

# The accuracy, completeness and timeliness of discharge medication information and implementing medication reconciliation

## *A cross-sectional survey of general practitioners*

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### Background and objective

General practitioners (GPs) require accurate medication information to care for recently discharged hospital patients. Pre-discharge medication reconciliation improves the accuracy of patient medication lists that GPs receive. This study aimed to explore GPs' perceptions of the accuracy, completeness and timeliness of hospital discharge medication information, and how they undertake medication reconciliation.

### Methods

Using a cross-sectional online survey, quantitative and qualitative data were collected from a convenience sample of GPs practising across the Gold Coast, Australia. Data were analysed using descriptive statistics and content analysis.

### Results

Twelve GPs were recruited. Patient hospital discharge medication information was mostly accurate and complete, but delays in receiving this information affected the ability of GPs to undertake medication reconciliation.

### Discussion

Receiving accurate and timely patient discharge medication information can reduce errors. Optimising the communication of medication information to GPs may improve patient safety.

**MEDICATION ERRORS** are a significant healthcare issue costing the Australian community approximately \$1.4 billion each year.<sup>1</sup> A medication error is defined as a process error that potentially or actually results in patient harm.<sup>2</sup> For patients, medication errors can result in harm and sometimes death,<sup>2</sup> with the risk of error increasing as patients transition through a healthcare system (hospital admission to discharge to the community).<sup>3</sup> Recent evidence suggests up to 87% of discharged hospital patients have medication-related information errors.<sup>3,4</sup> Medication reconciliation is a patient safety strategy that aims to reduce medication errors<sup>2</sup> by obtaining, verifying and documenting an accurate patient medication list.<sup>2,5,6</sup> When comprehensively implemented, medication reconciliation helps clinicians identify and rectify medication discrepancies.<sup>7,8</sup> Medication reconciliation also contributes to the accuracy and completeness of the documented discharge medication information that is shared with the patient and general practitioner (GP).<sup>5,6,9</sup>

As patients transition from hospital to home, responsibility for their clinical care transfers to their GP.<sup>10</sup> Continuity of patient care in the community relies on the GP having access to complete, accurate and timely written and/or electronic information about a patient's recent medical treatment and current discharge

medications.<sup>10</sup> GPs use this information to reconcile the patient's medications on their first post-discharge visit.<sup>8,10</sup> However, evidence suggests that sometimes this information may not be transferred to GPs in a timely fashion, increasing the risk of medication error. For example, GPs in Ireland reported that hospitals were slow to send patients' hospital discharge medication information, which affected their ability to deliver well-informed care.<sup>8</sup> While many clinicians view electronic health records as an enabler to improve inter-professional information sharing,<sup>11</sup> some question the data quality and accuracy within the system.<sup>11</sup>

This study aimed to explore and describe the perceptions of Gold Coast GPs regarding the completeness, accuracy and timeliness of patient hospital discharge medication information, and how GPs implement medication reconciliation – a topic for which there is limited research.<sup>4</sup>

### Methods

This exploratory, descriptive study gathered quantitative and qualitative data using an online cross-sectional survey. The researchers recruited a convenience sample of GPs working in general practice in the Gold Coast Primary Health Network, Queensland, Australia, and who provided continuing

care to patients recently discharged from the region's largest public hospital. The researchers estimated that approximately 700 GPs practised across the widespread geographical location of this health network, making the selection of the present cross-sectional online study design appropriate in terms of reach. As recommended, this study was conducted and reported using the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement.<sup>12</sup>

The research questions were:

- What are GPs' perceptions of the completeness and accuracy of the medication list for patients recently discharged from hospital?
- How do GPs implement the medication reconciliation process?

Using an iterative process, the development of the data collection tool was informed by the literature<sup>13</sup> and by research team expertise in primary and tertiary healthcare. While not formally psychometrically tested and validated, the tool was developed specifically for this study and comprised 20 Likert scale questions (1 = Strongly agree to 5 = Strongly disagree) and two open-ended free-text (unlimited word count) questions (Table 1). Using the Lime survey web-based platform, the survey was deployed in July 2018. The online survey link was embedded in an article the researchers published in the locally distributed electronic newsletter *Generally Speaking*. Two weeks after the initial survey deployment, a reminder to complete the survey was published in the newsletter *Generally Speaking*. Two study inclusion criteria applied: being a registered GP, and being involved in caring for discharged hospital patients. Participants could submit the survey once only. Clicking on the online survey link implied participant consent. No identifiable GP data were collected, assuring GPs' anonymity.

