history and co-morbidities<br>9. Complete medication history<br>10. Known allergic or hypersensitivities,<br>11. Discharge summary is legible<br>12. Received within 2 days post discharge (weekends and public holidays were excluded). |
| Medication information* | 13. Full list of all discharge medicines<br>a. All doses<br>b. All frequencies<br>c. All routes of administration<br>d. All formulations<br>e. Therapy duration when a medication was initiated by hospital team where this was appropriate (e.g. antibiotics, short course corticosteroids or hypnotics) |
| Therapy changes information** | 14. List of all medication altered<br>a. All medicines initiated with reason(s)<br>b. All medicines discontinued with reason(s)<br>c. All medicines changed with reason(s) |

*Based on the completeness of the medicines listed in the discharge summary, for example if five medicines were listed in the discharge summary, the criteria would have been fulfilled if all the requirements (name, dose, duration etc.) for the five medicines were recorded. To avoid double counting, if for example the same patient used six medications according to the GP and five were listed in the discharge summary. omission of the 6$^{th}$pre-admission medication would be scored as "complete medication history" not fulfilled with no further penalty under the 'medication information' criterion. **The whole discharge summary was reviewed to identify changes in therapy and rationale for change, initiation or discontinuation.

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## Tables

**Table 3 Audit sample characteristics**

| | Measure | H1 n=715 | H2 n=57 | H3 n=136 | H4 n=55 | H5 n=2,368 | Community hospitals n=52 | Others n=61 | Total N=3,444 |
|---|---|---|---|---|---|---|---|---|---|
| **Patient demographics** | | | | | | | | | |
| Age | Median (IQ) | 67 (45,81) | 59 (46,70) | 60.5(39.3,76.8) | 73 (57,80) | 66.0 (46,79) | 76.0 (70.3,84.8) | 65.0 (46.5-76) | 66 (46,80) |
| Female | N (%) | 371 (51.9) | 22 (38.6) | 81 (59.6) | 27 (49.1) | 1194 (50.4) | 26 (50.0) | 32 (52.5) | 1,753 (50.9) |
| No. of medicines | Median (IQ) | 5 (2,8) | 6 (2,8) | 6 (3,10) | 5 (3,8) | 6 (2,8) | 6 (3,10) | 6 (3,9) | 5 (2,8) |
| Hospital stay | Median (IQ) | 4 (2,8) | 3 (1.5,8) | 3 (2,6) | 4.5 (2,13) | 4.5 (2,8) | 13 (5,36) | 4.5 (2,10) | 4 (2,8) |
| Time of discharge summary arrival | Median (IQ) | 2 (2,8) | 2 (2,4) | 1 (0,2) | 2 (1,2.5) | 2 (1,3) | 2 (2,4) | 2 (1,3) | 2 (1,3) |
| **Type of discharge summary** | | | | | | | | | |
| Electronic discharge summaries | N (%) | 110 (15.4) | 29 (50.9) | 126 (92.6) | 25 (45.5) | 2,211 (93.4) | 30 (57.7) | 39 (63.9) | 2,570 (74.6) |
| **Type of admission** | | | | | | | | | |
| Unplanned admission | N (%) | 433 (60.6) | 28 (49.1) | 20 (14.7) | 41 (74.5) | 1591 (67.2) | 30 (57.7) | 25 (41.0) | 2,168 (63.0) |
| Unspecified type of admission | N (%) | 106 (14.8) | 10 (17.5) | 92 (67.6) | - | 128 (5.4) | 14 (26.9) | 15 (26.6) | 365 (10.6) |
| **Ward specialities** | | | | | | | | | |
| Medicine for Elderly | N (%) | 73 (10.2) | 3 (5.3) | 21 (15.4) | 1 (1.8) | 454 (19.2) | 7 (13.5) | 5 (8.2) | 564 (16.4) |
| Urology | N (%) | 76 (10.6) | 4 (7.0) | 25 (18.4) | 2 (3.6) | 292 (12.3) | 2 (3.8) | 2 (3.3) | 403 (11.7) |
| General surgery | N (%) | 54 (7.6) | 8 (14.0) | 1 (0.7) | 10 (18.2) | 244 (10.3) | 3 (5.8) | 1 (1.6) | 321 (9.3) |
| Thoracic | N (%) | 27 (3.8) | 1 (1.8) | 5 (3.7) | - | 210 (8.9) | - | - | 243 (7.1) |
| Cardiology | N (%) | 24 (3.4) | 4 (7.0) | 5 (3.7) | 3 (5.5) | 195 (8.2) | 1 (1.9) | 3 (4.9) | 235 (6.8) |
| Orthopaedic | N (%) | 62 (8.7) | 4 (7.0) | 3 (2.2) | 7 (12.7) | 137 (5.8) | 3 (5.8) | 7 (11.5) | 223 (6.5) |
| Paediatrics | N (%) | 63 (8.8) | 2 (3.5) | 6 (4.4) | - | 131 (5.5) | 1 (1.9) | - | 203 (5.9) |
| General medicine | N (%) | 70 (9.8) | 1 (1.8) | 40 (29.4) | 9 (16.4) | 65 (2.7) | 2 (3.8) | 2 (3.8) | 189 (5.5) |
| Gynaecology | N (%) | 21 (2.9) | 4 (7.0) | 13 (9.6) | 2 (3.6) | 105 (4.4) | - | 4 (6.6) | 149 (4.3) |
| Oncology | N (%) | 10 (1.4) | 6 (10.5) | 1 (0.7) | - | 121 (5.1) | 2 (3.8) | 1 (1.6) | 141 (4.1) |
| Gastroenterology | N (%) | 26 (3.6) | 2 (3.5) | 2 (1.5) | 4 (7.3) | 90 (3.8) | - | 8 (13.1) | 132 (3.8) |
| Others* | N (%) | 65(9.1) | 15 (26.3) | 9 (6.6) | 15 (27.3) | 266 (11.2) | 9 (17.3) | 14 (23.0) | 393 (11.4) |
| Unspecified specialities | N (%) | 144 (20.1) | 3 (5.3) | 5 (3.7) | 2 (3.6) | 58 (2.4) | 22 (42.3) | 14 (23.0) | 248 (7.2) |
| **Profession types** | | | | | | | | | |
| Doctors | N (%) | 602 (84.2) | 40 (70.2) | 22 (16.2) | 33 (60.0) | 1728 (73.0) | 38 (73.1) | 41 (67.2) | 2,504 (72.7%) |
| Pharmacists | N (%) | - | - | - | - | 36 (1.5) | - | - | 36 (10.5) |
| Specialist nurse practitioners | N (%) | 5 (0.7) | 2 (3.5) | - | - | 135 (5.7) | 1 (1.9) | 3 (4.9) | 146 (4.2) |
| Unspecified profession | N (%) | 108 (15.1) | 15 (26.3) | 114 (83.8) | 22 (40.0) | 469 (19.8) | 13 (25.0) | 17 (27.9) | 758 (22.0) |

