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

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23   **Summary**

24   **Aims**

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

29   **Methods**

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

34   **Results**

35   Of 3,444 discharge summaries audited, 2,421 (70.3%) were from two teaching hospital and
36   906 (26.3%) from three district hospitals. Unplanned admissions accounted for 2,168 (63.0%)
37   of the audit sample and 74.6% (2,570) of discharge summaries were electronic. Mean [95%
38   CI] adherence to the total NPC minimum dataset was 71.7% [70.2-73.2]. Adherence to
39   patient, admission and discharge information was 77.3% [77.0-77.7], 67.2% [66.3-68.2] for
40   medicine information and 48.9% [47.5-50.3] for therapy change information. Allergy status,
41   co-morbidities, medication history and rationale for therapy change were the most frequent
42   omissions.
43   Predictors of adherence included quality of the discharge template, electronic discharge
44   summaries and smaller numbers of prescribed medicines.

45   **Conclusions**

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

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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.

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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

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88   information transfer at hospital discharge (n = 55) and controlled studies evaluating the

89   efficacy of interventions to improve information transfer (n = 18). Kripalani et al. followed

90   by a number of studies in later years, found that deficits in communication and information

91   transfer at hospital discharge are common and may adversely affect patient care. The

92   researchers were however unable to identify the factors associated with the deficits [10, 4, 5,

93   7, 11, 12].

94   Transfer of discharge summary information is a multi-factorial process and the relationships

95   between these factors and the quality of discharge communication are unclear [9, 15]. Factors

96   which influence discharge summary information might be system related such as discharge

97   summary template content, whether the document used to transfer information is handwritten

98   or electronic [11, 16, 17], time available to collect and communicate discharge information

99   and whether the admission was planned or unplanned [5, 18]. Variations in discharge

100   information may be related to the individual such as the medical training of the person

101   completing the discharge summary, the complexity of the patient's care and discharge

102   medication [5, 7, 19].

103   There is limited UK evidence evaluating the quality of information received in primary care

104   following patient discharge which currently comprises one general practitioner (GP) survey

105   [8], two large audits [3, 9] and one retrospective case-note review study [6].

106   In response to patient safety concerns, in 2008, the UK National Prescribing Centre (NPC)

107   stipulated a minimum dataset of information to be communicated at all transitions of patient

108   care [20]. The NPC is now a part of the UK National Institute for Health and Care Excellence

109   (NICE) which has therefore adopted the NPC guidance as a national standard for information

110   communication at care transition. NICE is a government funded organisation that supports

111   health professionals in providing the best possible healthcare. There are no large scale reports

112   of the extent to which discharge summaries adhere to these guidelines and thus no indication

113   of their impact on the quality of practice.

114   **AIMS**

115   The aims of this study were to report the magnitude of hospital discharge summary adherence

116   to the NPC minimum dataset and to identify the extent of adherence to different elements

117   within the dataset. Additionally, the study aimed to determine the factors affecting the

118   likelihood of discharge summary adherence to the NPC minimum dataset.

119   **METHODS**

120   **Setting and Study design**

121   A retrospective review of a sample of discharge summaries received by medical practices

122   from one primary care trust was conducted between January to March 2011 in the eastern

123   region of the UK. As an audit, ethical approval was not required; however, appropriate

124   authorisation to undertake the audit was obtained from the NHS Norfolk in August 2010.

125   An audit tool was developed to record either 'yes' or 'no' for the presence of each NPC

126   minimum dataset item in a discharge summary. Table 1 describes the minimum dataset

127   recommended by the NPC following hospital discharge.

128   **Sample selection**

129   All medical practices (n=91) in one primary care trust were invited to participate and

130   practices self-selected a member of the medical team to complete a piloted audit data

131   collection form for each discharge summary. Each practice was allocated a target number of

132   eligible discharge summaries to prospectively collect and a standardised procedure for data

133   collection form completion was issued. Discharge summaries were selected consecutively

134 until the allocated number was collected. The allocation was based on the assumption that a

135 sample representing 5% of the patients registered with a practice is a reasonable work load

136 for GP practices to audit. List sizes of the GP practices ranged from 200 to 2,180, thus

137 practice allocated numbers ranged from 10 to 109. A total sample of 3,761 discharge

138 summaries was anticipated.

