An admission medication reconciliation programme carried out by pharmacists: impact on surgeons' prescriptions

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ABSTRACT

Objectives To describe a medication reconciliation (MR) procedure prepared by the pharmacist for patients admitted for elective surgery and to assess the surgeon's degree of acceptance.

Methods A 1-year retrospective observational study was conducted. The patient population consisted of patients aged ≥ 18 years admitted during 2016 for elective surgery and whose planned length of hospital stay was >24 hours. A pharmacist performed MR following a specific protocol. A review of the reconciliations prescribed later by the surgeons was conducted. Statistical analyses were performed for qualitative and quantitative variables.

Results The pharmacist prepared a total of 1986 reconciliation reports. The 179 patients reviewed in this study had a mean age of 65.7 ± 11.8 years, 49.2% were women and 98.9% of patients were reconciled by the surgeon in the operating theatre using an electronic prescribing system (85.5% were fully reconciled).

Conclusion The hospital's MR protocol resulted in almost 100% of patients being reconciled within the subgroup of elective surgery patients by the prescribing surgeons.

other studies have reported that 38–55% of patients admitted to surgical departments show reconciliation errors during admission, and patients admitted for elective surgery stand out as the population most susceptible to reconciliation errors.^{2–4,5,7}

Even though a number of MR programmes have been tested and no gold standard for the process has been established, a systematic review found that these programmes reduce medication errors and potential adverse events.⁸ According to the literature, the clinical pharmacist, as a professional who is present across the different hospital care settings, plays an essential role in reducing medication errors during this process.^{8,9}

Data collected in the different surgical departments of our hospital during 2014 for patients undergoing elective surgery showed the following percentages of MR performed: Trauma and Orthopaedics 36.7%, Urology 63%, Otolaryngology 64.3%, Gynaecology 56.7% and General Surgery 26.7%. As a result, at the beginning of 2015 our institution implemented, as a patient safety improvement programme, an MR procedure performed by the pharmacist for patients admitted for elective surgery.

The aim of the study is to describe the reconciliation itinerary followed by the clinical pharmacist for patients admitted for elective surgery at our institution and the work performed by the pharmacist. We also aimed to assess the surgeon's degree of acceptance of the Reconciliation Report prepared by the pharmacist and to analyse unintentional medication omissions in medical prescriptions.

INTRODUCTION

The Global Patient Safety Challenge on Medication Safety, recently launched by the WorldHealth Organization, is a new global initiative aimed at reducing severe avoidable medication-associated harm in all countries by 50% over the next 5 years. This initiative considers medication review and reconciliation as a potential solution for medication errors.¹ The impact of these processes on reducing medication errors at admission has been reported in the literature.²

Medication reconciliation (MR) is defined as 'the formal process of establishing and documenting a consistent, definitive list of medicines across transitions of care and then rectifying any discrepancies'.¹ However, although this process improves patient safety, MR is not free from errors; 30–70% of patients' treatments contain unintentional discrepancies with their previous treatments² and they can potentially have adverse consequences in 39% of cases³ but, as a result of MR, discrepancies are identified in 50% of patients at the time of hospital admission.⁴

Medication omission is the most common type of error at the time of patient admission, occurring in 40–80% of patients.^{5,6} Furthermore,

METHODS

We conducted a 1-year retrospective observational study. The study was performed at a 350-bed hospital in Spain providing care to a population of 404 426 inhabitants. The patient population consisted of all patients aged 18 years and older admitted during 2016 for elective surgery and whose planned length of hospital stay following surgery was more than 24 hours in order to optimise the time available for the pharmacist to perform MR. These interventions were previously agreed between all the surgical departments, and during the pre-anaesthesia visits patients were requested to complete a form detailing their home medication. This form was digitalised and included in their medical records. For all patients, a clinical pharmacist performed MR prior to the

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Figure 1 Costa del Sol Hospital medication reconciliation protocol.

intervention following a specific Costa del Sol Hospital MR protocol, described in [figure 1](#).

During the weekend a hospital pharmacy specialist or a supervised hospital pharmacy resident obtained the list of planned surgical interventions for the upcoming week ([figure 1](#), step I). Once the patients were selected based on the criteria described above, the best possible medication history (BMH)¹⁰ was obtained using all the digital sources available, including the home medication form. If any discrepancies were found between the sources, the pharmacist called the patient for clarification ([figure 1](#), step II). Once BMH was compiled, specific recommendations were included in the MR report based on the type of surgery planned (eg, revision of levothyroxine treatment for patients undergoing thyroidectomy) or hospital protocols ([figure 1](#), step III). On the day of the intervention, the surgeon

accessed the MR report and added the home medication to the surgical treatment in the operating theatre using an electronic prescribing system.