*E.g. Nephrology, Neurology, ENT, Endocrinology, Dermatology, Rheumatology, Ophthalmology, Maternity care and Neonatal

**Table 4 Discharge summary adherence to NPC minimum dataset**

| | | Discharge summaries adherence | | | |
|---|---|---|---|---|---|
| | N | Total NPC minimum dataset | Patient, admission & discharge information | Medicine Information | Therapy change information |
| **Type of discharge summary** | | | | | |
| Electronic | 2,570 | 73.7% [73.3-74.1] | 79.5% [79.1-79.9] | 67.2% [66.3.-68.20] | 50.9% [49.4-52.3] |
| Handwritten | 874 | 67.0% [65.2-66.8] | 71.0% [70.2-71.9] | 54.8% [53.4-56.3]. | 40.2% [36.9-43.7]. |
| **Type of admission** | | | | | |
| Planned | 911 | 71.3% [70.6-72.1] | 77.2% [76.5-78.0] | 63.9% [62.2-65.6] | 46.3% [43.8-48.9]. |
| Unplanned admission | 2,168 | 71.8% [71.3-72.3] | 77.5% [77.1-78.0] | 62.9% [61.9-64.0] | 49.0% [47.3-50.8] |
| Unspecified type of admission | 365 | 72.6% [71.2-74.1] | 76.4% [75.0-77.8] | 70.8% [68.5-73.1] | 55.4% [51.2-59.7] |
| **Hospital** | | | | | |
| H1 | 715 | 65.0% [64.1-65.9] | 69.8% [68.9-70.7] | 54.3% [52.9-55.8] | 41.8% [37.8-45.9] |
| H2 | 57 | 73.5% [70.6-76.8] | 79.7% [76.2-83.1] | 69.1% [62.5-75.8] | 46.9% [34.7-59.1] |
| H3 | 136 | 81.4% [79.7-83.2] | 85.4% [83.9-87.0] | 83.0% [80.0-86.0] | 65.5% [60.0-71.0] |
| H4 | 55 | 71.7% [68.3-75.1] | 79.4% [76.7-82.1] | 48.2% [40.2-56.2] | 26.4% [14.6-38.2] |
| H5 | 2,368 | 73.5% [73.1-74.0] | 79.3% [79.0-79.7] | 66.4% [65.4-67.4] | 50.6% [49.0-52.1] |
| Community hospital | 52 | 62.4% [58.1-66.9] | 68.6% [64.3-72.9] | 58.5% [49.5-67.5] | 27.7% [15.8-39.6] |
| Others | 61 | 65.8% [62.5-69.2] | 72.5% [69.2-75.8] | 60.3% [54.2-66.4] | 36.9% [26.1-47.7] |
| **Ward specialities** | | | | | |
| Medicine for Elderly | 564 | 73.5% [72.6-74.4] | 79.7% [78.8-80.6] | 64.7% [62.8-66.7] | 53.0% [49.7-56.2] |
| Urology | 403 | 73.3% [72.2-74.4] | 78.4% [77.1-79.1] | 67.6% [65.3-69.9] | 52.0% [48.3-56.2] |
| General surgery | 321 | 71.1% [69.9-72.4] | 78.1% [76.9-79.3] | 58.8% [55.7-61.9] | 42.3% [37.7-46.9] |
| Thoracic | 243 | 73.3% [72.0-74.6] | 78.7% [77.5-80.0] | 67.2% [64.4-69.7] | 51.5% [46.6-56.4] |
| Cardiology | 239 | 73.0% [71.5-74.5] | 78.9% [77.4-80.4] | 65.2% [62.3-68.1] | 50.7% [46.5-54.9] |
| Orthopaedic | 217 | 68.6% [67.1-70.2]. | 75.0% [73.5-76.5] | 63.5% [60.5-66.6] | 34.9% [29.0-40.7] |
| Paediatrics | 203 | 71.4% [69.7-73.1] | 76.6% [74.9-78.2] | 64.7% [61.0-68.3] | 46.8% [40.8-52.8] |
| General medicine | 187 | 72.0% [70.3-73.7] | 75.8% [73.9-77.5] | 64.8% [61.1-68.6] | 58.3% [51.5-64.9] |
| Gynaecology | 145 | 72.2% [70.1-74.3] | 78.9% [77.1-80.6] | 64.0% [59.4-68.5] | 49.6% [42.0-56.9] |
| Oncology | 140 | 73.9% [72.1-75.7] | 77.8% [76.2-79.4] | 68.2% [64.4-72.1] | 58.9% [52.6-65.3] |
| Gastroenterology | 126 | 69.6% [67.7-71.6] | 75.7% [73.7-77.7] | 60.2% [56.1-64.2] | 48.1% [41.0-55.3] |
| Others* | 421 | 72.6% [71.5-73.7] | 78.4% [77.3-79.4] | 62.8% [59.9-65.6] | 43.1% [39.0-47.2] |
| Unspecified specialities | 235 | 64.4% [62.7-66.1] | 68.8% [67.1-70.5] | 60.2% [56.0-62.5] | 49.0% [43.2-54.9] |
| **Profession types** | | | | | |
| Doctors | 2,504 | 71.0% [70.5-71.5] | 76.6% [76.2-77.1] | 62.8% [61.9-63.8] | 48.1% [46.4-49.7] |
| Pharmacists | 36 | 74.6% [71.7-77.5] | 80.1% [77.6-82.6] | 69.1% [61.2-77.0] | 51.5% [38.4-64.6] |
| Specialist nurse practitioners | 146 | 74.5% [72.5-76.6] | 79.8% [78.1-81.5] | 65.6% [61.0-70.3] | 53.0% [46.8-59.2] |
| Unspecified profession | 758 | 73.6% [72.6-74.4] | 79.1% [78.3-79.9] | 67.5% [65.7-69.3] | 50.5% [47.8-53.2] |
| **Extent of adherence** | 3,444 | 71.7% [70.2-73.2] | 77.3% [77.0-77.7] | 67.2% [66.3-68.2] | 48.9% [47.5-50.3] |

*E.g. Nephrology, Neurology, ENT, Endocrinology, Dermatology, Rheumatology, Ophthalmology, Maternity care and Neonatal