139 All discharge summaries of patients hospitalised for 24 hours or longer were included and

140 those for patients transferred to another trust or deceased before discharge or data collection

141 were excluded.

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

143 Discharge summaries were scored against all NPC criteria presented in Table 1, except for

144 "procedures carried out" and "additional information related to corticosteroid record cards or

145 anticoagulant books". Discharge summaries were scored one point when a criterion was

146 successfully fulfilled (i.e. all information was provided and/or accurate as appropriate).For

147 example, if a patient had three allergies and only one was documented the criterion was not

148 fulfilled. Two points were scored for each criterion not fulfilled. Discharge summaries for

149 patients with no medication history or where no medicines were changed, initiated or

150 discontinued were scored only against the applicable criteria and therefore the extent of

151 adherence to the NPC minimum dataset was estimated as a percentage using the equation

152 below:

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

154
  - o Discharge summary adherence score (S)= Sum of the point(s) assigned to each applicable criterion
  - o T= score representing complete adherence to all applicable criteria

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156   NPC minimum dataset criteria were organised into three categories: 'patient, admission and

157   discharge information', 'medication information' and 'therapy change information'. These

158   are shown in Table 2.

159   **Audit quality assurance**

160   Variations between auditors were systematically evaluated to assess the quality of the audit

161   data. All participating medical practices were stratified by list size into five strata;

162   computerised random number generation was used to select five medical practices from each

163   stratum to assess variations in audit data collection. Similarly, twenty discharge summaries

164   were randomly selected from each of the selected practices and re-audited by the lead author

165   (EH). Agreement for each audit question was calculated using the Kappa statistic. Kappa

166   scores ranging from 0.01-0.40 were considered of slight to fair agreement, 0.41- 0.60 of

167   moderate agreement, 0.061-0.80 good and > 0.81 of substantial agreement [22].

168   Twenty handwritten discharge summaries were randomly selected using a computerised

169   random number generator and legibility rated by a GP independent to the medical practice

170   from which the data were collected. Agreement between the GP assessment and auditors was

171   assessed by weighted Kappa scores which was interpreted in a similar way to unweighted

172   Kappa scores. Cells were weighted according to the magnitude of disagreement; the method

173   used to weight cells is the absolute error weight [23].

174   **Data collection and outcome measurements**

175   In addition to data describing discharge summary adherence to the NPC minimum dataset,

176   the following data were collected from each discharge summary: dates of admission and

177   discharge, whether it was planned or emergency and the role of the professional responsible

178   for discharge; patient medical and demographic information, clinical information related to

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179   laboratory results and post admission complications and the number of working days between

180   discharge and receipt of the discharge summary by primary care.

181   From each hospital represented in the audit, a copy of the discharge summary template was

182   obtained. For some hospitals, more than one template was available and thus the template

183   representing the majority of the discharge summaries from that hospital was selected for

184   analysis.

185   Discharge summary legibility was assessed using a four point scale [21]: 'Illegible', 'most

186   words are illegible', 'some words illegible' and 'legible'.

187   The audit tool was piloted and face validated by two primary care pharmacists and one GP

188   before Trust-wide distribution.

189   Total adherence to the NPC minimum dataset was reported as the primary outcome. Extent

190   of discharge summary adherence to the three categories of the NPC minimum dataset was

191   the secondary outcomes.

192   **Data analysis**

193   Data were processed using the Statistical Package for Social Science (SPSS version 18).

194   Descriptive statistics were reported as a mean [95% CI] and median (IQ) as appropriate.

195   General linear models (GLM) were used to investigate the effect of factors such as, the

196   number of prescribed medicines, type of discharge summary (handwritten or electronic) and

197   discharge summary template on adherence to the NPC minimum dataset. Stepwise backward

198   elimination was used to reach the most parsimonious GLM models.