The online survey data were analysed using IBM SPSS version 25.0<sup>14</sup> (Likert items) and content analysis (open-ended questions). Descriptive analyses using absolute (n) and relative (%) frequencies were used for categorical and ordinal level data. To answer the study research

questions, the open-ended question responses were inductively analysed using conventional content analysis as described by Graneheim and Lundman.<sup>15</sup> The researchers read the open-ended responses several times and meaning units (phrases) were highlighted using coloured pens.<sup>15</sup> Following phrase condensation, codes were assigned, and similar codes grouped and labelled into subcategories.<sup>15</sup> These subcategories were organised into categories, with their definition informed by the data.<sup>15</sup> This process continued until the researchers reached consensus.<sup>15</sup>

The study was guided by the 2018 updated National Statement on Ethical Conduct in Human Research<sup>16</sup> and received ethical clearance from the relevant Human Research Ethics Committees (Gold Coast Hospital and Health Service [HREC/18/QGC/116] and Griffith University [2018/405]).

## Results

It is not known how many GPs accessed the electronic newsletter containing the survey link; however, 15 GPs launched the survey and 12 completed responses were received (Table 1). Eleven of the 12 GP participants provided their demographic data. Among this group there was an almost equal number of males (n = 5) and females (n = 6) aged 30–59 years. Their primary healthcare clinical experience ranged 8–31 years (mean 19.4 years; standard deviation: 8.3 years). GPs indicated the discharge information they received for patients under their care was usually accurate and complete. Most GPs (n = 8) preferred to reconcile patients' discharge medications at the first post-discharge visit and relied on the discharge summary information to do this. However, medication reconciliation was difficult if a discharge summary listing patient medications was not received. In these circumstances, GPs asked patients or their carers about their current medications. Although time-consuming, medication reconciliation was valued by GPs because it contributed to patients' safe use of prescribed medications.

Two categories emerged from the GP survey open-ended questions:

'completeness and accuracy of hospital discharge medication information' and 'implementing medication reconciliation' (Table 2).

### Completeness and accuracy of hospital discharge medication information

The category 'Completeness and accuracy of hospital discharge medication information' had three subcategories: 'Delays in receiving discharge summary', 'Accurate medication information' and 'Lacking details about medication changes'. GPs' perceptions of the completeness and accuracy of hospital discharge medication information varied. While most did not report information inaccuracies, they did experience delays in receiving the discharge summary and medication information. As highlighted by two participants: '... receiving discharge summaries in a timely manner has been a frequent problem', and 'timeliness is more of a problem than accuracy'. Once received, the discharge summaries and medication information were considered mostly accurate. Occasional errors resulted in reduced confidence, as stated by one GP: 'often correct but as [there] have been mistakes and misunderstandings in the past I do not feel confident'. Another reported concern was the rationale for medication changes: '... a short explanation as to why changes are made would be helpful ...'. These experiences highlight gaps in communicating medication information as patients transition from hospital to the community.

### Implementing medication reconciliation

The category 'Implementing medication reconciliation' had two subcategories: 'Relying on the discharge summary' and 'Performing medication reconciliation with the patient present'. All GPs relied on the discharge summary and medication information to reconcile the patient's medications: 'I normally undertake this [medication reconciliation] at their first visit post discharge – as long as I have a discharge summary'. Representative of a number of participants, one GP stated: 'I reconcile both with the patients

**Table 1. General practitioners' (GPs') perceptions of the accuracy and completeness of hospital discharge medication information, and GPs' implementation of medical reconciliation (n = 12)**

Perceptions of the 'completeness' and 'accuracy' of hospital discharge medication information	Strongly agree n (%)	Agree n (%)	Neutral n (%)	Disagree n (%)	Strongly disagree n (%)
1. The hospital discharge medication information is usually complete	1 (8.3)	9 (75.0)	1 (8.3)	1 (8.3)	0 (0.0)
2. The hospital discharge medication information is usually accurate	1 (8.3)	10 (83.3)	1 (8.3)	0 (0.0)	0 (0.0)
3. Inaccurate hospital discharge medication information increases my workload	5 (41.7)	5 (41.7)	2 (16.7)	0 (0.0)	0 (0.0)
4. I have confidence that the hospital discharge medication information is accurate	0 (0.0)	6 (50.0)	5 (41.7)	1 (8.3)	0 (0.0)
5. Hospital discharge medication information is important for continuity of patient care	12 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
6. Information about new medications is usually included in hospital discharge documentation information	2 (16.7)	10 (83.3)	0 (0.0)	0 (0.0)	0 (0.0)
7. Information about discontinued medication is usually included in hospital discharge documentation information	2 (16.7)	8 (66.7)	2 (16.7)	0 (0.0)	0 (0.0)
8. Information about changes to existing medications is usually included in hospital discharge documentation information	1 (8.3)	8 (66.7)	3 (25.0)	0 (0.0)	0 (0.0)
9. There are often errors on the hospital discharge medication information	0 (0.0)	2 (16.7)	5 (41.7)	5 (41.7)	0 (0.0)
10. I usually receive hospital discharge medication information in a timely manner	0 (0.0)	1 (8.3)	2 (16.7)	5 (41.7)	4 (33.3)