**Table 5 Templates of the primary medium of discharge summary**

| | Electronic templates | | | Handwritten template | | |
|---|---|---|---|---|---|---|
| **Information** | **Template2** | **Template 3** | **Template 5** | **Template 1** | **Template 4** | **Community hospital template** |
| **Patient** | | | | | | |
| Name | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Date of birth | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| NHS number | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Past medical history | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Allergy and hypersensitivities | ✓ | ✓ | × | × | × | × |
| **Admission and discharge** | | | | | | |
| Admission date | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Discharge date | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Presenting diagnosis | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Procedures & investigation | ✓ | ✓ | ✓ | ✓ | ✓ | × |
| **Medicine** | | | | | | |
| Name | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Dose | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Frequency | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Route | ✓ | ✓ | ✓ | × | ✓ | ✓ |
| Formulation | × | ✓ | × | × | × | × |
| Duration | × | × | ✓ | ✓ | ✓ | ✓ |
| **Therapy change** | | | | | | |
| Medication started | × | × | ✓ | × | × | × |
| Reason for medication started | × | × | × | × | × | × |
| Medication stopped | × | ✓ | ✓ | × | × | × |
| Reason for medication stopped | × | × | × | × | × | × |
| Medication changes | × | ✓ | × | × | × | × |
| Reason for medication changed | × | × | × | × | × | × |
| **Ward details** | | | | | | |
| Consultant name | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Ward name | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| **%Template adherence to the NPC minimum dataset** | **65.2%** | **78.3%** | **73.9%** | **60.9%** | **65.2%** | **60.9%** |

**Table 6 Regression models* for factors predicting discharge summary adherence to the total NPC minimum dataset, patient, admission & discharge information, mediation information and therapy change information**