199   Furthermore, GLM analysis was performed to determine the effect of ward speciality on

200   discharge summary adherence to the NPC minimum dataset. Community and specialist care

201   hospitals such as mental health hospitals were excluded from this analysis as they do not have

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202 the breadth of different ward specialities demonstrated by general hospitals. Likewise, GLM

203 analysis was employed to determine the effect of factors and ward speciality on discharge

204 summary adherence to each of the three categories of the NPC minimum dataset.

205 All models presented were checked for assumptions of linearity, multicollinearity and

206 homoscedasticity; none of these assumptions were violated.

207 **RESULTS**

208 **Study sample**

209 A small number of practices (n=7) did not complete the audit in the specified time window.

210 These only represented 317 (8%) of the anticipated number of discharge summaries which

211 were therefore excluded from analysis. A total of 3,444 discharge summaries representing 12

212 different hospitals were audited by 84 medical practices. Discharge summaries from two

213 teaching hospitals accounted for 2,421 (70.3%), three general district hospitals accounted for

214 906 (26.3%), 21 (0.6%)were from a mental health trust52 (1.5%) were from community and

215 40 (1.2%) were from private hospitals or hospitals beyond the region surrounding the Trust.

216 Table 3 summarises the audit sample characteristics. Discharge summaries were primarily

217 electronic and arising from unplanned admissions. The audit was largely of older patients and

218 with a relatively even gender distribution. The highest proportion of discharge summaries

219 were from medicine for elderly wards. For more than 20% of discharge summaries there was

220 no indication of the role of the healthcare professional responsible for preparing the discharge

221 summary. Where profession type was provided, doctors represented the highest proportion of

222 which 1113 (44.5%) were of an unknown training level and 853 (34.1%) were doctors in

223 their first year of practice after qualification.

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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.

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247   The majority of discharge summaries were electronic and thus legible, however, 374 (42.8%)

248   95%CI [39.5-46.1] of the handwritten discharge summaries were considered partially

249   illegible with the clinical message deemed unaffected, 33 (8.8%) 95%CI [6.9-10.7] were

250   considered mostly illegible with the meaning of the clinical message unclear and 13 (1.5%)

251   95%CI [0.69-2.3] were deemed completely illegible.

252   Table 4 presents the extent of discharge summary adherence to the NPC requirement for

253   patient, admission and discharge information. Electronic discharge summaries were more

254   likely to provide comprehensive patient, admission and discharge information compared to

255   handwritten discharge summaries. Planned and unplanned admissions, however,

256   demonstrated similar adherence rates.

257   Variation can be seen between wards with respect to patient, admission and discharge

258   information with orthopaedic demonstrating the lowest adherence. The most notable

259   deviations were in the recording of co-morbidities and medication histories which were only

260   fulfilled for 79 (41.8%) and 87 (39.0%) discharge summaries respectively. Discharge

261   summaries written by pharmacists and nurses demonstrated better adherence than those

262   written by doctors. It was again in the recording of co-morbidities and medication histories

263   that the main differences lay. Discharge summaries prepared by doctors reported full details

264   of co-morbidities and medication histories for only 50.6% (1,266) and 41.7% (1,042)

265   compared to 58.3% (21) and 50% (18) for pharmacists and 61.6% (90) and 43.8% (46) for

266   nurses respectively.

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

268   Mean [95% CI] discharge summary adherence to medication information reporting was

269   64.0% [63.2-64.8]. Figure 1 illustrates adherence rates for medication information with

270   deviations manifested particularly with medicine formulation and duration.

271 Table 4 presents the extent of discharge summary adherence to medication information

272 reporting. It can be seen that electronic discharge summaries demonstrated higher adherence

273 than handwritten discharge summaries. Variation can be seen between wards with general

274 surgery wards demonstrating the lowest adherence rate. No discernible differences were seen

275 between planned and unplanned admissions or profession types.