The number of elective surgeries performed and the number of reports prepared by the pharmacist in 2016 were obtained from the databases to assess the degree of compliance with the protocol. A review of the reconciliations performed by the surgeons in 2016 in the operating theatre using an electronic prescribing system on the day of the elective surgery was conducted. A patient sample size of 179 was calculated based on the 1986 MR reports prepared in 2016, an expected ratio of reconciliations performed by the surgeon of 85% (based on the 2015 data from the department), a 95% CI and a 5% accuracy. All patients were randomly selected. Reports reviewed per surgical department are shown in [table 1](#).

Table 1 Reconciliation reports issued in 2016 per surgical department and results of reports reviewed

Surgical department	Reports issued	Reports reviewed	Total number of reconciled patients: fully and partially reconciled (with some omissions) (%)		Unreconciled patients (%)
General surgery	415	37	37 (100)	Full: 32 (86.5) Partial: 5 (13.5)	0 (0.0)
Gynaecology and obstetrics	423	38	38 (100)	Full: 35 (92.1) Partial: 3 (7.9)	0 (0.0)
Otolaryngology	101	10	10 (100)	Full: 7 (70.0) Partial: 3 (30)	0 (0.0)
Trauma and orthopaedics	481	43	43 (100)	Full: 41 (95.3) Partial: 2 (4.7)	0 (0.0)
Urology	566	51	49 (96.1)	Full: 38 (74.5) Partial: 11 (21.6)	2 (3.9)
Total	1986	179	177 (98.9)	Full: 153 (85.5)	2 (1.1)

The surgeon's degree of acceptance was measured based on the degree of consistency between the information contained in the MR report and the hospital treatment prescribed. Patients were classified as 'fully reconciled' if their prescribed treatment included all the recommendations issued by the pharmacist; as 'reconciled with unintentional medication omissions' if one or several of the drugs recommended in the MR report had not been added by the surgeon and there was no reason for omitting them (in practice these patients are considered as 'reconciled'); or as 'unreconciled' if none of their prior medications were reconciled with their hospital treatment. All unintentional medication omissions made by the surgeon were analysed. We also collected patients' demographic characteristics (age and gender).

Statistical analysis was performed using absolute frequencies (percentages) for qualitative variables and central measures (mean) with dispersion measures (SD, range) for quantitative variables.

RESULTS

Following patient selection criteria, 2061 elective surgeries were performed during the year 2016. The pharmacist prepared a total of 1986 reports, amounting to 96.4% of patients. Mean age was 59.7 ± 16.1 years and 50.6% were women.

The results of the review are shown in table 1, globally and broken down by surgical department. The 179 patients reviewed had a mean age of 65.7 ± 11.8 years and 49.2% were women. It is of note that 98.9% of patients were reconciled by the surgeon in the operating theatre (85.5% were fully reconciled). No discrepancies were found concerning route, dose or regimen between pharmacists' reports and surgeons' prescriptions.

Of the group of 24 patients reconciled by the surgeon in the prescription with unintentional medication omissions (13.4%), two drugs were omitted in six patients and only one was omitted in 18 patients. A total of 31 drugs were omitted: 15 statins, six antiglaucoma eye drops, two drugs for benign prostatic hyper trophy, two pregabalin, two allopurinol, two levothyroxine, one diltiazem and one inhaler.

DISCUSSION

The general purpose of preoperative MR is to achieve the highest safety level prior to elective surgery.^{5,9} Most patients who are going to undergo elective surgery take medication that is not related to the surgery and therefore this raises safety issues which need to be addressed to reduce potential complications during the perioperative period.⁵ The present study shows the

benefits of a proactive MR protocol (figure 1) conducted by a hospital pharmacist prior to patient admission, which ensures surgeons have the right information about the patient's home medication when they have to prescribe hospital treatment in the operating theatre. The very high degree of acceptance of the MR protocol shown by the physicians in our study also provides support for the implementation of the MR programme. In certain countries such as the UK, MR at admission is assigned to pharmacists because of their ability to obtain a more precise medication history compared with other professionals,^{5,7,9} and a recent meta-analysis supports the claim that the implementation of pharmacist-led MR programmes is effective in improving post-hospital healthcare utilisation and medication safety.¹⁰

