



Medication-related problems during transfer from hospital to home care: baseline data from Switzerland

Carla Meyer-Masseti^{1,2} · Vera Hofstetter¹ · Barbara Hedinger-Grogg³ · Christoph R. Meier^{1,2} · B. Joseph Guglielmo⁴

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Abstract

Background The shift from inpatient to ambulatory care has resulted in an increase in home care patients. Little is known regarding medication safety associated with patient transfer from hospital to home care. **Objective** To evaluate medication-related problems in patients transferring from hospital to home care in Switzerland. **Setting** A non-for-profit home care organization in the city of Lucerne/Switzerland. **Methods** We conducted a prospective observational study, including patients aged ≥ 64 years and receiving ≥ 4 medications at hospital discharge. Two structured questionnaires assessing the transfer process were completed by home care nurses. Prescription quality was assessed using a PCNE Type 2b Medication Review. **Main outcome measures** The quality of the transfer process was measured comparing agreed-upon with reported parameters. Prescription quality was analyzed assessing the unambiguity of the prescription. Potentially inappropriate medications (Priscus[®] list), contraindications, duplications and interactions, and clinical pharmacist-identified potential medication-related problems were collected. **Results** Study patients ($n = 100$) received 8.6 ± 3.5 regularly administered medications. Only 5/100 patients had a complete set of written discharge information. At the time of the first visit, 13/100 patients had no written medication information available. Discharge medication prescriptions were clear to nurses in 62% of patients. In 20 patients, the required medications were unavailable, resulting in 19 medication errors. Assessment by a clinical pharmacist revealed only 33/100 patients had a clear discharge prescription. Of a total of 984 prescribed drugs, 16% were considered to be ambiguous, 22 (2.2%) were potentially inappropriate. 7/984 drugs were contraindicated, 8 were duplicates. **Conclusion** In addition to the known risk factors in patients transferring from hospital to home care (age, polymedication, multiple providers), 3 major problems impacted upon medication safety: fragmented communication, unreliable medication availability and a poor prescription quality. Clinical pharmacists are an important option to improve medication safety ass.

Keywords Home care · Hospital discharge · Medication safety · Seamless care · Switzerland · Transition of care

Impacts on Practice

- Fragmented communication, unreliable medication availability and poor prescription quality are the most common drug-related problems during discharge from hospital to home care in Switzerland.
- Involving clinical pharmacists in the discharge procedure is an important option to improve medication safety associated with transfer from the acute care to the home care setting.

✉ Carla Meyer-Masseti
carla.meyer@unibas.ch

¹ Clinical Pharmacy & Epidemiology, Department of Pharmaceutical Sciences, University of Basel, Basel, Switzerland

² Hospital Pharmacy, University Hospital of Basel, Spitalstrasse 26, 4031 Basel, Switzerland

³ Spitex Stadt Luzern, Lucerne, Switzerland

⁴ School of Pharmacy, University of California San Francisco, San Francisco, USA

Introduction

Medication-related problems (MRPs), which include adverse drug reactions (ADRs) and medication errors (MEs), are frequent. Medication errors account for 30–50% of all errors in health care and represent the largest group of treatment errors [1]. Since the publication of the landmark report “To err is human”, progress has taken place with MRPs and their prevention [2].

Medication safety research has focused primarily upon institutional settings with little attention regarding home care. In Switzerland, it is estimated that the population aged ≥ 65 years will expand from 18% in 2015 to 26% by 2045 [3]. In addition, healthcare cost constraints and technology advancements will increase the treatment of patients in the ambulatory care setting.

One approach might be to focus medication safety initiatives on high risk populations. The home care population is predominantly elderly and receiving multiple medications, well known risk factors for MEs [4–8]. In addition, home care patients often receive care from multiple providers and transition in and out of inpatient facilities, increasing the potential for disruption of care [9].

Transfers between care settings are associated with a high rate of MRPs, including MEs [10–12]. Despite this fact, our previous investigation revealed only 11 studies analyzing medication safety during transfer of care from hospital to home care, all of which originated from the United States and Australia [9].

The scope of MRPs in patients transitioning from hospital to home care in Switzerland is not well-characterized. In addition, while it is widely accepted that pharmacists can significantly improve medication safety through medication reconciliation during transfer of care, their role is limited in Switzerland [13, 14]. Swiss primary care providers can directly dispense drugs to their patients, thus eliminating the pharmacist check and balance and MRP detection.