Adherence to NPC requirements relating to therapy change information

277 Discharge summary reporting of therapy change information demonstrated the lowest

278 adherence among the three categories of the NPC minimum dataset with a mean adherence of

279 48.9% [47.5-50.3]. Figure 1 illustrates adherence rates for therapy change information; the

280 rationale for medicines initiated, discontinued or changed was persistently omitted.

281 Table 4 presents the variation in discharge summary adherence to therapy change information

282 reporting; electronic discharge summaries demonstrated better adherence than handwritten

283 discharge summaries. Unplanned admissions were associated with a slightly higher

284 adherence rate than planned admissions. Of the different types of ward, orthopaedic wards

285 demonstrated the lowest adherence. Small variation can be seen between healthcare

286 professions with discharge summaries prepared by doctors demonstrating lower adherence.

Predictors of adherence to NPC minimum dataset

288 Table 6 summarises the regression models for factors influencing discharge summary

289 adherence to the total NPC minimum dataset, patient, admission and discharge information,

290 medication information and therapy change information.

291 With respect to adherence to the total NPC minimum dataset ($R^2 = 0.14$, adjusted $R^2 = 0.14$),

292 Template 1 and community hospital templates contributed significantly to lower adherence

293 whilst Template 3 contributed to higher adherence. Handwritten discharge summaries and an

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294 increased number of medicines contributed to lower adherence. The effect of ward speciality

295 on discharge summary adherence to the NPC minimum dataset adjusting for type of

296 discharge summary and number of medicines (R^2=0.10, adjusted R^2=0.11) identified that

297 orthopaedic wards contributed to the lowest adherence; B (SE) = -3.7 (1.1), p <0.001

298 followed by general surgery -2.36 (1.03), p=0.02.

299 Investigating factors influencing the three categories of NPC minimum dataset identified

300 similar predictors. For patient, admission and discharge information (R^2=0.18, adjusted

301 R^2=0.16), the community hospital template was the strongest predictor of poor adherence.

302 For medicine information (R^2=0.13, adjusted R^2=0.11), a handwritten discharge summary

303 was the strongest predictor of poor adherence. For therapy change information (R^2=.11,

304 adjusted R^2=0.09), template3 was the only predictor of good adherence, the remainder were

305 very strong predictors of poor adherence.

306 Similarly, investigating the influence of ward specialty adjusting for discharge summary

307 template, the number of medications and type of discharge summary, identified orthopaedic

308 wards as the strongest predictor of poor adherence; B [95% CI] -3.68 [-6.3- -1.06], p=0.01 for

309 patient, admission and discharge details (R^2=0.14, adjusted R^2=0.14) whilst general surgery

310 wards were the strongest predictor of poor adherence for medicine information (R^2=0.11,

311 adjusted R^2=0.09); -8.90 (2.7) [-14.27- -3.52], p=0.001. For therapy change information, all

312 wards demonstrated poor adherence with orthopaedic wards again being the strongest

313 predictor of poor adherence (R^2=0.11, adjusted R^2=0.06); -22.4 (4.9) [-32.1- -12.7], p <

314 0.001.

315 **Quality assurance of audit data**

316 Ninety-five discharge summaries were re-audited and Kappa scores ranged between 0.61 and

317 1 with a mean [95%CI] of 0.83 [0.81-0.85] indicating good to substantial agreement. The

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

319 indicating substantial agreement.

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322 **DISCUSSION**

323 This study highlights that three years after the UK minimum dataset for discharge

324 information transfer being stipulated, the requirements are not consistently met. The

325 deviations identified reflect those of previous studies which have also cited allergy status, co-

326 morbidities, medication history, details of medicines prescribed and rationale for therapy

327 changes as common omissions [4-7, 12, 30,31, 40-41].