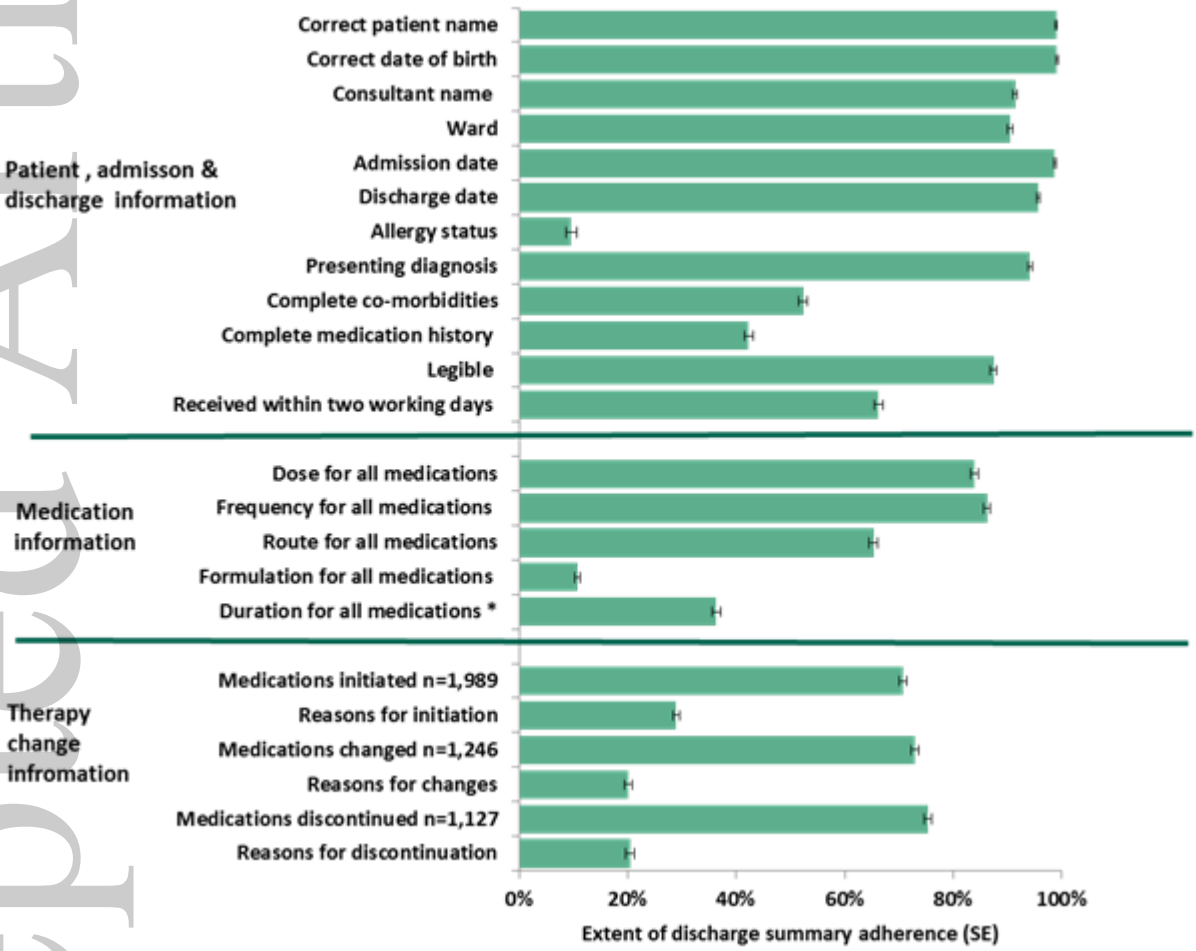
| | Adherence to total NPC minimum dataset | | | | | Adherence to patient, admission & discharge information | | | | | Adherence to medication information | | | | | Adherence to therapy change information | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 95% CI for B | | | | | 95% CI for B | | | | | 95% CI for B | | | | | 95% CI for B | |
| | B | Std. Error | p | Lower limit | Upper limit | B | Std. Error | p | Lower limit | Upper limit | B | Std. Error | P | Lower limit | Upper limit | B | Std. Error | p | Lower limit | Upper limit |
| Constant | 78.6 | 0.75 | < 0.001 | 77.1 | 80.1 | 79.1 | 0.32 | <0.001 | 78.4 | 79.7 | 66.7 | 0.82 | <0.001 | 65.1 | 68.3 | 52.1 | 1.2 | <0.001 | 49.7 | 54.5 |
| No. of medications | -0.24 | 0.04 | < 0.001 | -0.3 | -0.2 | 0.11 | 0.04 | .007 | 0.03 | 0.2 | -0.02 | 0.10 | 0.86 | -0.2 | 0.18 | -0.23 | 0.16 | 0.15 | -0.6 | 0.1 |
| **Type of discharge summary** | | | | | | | | | | | | | | | | | | | | |
| Handwritten | -3.51 | 0.63 | < 0.001 | -4.8 | -2.3 | -4.8 | 0.86 | <0.001 | -6.5 | 3.1 | -13.5 | 3.62 | <0.001 | -20.6 | -6.4 | -5.6 | 4.2 | 0.19 | -13.9 | 2.8 |