Aims of the study

Our objective was to evaluate MRPs associated with the transfer from hospital to home care associated with a Swiss home care organization. Our aims were to evaluate the medication management discharge process (timeliness, accuracy and integrity of information transfer), the discharge medication prescription (prescription quality), the availability of medication at the patient’s home, as well as documenting the clarity of the prescription.

Ethics approval

The study was approved by the Ethics Committee of Central and Northwestern Switzerland (EKNZ BASEC 2016-01431).

Method

This observational study was performed at Spitex Stadt Luzern, a non-for-profit home care organization in Lucerne, Switzerland. The organization provides 24/7 nursing care services for up to 1800 patients per year, employing 259 staff members (157 full-time equivalents) [15].

From October 10, 2016 to June 27, 2017, the medication management discharge process, prescription quality and post-discharge medication availability was evaluated for 100 home care-patients. Patients were consecutively included in the study (until 100 study subjects were reached) if they were ≥ 64 years, discharged directly from hospital to home care (no rehabilitation or nursing home stay) and prescribed ≥ 4 medications upon discharge. Patients were excluded if their acute care visit was an emergency department visit without associated hospitalization.

Patient-specific information (age, gender, length of hospital stay, previous use of home care services, provision of medication-related services, time commitment for medication counseling) were collected.

Hospital discharge information was transmitted primarily on paper (by fax, email or via patient/caregiver). Medication information was entered into the home care organization electronic patient medical records (Swing[®]) by nursing; all entries were double-checked by a second nurse.

The medication management discharge process (subsequently referred to as “discharge process”) was evaluated using two structured questionnaires completed by nursing staff. The first questionnaire assessed the first home care visit; the second questionnaire was used for the 7–10 day follow-up visit. Each questionnaire was completed by the nurse with primary responsibility for the patient.

The two different questionnaires were developed by a team, including a pharmacist, the quality manager and an advanced-practice nurse associated with the home care organization. Both questionnaires were developed based upon known home care critical incident reports regarding hospital discharge-related medication use problems. Comprehensibility of the questionnaire was ensured via informal feedback from home care nurses.

The survey elements included: (1) waiting time from application to the first visit, (2) completeness of written

discharge information (5 required documents: physician prescription for home care service, physician discharge report, nursing discharge report, medication list, discharge medication prescription), (3) nursing assessment of the clarity of the prescription, (4) availability of the prescribed medication at the patients' home, (5) availability of the physician for medication-related follow-up questions and (6) reporting of medication-related errors [as per National Coordinating Counsel for Medication Error Reporting and Prevention (www.nccmerp.org)] during the first and follow-up visits, (7) nurse filing of a critical incident report regarding the discharge process.

Prescription quality was assessed by a clinical pharmacist using a structured data collection sheet based on a PCNE Type 2b Medication Review [16]. This assessment was based upon the written information available at the time of the first home-visit; no intervention was undertaken and no direct patient-contact was attempted.

Prescriptions were defined as “clear” by the clinical pharmacist if the drug product was clearly identifiable (name, dosage form, strength, dose, frequency, application instructions). In addition, availability of an indication for every drug prescribed was assessed. Potentially inappropriate medications (PIMs) were identified by the clinical pharmacist using the PRISCUS[®] list, an instrument similar to the Beers list, but with a focus on drugs available on the European market [17, 18]. Drug-drug interactions (DDIs) were categorized using the online tool www.compendium.ch. The categories included: (1) drug combination strictly contraindicated, (2) drug combination suggested to be contraindicated as a precaution, (3) drug monitoring/adjustment required, (4) drug monitoring/adjustment required with presence of additional risk factors, (5) drug monitoring suggested as a precaution, (6) no action necessary. Potential contraindications were identified using the officially approved Swiss medication information for professionals (www.compendium.ch).

Results

During the study period, 457 patients were discharged directly from the hospital to home care. Of these patients, 100 patients fulfilled the inclusion criteria. The patient characteristics are displayed in Table 1.

Of the patients included in the study, 48 were male and 52 female. The average age was 82 ± 8 years (Range: 65–98 years, median 83 years).