328 Incomplete allergy status, omissions regarding medicines prescribed before admission and

329 co-morbidities have been demonstrated to contribute to patient harm associated with

330 unintended discontinuation or unsafe prescribing [26, 27]. Additionally, incomplete

331 information regarding therapy changes and discharge medications might confuse primary

332 care providers and contribute to time wastage while attempting to establish whether change

333 was intentional.

334 The lack of progress with discharge information communication is of concern. This study has

335 identified predictors of non-adherence plus characteristics associated with increased

336 adherence to NPC requirements. Recommendations to enhance discharge information transfer

337 have therefore been proposed.

338 Considerable variations were seen between hospitals; H3 demonstrated the greatest

339 adherence. Notably, deviations between hospitals followed a similar pattern to the extent of

340 discharge summary template adherence to the NPC minimum dataset. This is consistent with

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341   previous research outlining that the use of a standardised discharge summary form resulted in

342   more comprehensive and accurate communication of discharge information [11,

343   17].Similarly, this has been advocatedby the Health Informatics Unit at the UK Royal

344   College of Physicians since 2008 [28].

345   Electronic discharge summaries demonstrated better adherence to all NPC requirements

346   compared to handwritten discharge summaries. Similar findings have been reported in

347   previous studies with electronic discharge summaries reducing hand transcription and

348   allowing faster and uniform recording of discharge information [5, 10]. However, they have

349   been associated with increased errors due to incorrect selection or user entry [14, 29]. This

350   present study design did not allow for such errors in recording to be captured.

351   The inverse relationship between adherence to the NPC minimum dataset and the number of

352   prescribed medicines is intuitive and consistent with previous reports [30, 31]. When a

353   patient is prescribed a medication there is an increased opportunity for communication errors.

354   The poor performance of orthopaedic and general surgery wards is consistent with previous

355   studies [3, 7, 24, 32]. Discharge summaries from these wards persistently recorded no

356   rationale for therapy changes and provided incomplete information related to medicine and

357   co-morbidity history. Patient short stay admissions for minor risk procedures within these

358   care areas might contribute to a hospital team perception that the GP will decipher changes

359   and continue patient care from the clinical history provided [33]. However, without

360   comprehensive notification about post discharge treatment and full details of patient

361   medicines, the GP might feel unable to continue patient care and maintain clinical

362   responsibility [34]. Additionally, inattention to secondary conditions could explain these

363   frequent deficits, this has been also suggested in a recent report in 2012 highlighting that

364   errors occurred on discharge were more likely attributed to medicines unrelated to the

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365 primary diagnosis [35]. Inattention to secondary conditions and consequently medicines

366 which are unrelated to the primary diagnosis might be of significant implication to patient

367 care and safety; a national review in the USA including over 11 million discharged patients

368 from 2003-2004 highlighted that among patients who were readmitted within 30 days after a

369 surgical discharge, 70.5% were for unrelated condition[36]. Thus, it is important to devote

370 equal attention to all patient medicines.

371 Further exploration of the factors contributing to variations in ward performance is

372 warranted. This may be achieved through interviews with care providers at health transition

373 points to enhance our understanding of the reasons underlying persistent deviations within

374 individual wards and the contributors to good adherence within others. Such information

375 might guide future intervention development and resource prioritisation.

376 This study found no difference between profession types with respect to discharge summary

377 adherence to the NPC minimum dataset or risk of discrepancy. This is, however, inconsistent

378 with two large UK reports [15, 37] and smaller studies in USA and Europe [38, 39]which

379 have indicated that trainee doctors are a contributing factor to increased risk of admission

380 error. The absence of effect of profession type in the present audit could reflect the high

381 proportion of discharge summaries with an unspecified profession or training level resulting

382 in a limited number of data points for this factor. Thus, no firm conclusion can be drawn on

383 this regard warranting further work.

384 Our study is the first to report adherence levels to the NPC minimum dataset across an entire

385 primary care trust. Whilst not generalisable to the whole of the UK, the audit has presented a

386 large dataset representing various hospitals and specialities. This study is also the first to

387 investigate a number of process, system and patient related factors predicting adherence to

388 the NPC minimum dataset.