Open-ended question: 'Please describe your experience of the accuracy and completeness of the Gold Coast University Hospital patient discharge medication information.'

Implementation of the medication reconciliation process	Strongly agree n (%)	Agree n (%)	Neutral n (%)	Disagree n (%)	Strongly disagree n (%)
11. When my patient is discharged from hospital, I routinely reconcile the hospital and practice medication lists*	10 (83.3)	0 (0.0)	1 (8.3)	0 (0.0)	0 (0.0)
12. GPs have an important role in medication reconciliation*	11 (91.7)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
13. Medication reconciliation is time consuming for GPs*	8 (66.7)	3 (25.0)	0 (0.0)	0 (0.0)	0 (0.0)
14. The accuracy of the hospital discharge medication information is sufficient to allow me to perform medication reconciliation*	1 (8.3)	7 (58.3)	1 (8.3)	2 (16.7)	0 (0.0)
15. The timeliness of the hospital discharge medication information allows me to perform medication reconciliation*	0 (0.0)	1 (8.3)	4 (33.3)	5 (41.7)	1 (8.3)
16. Medication reconciliation after hospital discharge is mainly the pharmacists' responsibility*	0 (0.0)	1 (8.3)	1 (8.3)	9 (75.0)	0 (0.0)
17. I use the hospital discharge medication list that is given to a patient for medication reconciliation when it is available*	8 (66.7)	2 (16.7)	1 (8.3)	0 (0.0)	0 (0.0)
18. I am able to perform medication reconciliation after hospital discharge*	1 (8.3)	6 (50.0)	2 (16.7)	2 (16.7)	0 (0.0)
19. Medication reconciliation is an important strategy to help ensure patient safety*	10 (83.3)	1 (8.3)	0 (0.0)	0 (0.0)	0 (0.0)
20. When patients are discharged from hospital, I undertake medication reconciliation opportunistically†	4 (33.3)	6 (50.0)	0 (0.0)	0 (0.0)	0 (0.0)

Open-ended question: 'Please describe how you perform medication reconciliation for your patients after they are discharged from hospital.'

\*n = 1 missing data

†n = 2 missing data

and the summary'. Some GPs relied on information provided by the pharmacist, patient or their carer to implement medication reconciliation following hospital discharge.

## Discussion

This study explored and described GPs' perceptions of the completeness, accuracy and timeliness of the medication information they received in patients' hospital discharge summaries, including how they implement medication reconciliation. GPs' perceptions of the completeness and accuracy of the hospital discharge medication information focused on the effective communication of health information from the tertiary healthcare provider, given the impact of this on continuity of care for, and overall safety of, patients.

For patients, hospital discharge exposes them to the risk of error as their care transitions from hospital clinicians to GPs.<sup>9,10,17</sup> Patients' care continuity relies on accurate and timely exchange of health information via hospital discharge summaries and medication lists.<sup>10,18</sup> It is estimated that up to half of all hospital discharge summaries (electronic and/or written) contain missing medication information.<sup>1,4,17,19</sup> Yet, the present study found contrasting results, with most GPs reporting the hospital discharge medication information was usually complete and correct. It is possible the sample of GPs was too small to capture opposing views, or that the survey question wording of 'usually complete' was not specific enough to elicit a critical response from participants. Regardless, these findings show that most GPs perceived they receive accurate

and complete medication information that enables them to care for patients discharged from hospital.

GPs are responsible for providing complex patient care and collaborate with numerous external healthcare and social service providers.<sup>20</sup> This diverse workload, however, can generate a substantial administrative burden and increase stress on primary care doctors.<sup>20</sup> Delays in receiving accurate and complete hospital discharge information not only add to this burden, but may negatively affect the trust between GPs and hospital clinicians.<sup>10</sup> In the present study, only half of GPs were confident in the accuracy of the hospital discharge medication information, despite most acknowledging it was usually complete and accurate. Wheeler et al<sup>10</sup> highlight the importance of shared accountability between hospital and community clinicians in preventing medication errors.<sup>9</sup> These findings might indicate that GPs' confidence is affected when occasional mistakes in the discharge medication information are identified.