Three different hospitals discharged patients to the study home care organization: 75 patients were discharged from a public hospital, 24 from a private hospital and 1 patient from a public hospital from a different district. The average length of the antecedent hospital stay was 16 ± 15.5 days (Range: 1–85 days, median 10 days). Forty eight patients

Table 1 Information on study population

Characteristics of the study population	Total
Patients discharged from hospital	457
Excluded patients	357
Excluded patients—age (<64 years)	160
Excluded patients—other	197
Medication not managed by home care	128
Not transferred directly from the hospital	35
<4 medications	22
Only 1 home care visit (Re-hospitalization, death, early termination of home care)	9
Emergency room visit only, no overnight stay	2
Incomplete questionnaire	1
Included patients	100
Included patients—male	48
Included patients—female	52

Table 2 Medication related services provided by the home care organization

Medication-related services	Services planned First visit (Number of patients)	Services provided Follow-up visit (Number of patients)
Delivery of drugs	20	24
Drug preparation	76	75
Double-check of drug preparation	76	76
Administration/supervision of intake	66	61
Patient/caregiver education	28	30
Regular communication with caregivers	26	30
Logistics/supply	49	44
Other medication-related activities	8	5
Activities anticipated, but not yet defined	8	n/a
Activities anticipated, but not yet defined	8	n/a
Total	356	345

had previously received care from the home care organization prior to their hospitalization.

The scope of medication-related services provided by the home care organization is displayed in Table 2. Patients received on average 4 services related to medication use (Range: 1–6) as described in Table 2. The most commonly provided medication services included drug preparation (including double-check), medication administration, and securing the adequacy of the medication supply.

Medication counseling was provided to 28 patients and/or caregivers by home care nurses during the first home care

visit. In 8/28 (30%) of these patients, the time required to provide education exceeded the associated health insurance reimbursement.

Analysis of the discharge process

Of the 100 patients, 75 were enrolled by the hospital, 23 either enrolled by caregivers or self-enrolled, and 3 by other healthcare providers. Of the enrolled patients, 76% were enrolled on time (i.e. at least 48 h before the first home care visit).

A complete set of written discharge information was available for the first home care visit in only 5 patients. The discharge documents most often unavailable were the discharge medication prescription (78 patients) and the prescription for home care services (46 patients). The physician discharge report was available for only 55 patients, the nursing discharge report for 63 patients. For 13 patients, neither a medication list nor a medication discharge prescription was available.

The prescription was considered by nursing to be clear in 62%, partially clear in 32%, and unclear in 6% of instances, respectively. In those instances requiring immediate clarification, nurses contacted the primary care provider in 57%, the hospital in 30%, and a medical specialist in 3% of the cases, respectively. Clarification was achieved before the next home care visit 65% of the time. A total of 22 MEs were associated with unclear prescriptions, most often resulting in a delayed intake.

In 20 patients, medications were unavailable at the time of the first home care visit, necessitating 25 phone calls. The primary care provider (75%) and the public pharmacy (25%) were the most common contacts. Medication errors due to missing medications were reported in 19 cases, most often due to delayed (N=4) or no intake/administration (N=6). Despite 10 MEs associated with unavailability of medication, a critical incident was reported only 3 times and a complaint toward the hospital was provided only twice.

In 37/100 patients, nurses stated additional information was required regarding their patients' discharge drug regimens.

The rate of receipt of a clearly understood prescription improved from 63% to 87% at the follow-up visit. While medication availability improved at the follow-up visit, 14 patients continued to have an inadequate drug supply, leading to 7 MEs. The dynamic nature of home care is underscored by the fact that over half (53/100) of all patients required medication adjustment during the time period from hospital discharge to the follow-up home care visit.

After the follow-up visit, communication with a primary care provider took place 15 times to clarify medication-related issues. However, the provider could be reached directly in only 4/15 cases.

Nursing medication errors included dispensing/administration (N=8), medication preparation (N=4) and documentation (N=3).

Quality of the discharge medication prescription assessed by a clinical pharmacist

Patients received an average of 8.6 ± 3.5 drugs (median 8 drugs, Range: 1–17) and an average of 1.2 ± 2.1 as-needed drugs (median 1, Range: 0–11). Patients were taking an average of 12.5 ± 6.7 fixed doses (median 12, 1–33) per day. A total of 73% (910 of 1249 fixed doses) could be prepared in a compliance aid (e.g. solid dosage form). Patients took medications an average of 3.4 ± 1.4 times/day (median 3, Range: 1–8). Seventy of the 100 patients received anticoagulants: acetylsalicylic acid (N=28 patients), newer generation oral anticoagulants (N=23), phenprocoumon (N=13), heparin (N=8), and clopidogrel (N=6).