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389　However, the sampling strategy could have resulted in more than one discharge summary

390　being received from the same hospital doctor which could in turn lead to less discrimination

391　within the study results. The methodological approach of data collection by multiple people

392　whilst affording a large sample size, introduced the potential for variations in quality. The

393　audit process required the whole discharge summary to be reviewed to identify changes in

394　therapy and rationales; it is possible that the reasons for change and additional information

395　included in the body of the discharge summary may have been missed due to human error.

396　Additionally, discharge summary adherence in our study was not graded on a discrete scale

397　and therefore variation in quality might not have been fully captured by the simplistic yes/no

398　criteria. Nevertheless, the quality assurance process demonstrated good to substantial

399　agreement thus provides confidence in the presented data.

400　This study has reported the magnitude of discharge summary adherence to the NPC minimum

401　dataset but it is not possible to comment on the accuracy of information provided. Therefore,

402　further work to capture the accuracy of information communication is necessary.

403　This study has identified clear predictors of good adherence and thus allows

404　recommendations to be developed. However, the amount of variance explained by the

405　regression model was small and thus a substantial proportion remains unexplained warranting

406　further work to explore other predictors which might contribute to the quality of discharge

407　communication.

408　Discharge summary template was identified as a significant predictor of the quality of

409　discharge information. This valuable finding might help to promote the implementation of a

410　standardised pro-forma across all NHS trusts. However, there were variations in the templates

411　employed between wards within each hospital and the template representing the majority of

412　discharge summaries generated from each hospital was audited. The lack of standardisation

413 and use of multiple templates may indicate variation in care standards and patient

414 management between hospitals or wards. Therefore, it is impossible to determine from the

415 present study design, the extent to which variation in template affected discharge summary

416 adherence; future work capturing these other variables may therefore be beneficial.

417 Although the NPC is a government funded agency responsible for improving the quality of

418 prescribing, there is no mandate for hospitals to adhere to thisguidance and the extent to

419 which the guidance is utilised is unknown. There might be a need to widely publicise and

420 mandate the use of the NPC minimum dataset by hospitals and UK health institutions. Of

421 note is that the NPC criterion for discharge summaries to be received within two days post

422 discharge was fulfilled by 70% of discharge summaries. Recent recommendations however,

423 have placed greater emphasis on discharge summaries being sent within 24 hours of the

424 patient being discharged [42].

425 **CONCLUSIONS**

426 The completeness of discharge information communication in one primary care trust was

427 found to be inadequate three years post issue of national standards. Comprehensive electronic

428 pro-forma incorporating all NPC minimum dataset requirements may improve the quality of

429 discharge communication.

430 Adherence to the NPC minimum dataset varies across care areas, identifying wards

431 demonstrating poor adherence as well as good adherence is necessary to guide future

432 interventions. Patients prescribed higher numbers of medicines need greater care whilst

433 completing their discharge summary and communicating information upon care transition.

434 However, such recommendations might be difficult to implement in an environment of

435 multiple competing demands, thus it would be of value to identify the optimum method to

436 implement and prioritise MR service provision to patients most likely to benefit.

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Statement of conflicts of interest

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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 2. Correct date of birth 3. Consultant name 4. Ward 5. Date of admission 6. Date of discharge 7. Presenting diagnosis 8. Complete past medical history and co-morbidities 9. Complete medication history 10. Known allergic or hypersensitivities, 11. Discharge summary is legible 12. Received within 2 days post discharge (weekends and public holidays were excluded).