| Electronic | 0 | | | | | 0 | | | | | 0 | | | | | 0 | | | | |
| **Discharge summary template** | | | | | | | | | | | | | | | | | | | | |
| Template1 | -5.83 | 0.68 | < 0.001 | -7.2 | -4.5 | -8.5 | 1.00 | <0.001 | -10.5 | -6.5 | -6.1 | 2.3 | 0.01 | -10.6 | -1.7 | -5.6 | 4.2 | 0.19 | -13.9 | 2.8 |
| Template2 | 1.66 | 1.50 | 0.27 | -1.3 | 4.6 | 3.9 | 1.90 | 0.04 | 0.1 | 7.7 | 7.1 | 4.4 | 0.11 | -1.5 | 15.8 | -3.3 | 7.5 | 0.66 | -17.9 | 11.3 |
| Template3 | 8.14 | 0.97 | < 0.001 | 6.2 | 10.1 | 6.3 | 0.96 | <0.001 | 4.5 | 8.2 | 18.2 | 2.1 | <0.001 | 14.2 | 22.3 | 17.9 | 3.6 | 0.01 | 10.8 | 24.9 |
| Template4 | -0.13 | 1.53 | 0.93 | -3.1 | 2.9 | -0.58 | 2.1 | 0.78 | -4.7 | 3.5 | -6.2 | 4.6 | 0.18 | -15.2 | 2.8 | -12.1 | 6.8 | 0.08 | -25.5 | 1.3 |
| Template5 | 0 | | | | | 0 | | | | | 0 | | | | | | | | | |
| Community hospital template | -9.47 | 1.56 | < 0.001 | -12.5 | -6.4 | -9.5 | 1.9 | <0.001 | -13.2 | -5.7 | -4.9 | 4.3 | 0.25 | -13.5 | 3.5 | -19.2 | 8.1 | 0.02 | -35.1 | -3.3 |

*Final stepwise elimination models

**Figures legends**

*When medications were initated by hospital n=1,989

**Figure 1 Magnitudes of discharge summaries adherence to NPC minimum dataset**




**bcp_12463_f1**