Allergy information was available for only 20/100 patients. Physiological parameters considered necessary to assess the appropriateness of a medication regimen were available for the following number of patients: weight (N=41), height (N=20), blood pressure (N=42), heart rate (N=41), renal function (N=27), liver function (N=9), international normalized ratio INR (N=4), and blood glucose (N=13).

The most pertinent information of this chapter is aggregated in Table 3.

Only 33/100 patients were assessed by clinical pharmacists to have a clear medication list. The medication lists of all the other 67 patients required some clarification. Of a total of 984 prescribed drugs (regular and as-needed medication), 154 (16%) were considered to be ambiguous by the pharmacist. Missing information included: product information (60%, exact name, dosage form, strength), unique administration instructions (e.g. concomitant administration with food (16%), dose (13%) and frequency (11%)). The corresponding diagnosis was missing for 303 out of 984 drugs (31%). The lack of patient information resulted in potential MRPs in an additional 168 drugs out of 984.

Seven drugs were absolutely contraindicated in 6 patients; 23 drugs were relatively contraindicated in 17 patients.

Clinically significant interactions were present for 99 drug combinations; 93 interactions were category 3 (monitoring/adjustment required), 4 were category 2 (drug combination contraindicated as a precaution) and 2 were category 1 (drug combination contraindicated).

Eight drug duplications were observed in 7 patients.

The clinical pharmacist identified 22 PIMs based on the PRISCUS® list out of the 984 drugs (2.2%).

The clinical pharmacist identified an average of 4 medication-related monitoring parameters/patient (e.g. blood glucose, electrolytes, serum creatinine, etc.).

Table 3 Discharge prescription quality assessed by a clinical pharmacist

Missing information	Patients (% without listed information in medical records)
Allergy	80%
Weight	59%
Height	80%
Renal function	73%
Liver function	91%
Indication	77%
Potential medication-related problems (MRP)	Patients (% with MRP identified by pharmacist)
Contraindication	6%
Clinically significant drug interaction	20%
Duplication in therapy	7%
Potentially inappropriate medications	18%

Fifty four percent of drug regimens were clear with electronic, compared to only 27% with manual prescription.

Medication lists of those patients previously cared for by the home care system were compared to those associated with the discharge medication lists. An average of 2.2 drugs per patient (219 drugs in total) taken before hospital admission were not prescribed at discharge, without explanation. Additional unexplained changes included dosage change (26 drugs), drug product/substance switch [14], switch from regular to as-needed medication [10], change of administration time [7] and duplication with an over-the-counter therapy [1].

Hospital discharge information was incongruent with the discharge prescription in 30 patients (48 drugs). As one example, a drug therapy might be discussed in the physician discharge report, but not included in the discharge prescription.

The home care nursing transcription of written discharge information to the electronic home care record was associated with 118 discrepancies.

Discussion

To our knowledge, ours is the first study to analyze the quality of the medication management process associated with transfer from hospital to home care in Europe. In addition, the study is unique in that it assessed the quality of this process both from the pharmacist and the nursing perspectives.

Overall, our study confirmed some findings previously published, including MRP risk factors for home care patients (increased age, multiple medications and multiple providers) [9, 19].

However, our study revealed new factors associated with MRPs pertaining to the discharge from hospital to home care. These include poor prescription quality, fragmented communication, and unreliable medication availability.

A structured assessment of the process revealed that a complete set of written discharge information was rarely available at the time of the first home care visit. When prescription information was available, it was commonly ambiguous to both nurses and the clinical pharmacist. Drugs were often unavailable for home care administration. Importantly, the clinical pharmacist identified a number of potentially inappropriate medications and many other therapeutic aspects potentially needing clarification. Unexplained discrepancies associated with pre-hospital medication lists were common.

Incomplete medical information at the point of care is common in those settings not using electronic communication [20]. Until systematic electronic transfer of medical information between institutions takes place, hospitals and home care organizations need proactive discharge planning to ensure timely and complete discharge information.