Medication information*	13. Full list of all discharge medicines
	   a. All doses
	   b. All frequencies
	   c. All routes of administration
	   d. All formulations
	   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
	   a. All medicines initiated with reason(s)
	   b. All medicines discontinued with reason(s)
	   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 6th 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

	N	Total NPC minimum dataset	Patient, admission & discharge information	Medicine Information	Therapy change information
			Discharge summaries adherence		
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

Information	Electronic templates			Handwritten template		
	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
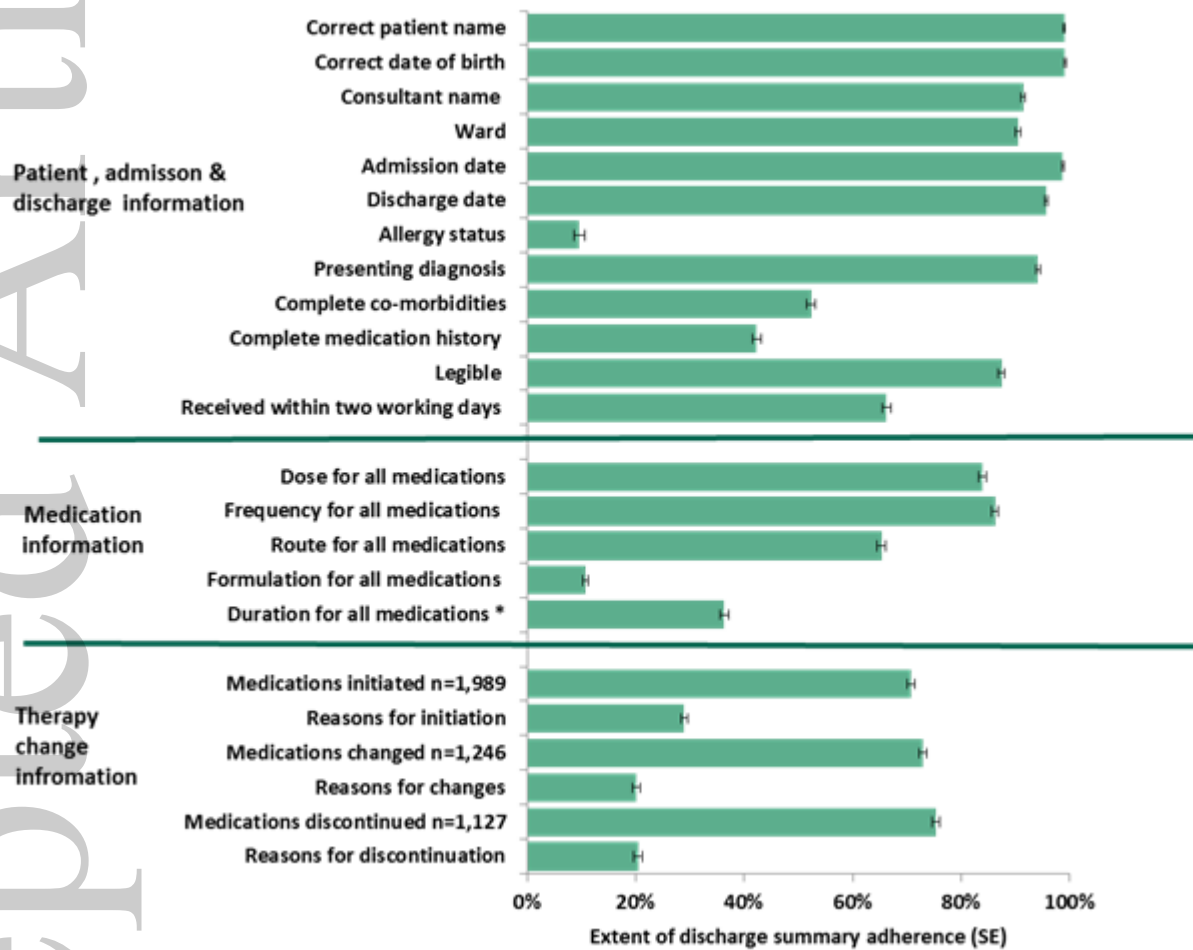
	Adherence to total NPC minimum dataset					Adherence to patient, admission & discharge information					Adherence to medication information					Adherence to therapy change information				
				95% CI for B					95% CI for B					95% CI for B					95% CI for B	
	B	Std. Error	p	Lower limit	Upper limit	B	Std. 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					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

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