Some GPs in the present study wanted greater details concerning patient medication changes, confirming previous research findings.<sup>17</sup> A recent Australian study examined the written and verbal communication of medication information at care transitions, including at discharge, and concluded that considerable clinician time was lost confirming the patient's discharge medications.<sup>21</sup> Care delays are increased and patient safety is compromised when vital patient information is not communicated in sufficient detail between hospital clinicians and primary care providers.<sup>17</sup>

Most GPs in the present study were solely responsible for reconciling

the patient's medications on their first post-discharge visit. While time consuming, medication reconciliation was acknowledged as a valuable patient safety activity. GPs relied on the hospital discharge summary and medication information to undertake medication reconciliation. Yet, evidence suggests GPs experience delays in receiving this information,<sup>19,20,22,23</sup> regardless of whether the information is transmitted in written or electronic formats.<sup>18</sup> For example, Belleli et al audited 49 Australian hospital discharge summaries of GP patients and found only 55% were available before the patient's first follow-up visit.<sup>23</sup> The present study confirms these findings, with most GPs experiencing similar delays and some relying solely on the patient to garner the necessary information needed to complete the medication reconciliation process. However, when GPs are forced to rely on patients or their carers for information, the potential for error increases.<sup>2</sup> Having systems that facilitate the timely transmission of health information to GPs will enable them to comprehensively implement medication reconciliation on patients' first follow-up visit<sup>4,8,17</sup> and help reduce these errors.

## Study limitations and strengths

There are limitations to the findings of this study. Cross-sectional study designs provide insights into participants' perceptions on a topic at a specific point in time but not inferences about cause-and-effect relationships. Despite multiple invitations to participate in this survey, the small sample of GPs means their opinions, while valuable, cannot be generalised to other contexts. Thus, definitive conclusions cannot be drawn from the data. Still, these valuable insights of participants highlight the challenges regarding medication documentation that facilitate continuity of patient care following hospital discharge.

## Conclusion

This study provides new insights into the completeness and accuracy of the medication information GPs receive in

**Table 2. General practitioners' perceptions: Categories and subcategories**

Category	Subcategory
Completeness and accuracy of hospital discharge medication information	Delays in receiving discharge summary
	Accurate medication information
	Lacking details about medication changes
Implementing medication reconciliation	Relying on the discharge summary
	Performing medication reconciliation with the patient present

hospital discharge summaries and the impact this can have on their ability to implement medication reconciliation. For GPs, delays in receiving the hospital discharge summary and medication information affected their ability to implement medication reconciliation – an important patient safety strategy known to reduce medication errors. Ensuring GPs receive timely discharge medication information will enable them to safely continue the patient's care in the community.