While unavailability of medication was not the most common MRP, it may have been the most impactful, routinely associated with delay or omission of therapy. Ensuring an adequate home care drug supply depends upon timely transfer of information to home care providers, patients, and informal caregivers.

Prescription quality can improve with the use of e-prescribing and clinical decision support, a finding we also observed [21]. However, medication reconciliation associated with prescribing from multiple providers requires qualified personnel [22].

The health care system in some regions of Switzerland potentially increases the risk for MRPs. Direct physician

dispensing takes place in certain regions, subsequently foregoing pharmacist medication reconciliation services. Independent of this unique practice, improvement in medication reconciliation is needed worldwide in all health care settings. In the case of home care, nurses often must collect medication information but also perform medication reconciliatory tasks with which they may be less comfortable. Consequently, the integration of a clinical pharmacist, either as a partner out of the public pharmacy or as a member of the home care organization, is a potential solution.

While the impact of clinical pharmacy services upon medication reconciliation is well documented, it is more limited in home care [23–25]. Our results suggest that a clinical pharmacist would improve medication safety associated with transfer from the acute hospital to the home care setting.

While critical incident reporting is a widely accepted strategy to trend health-care related problems, this process was underused in our study. Empowering nurses to proactively report transfer-related problems could identify gaps in care and better define tasks in the medication use process during transfer of care [26].

This study has several limitations.

The study was conducted in a health care setting where physicians dispense drugs directly to their patient. This practice is somewhat unique to the Swiss health care system and might influence drug supply and communication problems.

While the questionnaires used to assess nursing perception of the discharge process were optimized using informal feedback, they were not piloted in a structured study. In addition, while nurses were not specifically trained in the completion of the questionnaires, they received written instructions and contact information for clarifying arising questions.

The assessment of data collected in the scope of this study was done by a single pharmacist. It may well be that other pharmacists would have come to different conclusions in their assessment of potential MRPs.

Conclusion

Patients discharged from hospital to home care are at risk for MRPs due to their demographics, the fragmented transfer process and the complexity of their drug therapy. Drug prescriptions commonly lack clarity during transfer from hospital to home care, requiring timely reconciliation, using complete and accurate discharge information. Resolution of these issues is necessary to optimize medication safety associated with transfer from hospital to home care. Lastly, a more prominent role for clinical pharmacists in this setting offers the potential for improvement in this process.

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Conflicts of interest The authors declare that they have no conflicts of interest.

References

1. Landrigan CP, Parry GJ, Bones CB, Hackbarth AD, Goldmann DA, Sharek PJ. Temporal trends in rates of patient harm resulting from medical care. *N Engl J Med*. 2010;363(22):2124–34.
2. Kohn LT, Corrigan JM, Donaldson MS. *To err is human: building a safer health care system*. Washington, DC: National Academic Press; 1999.
3. Federal Office of Statistics. *Scenarios for the demographic development of Switzerland 2015–2045*. Neuchâtel: Federal Office of Statistics; 2015.
4. Meyer-Masseti C, Kaiser E, Hedinger-Grogg B, Luterbacher S, Hersberger K. Medication safety in the home care setting: error-prone process steps. *Pflege*. 2012;25(4):261–9.
5. Hofer-Dueckelmann C, Prinz E, Beindl W, Szymanski J, Fellhofer G, Pichler M, et al. Adverse drug reactions (ADRs) associated with hospital admissions—elderly female patients are at highest risk. *Int J Clin Pharmacol Ther*. 2011;49(10):577–86.
6. Krahenbuhl-Melcher A, Schlienger R, Lampert M, Haschke M, Drewe J, Krahenbuhl S. Drug-related problems in hospitals: a review of the recent literature. *Drug Saf*. 2007;30(5):379–407.
7. Salvi F, Marchetti A, D'Angelo F, Boemi M, Lattanzio F, Cherubini A. Adverse drug events as a cause of hospitalization in older adults. *Drug Saf*. 2012;35(Suppl 1):29–45.
8. Wimmer BC, Cross AJ, Jokanovic N, Wiese MD, George J, Johnell K, et al. Clinical outcomes associated with medication regimen complexity in older people: a systematic review. *J Am Geriatr Soc*. 2017;65(4):747–53.
9. Meyer-Masseti C, Meier CR, Guglielmo BJ. The scope of drug-related problems in the home care setting. *Int J Clin Pharm*. 2018;40(2):324–34. <https://doi.org/10.1007/s11096-017-0581-9>.
10. Wong JD, Bajcar JM, Wong GG, Alibhai SM, Huh J-H, Cesta A, et al. Medication reconciliation at hospital discharge: evaluating discrepancies. *Ann Pharmacother*. 2008;42(10):1373–9.
11. Garcia-Caballos M, Ramos-Diaz F, Jimenez-Moleon JJ, Bueno-Cavanillas A. Drug-related problems in older people after hospital discharge and interventions to reduce them. *Age Ageing*. 2010;39(4):430–8.
12. Bishop MA, Cohen BA, Billings LK, Thomas EV. Reducing errors through discharge medication reconciliation by pharmacy services. *Am J Heal Pharm*. 2015;72(17_Supplement_2):S120–6.
13. Mekonnen AB, McLachlan AJ, Brien JE. Effectiveness of pharmacist-led medication reconciliation programmes on clinical

- outcomes at hospital transitions: a systematic review and meta-analysis. *BMJ Open*. 2016;6(2):e010003.
14. Kwan Y, Fernandes OA, Nagge JJ, Wong GG, Huh JH, Hurn DA, et al. Pharmacist medication assessments in a surgical preadmission clinic. *Arch Intern Med*. 2007;167(10):1034–40.
 15. Spitex Stadt Luzern-Annual report. 2016. www.spitex-luzern.ch. Accessed 28 Sept 2018.
 16. Foundation PCNE. PCNE classification for drug related problems. v8.02. 2003–2017. Available from: https://www.pcne.org/upload/files/230_PCNE_classification_V8-02.pdf. Accessed 28 Sept 2018.
 17. Holt S, Schmiedl S, Thurmann PA. Potentially inappropriate medications in the elderly: the PRISCUS list. *Dtsch Arztebl Int*. 2010;107(31–32):543–51.
 18. American Geriatrics Society 2015 Updated beers criteria for potentially inappropriate medication use in older adults. *J Am Geriatr Soc*. 2015;63(11):2227–46. <http://doi.org/10.1111/jgs.13702>.
 19. Kaufmann CP, Stampfli D, Hersberger KE, Lampert ML. Determination of risk factors for drug-related problems: a multidisciplinary triangulation process. *BMJ Open*. 2015;5(3):e006376.
 20. Kattel S, Manning DM, Erwin PJ, Wood H, Kashiwagi DT, Murad MH. Information transfer at hospital discharge: a systematic review. *J Patient Saf*. 2016. <https://doi.org/10.1097/PTS.0000000000000248>.
 21. Abramson EL, Pfoh ER, Barrón Y, Quaresimo J, Kaushal R. The effects of electronic prescribing by community-based providers on ambulatory medication safety. *Jt Comm J Qual Patient Saf*. 2013;39(12):545–52.
 22. Mehrmann L, Ollenschläger G. Problemfelder und Best-Practice-Ansätze in der Arzneimittellversorgung an intersektoralen Schnittstellen—Eine Literaturanalyse. *Z Evid Fortbild Qual Gesundheitswes*. 2014;108(1):66–77.
 23. Dilks S, Emblin K, Nash I, Jefferies S. Pharmacy at home: service for frail older patients demonstrates medicines risk reduction and admission avoidance. *Clin Pharm*. 2016 [cited 2017 Jan 1];8(7). <http://www.pharmaceutical-journal.com/research/research-article/pharmacy-at-home-service-for-frail-older-patients-demonstrates-medicines-risk-reduction-and-admission-avoidance/20201303.article>.
 24. Viktil KK, Blix HS. The impact of clinical pharmacists on drug-related problems and clinical outcomes. *Basic Clin Pharmacol Toxicol*. 2008;102(3):275–80.
 25. Reidt S, Holtan H, Stender J, Salvatore T, Thompson B. Integrating home-based medication therapy management (MTM) services in a health system. *J Am Pharm Assoc*. 2016;56(2):178–83.
 26. Vrbnjak D, Denieffe S, O’Gorman C, Pajnikihar M. Barriers to reporting medication errors and near misses among nurses: a Systematic review. *Int J Nurs Stud*. 2016;63:162–78.