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### References

- Roughead EE, Semple SJ, Rosenfeld E. The extent of medication errors and adverse drug reactions throughout the patient journey in acute care in Australia. *Int J Evid Based Healthc* 2016;14(3):113–22. doi: 10.1097/XEB.0000000000000075.
- Australian Commission for Safety and Quality in Healthcare. Medication reconciliation. Sydney, NSW: Australian Commission for Safety and Quality in Healthcare, 2019. Available at [www.safetyandquality.gov.au/our-work/medication-safety/medication-reconciliation](http://www.safetyandquality.gov.au/our-work/medication-safety/medication-reconciliation) [Accessed 9 July 2020].
- Sponsler KC, Neal EB, Kripalani S. Improving medication safety during hospital-based transitions of care. *Clevid Clin J Med* 2015;82(6):351–60. doi: 10.3949/ccjm.82a.14025.
- Michaelsen MH, McCague P, Bradley CP, Sahn MJ. Medication reconciliation at discharge from hospital: A systematic review of the quantitative literature. *Pharmacy (Basel)* 2015;3(2):53–71. doi: 10.3390/pharmacy3020053.
- Lee KP, Hartridge C, Corbett K, Vittinghoff E, Auerbach AD. 'Whose job is it, really?' Physicians', nurses', and pharmacists' perspectives on completing inpatient medication reconciliation. *J Hosp Med* 2015;10(3):184–86. doi: 10.1002/jhm.2289.
- Redmond P, Grimes T, McDonnell R, Boland F, Hughes C, Fahey T. Tackling transitions in patient care: The process of medication reconciliation. *Fam Pract* 2013;30(5):483–84. doi: 10.1093/fampra/cmt051.
- Hare MP, Teasdale TL, Crilly J. Implementation of a clinical pharmacy service in the transfer unit of a tertiary hospital: A clinical quality audit. *J Pharm Pract Res* 2017;47(5):396–401. doi: 10.1002/jppr.1314.
- Redmond P, Carroll H, Grimes T, et al. GPs' and community pharmacists' opinions on medication management at transitions of care in Ireland. *Fam Pract* 2016;33(2):172–78. doi: 10.1093/fampra/cmww006.
- Redmond P, Grimes TC, McDonnell R, Boland F, Hughes C, Fahey T. Impact of medication reconciliation for improving transitions of care. *Cochrane Database Syst Rev* 2018;8(8):CD010791. doi: 10.1002/14651858.CD010791.pub2.
- Wheeler AJ, Scahill S, Hopcroft D, Stapleton H. Reducing medication errors at transitions of care is everyone's business. *Aust Prescr* 2018;41(3):73–77. doi: 10.18773/austprescr.2018.021.
- Boockvar KS, Santos SL, Kushniruk A, Johnson C, Nebeker JR. Medication reconciliation: Barriers and facilitators from the perspectives of resident physicians and pharmacists. *J Hosp Med* 2011;6(6):329–37. doi: 10.1002/jhm.891.
- von Elm E, Altman DG, Egger M, Pocock SJ, Gøtzsche PC, Vandenbroucke JP. The Strengthening of Reporting of Observational Studies in Epidemiology (STROBE) statement: Guidelines for reporting observational studies. *Ann Intern Med* 2007;147(8):573–77. doi: 10.7326/0003-4819-147-8-200710160-00010.
- Meguerditchian AN, Krotneva S, Reidel K, Huang A, Tamblyn R. Medication reconciliation at admission and discharge: A time and motion study. *BMC Health Serv Res* 2013;13:485. doi: 10.1186/1472-6963-13-485.
- IBM. IBM SPSS statistics for Windows 25.0. Version 25.0. Armonk, NY: IBM, 2017.
- Graneheim UH, Lundman B. Qualitative content analysis in nursing research: Concepts, procedures and measures to achieve trustworthiness. *Nurse Edu Today* 2004;24(2):105–12. doi: 10.1016/j.nedt.2003.10.001.
- National Health and Medical Research Council; Australian Research Council; Universities Australia. National statement on ethical conduct in human research 2007 (updated 2018). Canberra, ACT: National Health and Medical Research Council, 2018; p. 1–110.
- Kattel S, Manning DM, Erwin PJ, Wood H, Kashiwagi DT, Murad MH. Information transfer at hospital discharge: A systematic review. *J Patient Saf* 2020;16(1):e25–e33. doi: 10.1097/PTS.0000000000000248.
- Callen J, McIntosh J, Li J. Accuracy of medication documentation in hospital discharge summaries: A retrospective analysis of medication transcription errors in manual and electronic discharge summaries. *Int J Med Inform* 2010;79(1):58–64. doi: 10.1016/j.ijmedinf.2009.09.002.
- Tong EY, Roman CP, Mitra B, et al. Reducing medication errors in hospital discharge summaries: A randomised controlled trial. *Med J Aust* 2017;206(1):36–39. doi: 10.5694/mja16.00628.
- Osborn R, Moulds D, Schneider EC, Doty MM, Squires D, Sarnak DO. Primary care physicians in ten countries report challenges caring for patients with complex health needs. *Health Aff (Millwood)* 2015;34(12):2104–12. doi: 10.1377/hlthaff.2015.1018.
- Manias E, Gerdzt M, Williams A, McGuinness J, Dooley M. Communicating about the management of medications as patients move across transition points of care: An observation and interview study. *J Eval Clin Pract* 2016;22(5):635–43. doi: 10.1111/jep.12507.
- Li JYZ, Yong TY, Hakendorf P, Ben-Tovim D, Thompson CH. Timeliness in discharge summary dissemination is associated with patients' clinical outcomes. *J Eval Clin Pract* 2013;19(1):76–79. doi: 10.1111/j.1365-2753.2011.01772.x.
- Belleli E, Naccarella L, Pirota M. Communication at the interface between hospitals and primary care – A general practice audit of hospital discharge summaries. *Aust Fam Physician* 2013;42(12):886–90.

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