As mentioned above, the reconciliation by the pharmacy service prior to admission and the inclusion of a reconciliation clinical report in the patient's medical record that is available on the day of the elective surgery result in an optimisation of reconciliation times. This avoids delays in the prescription of home treatment by the surgeon as he/she has no access to the necessary tools in the operating theatre to perform an adequate MR. Furthermore, preparing the reconciliation report represents an opportunity for the pharmacist to optimise patient therapy and speed up certain hospital prescription processes such as adaptation of patients' chronic medication to the Institution's Pharmacotherapeutic Guidelines or timely procurement of drugs that are not included in the Guidelines or that cannot be replaced. These may be the likely reasons why the level of acceptance by the prescribing surgeon of the information included in the MR report and the number of reconciled patients were so high. A study by Bondesson *et al* also showed a very high level of acceptance of pharmacists' recommendations by physicians and confirms that the inclusion of clinical pharmacists in multiprofessional teams can improve drug therapy for inpatients.¹¹

A study by González-García *et al* highlights the greater risk of reconciliation errors in patients admitted for elective surgery.⁵ The fact that medication can be prescribed by different physicians (surgeons, anaesthetists), that patients may stay in different departments during the perioperative process, the lack of communication between different hospital health professionals or between patients and healthcare providers, and the absence of a pharmacist in the operating theatre are factors that contribute to this situation.¹²

Reconciliation errors in the study by González-García *et al*, which were described according to the type of unintentional discrepancy, included drug omission, different route/

dose/regimen, initiation of medication, interaction, different drug, duplication, drug unavailable in the hospital and incomplete prescription. The most common reconciliation error was drug omission.⁵ Data from our review show that, following the establishment of the protocol for elective surgery patients at our institution, only 24 patients had a reconciliation error. In all cases the error consisted of an unintentional medication omission and affected 13.4% of patients. These data represent a very low percentage of errors compared with other studies in which the prevalence ranged from 40% to 80%.^{5,6} This is because reconciliation was performed by the pharmacist prior to patient admission, thus reducing the possibility of errors when the surgeon reviewed the report during the prescription process. The lack of discrepancies related to route, dose or therapeutic regimen in our data shows that surgeons trust the pharmacists' MR reports. However, in some cases the surgeons preferred not to add certain of the medications indicated in the MR, although the reason for such omissions was not collected in this study. We found that a high proportion of these omissions concerned lipid-lowering agents which coincides with other results found in the literature.⁹ The benefit of the continued use of statins after the surgical process (even when nil by mouth is prescribed), which results from the reduction in morbidity and mortality, has been documented in several studies. The European Society of Cardiology recommends, with a level of evidence A, early resumption of statins following a surgical intervention.¹³ One of the reasons for these unintentional omissions could be the belief that patients who are nil by mouth do not need therapy to reduce cholesterol. In addition, antiglaucoma eye drops are also frequently omitted drugs at admission. The importance of maintaining treatment with antiglaucoma eye drops is supported by the Clinical Practice Guidelines on medication reconciliation at the Emergency Department, where these eye drops are included in the group of drugs that have to be reconciled in the first 4 hours following admission.¹⁴ These omissions could result from the fact that surgeons are not familiar with these types of treatments or that they may be undervalued.

The impact of our intervention has not been evaluated in the study. However, studies using a similar methodology have shown that reconciliation achieves a significant improvement in patient safety¹⁵ and economic benefits.¹⁶

Among the limitations of the present study and of the protocol developed at our institution, it should be highlighted first that patients undergoing elective surgery and an expected subsequent hospital stay of less than 24 hours who finally had to remain hospitalised for a longer period were excluded; and, second, that patients who were taking medication that had not been prescribed or who were mainly users of private healthcare did not have their prescribed medication in any of the information sources used for their MR and were therefore considered as patients who did not use any chronic medication (see figure 1).

CONCLUSION

The reconciliation protocol for elective surgery was performed in the majority of patients. There was a high percentage of

acceptance of the reconciliation report by the prescribing surgeons which resulted in almost 100% of patients being reconciled within the subgroup of elective surgery patients. The percentage of medication omissions in the MR was lower than that published in the literature because the established protocol was of a proactive nature. As a result of the analysis of unreconciled drugs, statins and antiglaucoma eye drops were by far the most commonly unreconciled drugs and, consequently, some specific improvement measures are required.

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Competing interests None declared.

Ethics approval This study was approved by the Research Ethics Committee of Costa del Sol Hospital. All protocols and procedures were performed in accordance with the Declaration of Helsinki.

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REFERENCES

- 1 Medication Errors: Technical Series on Safer Primary Care. Geneva: World Health Organization, 2016.
- 2 Lo L, Kwan J, Fernandes OA, et al. Chapter 25. Medication Reconciliation Supported by Clinical Pharmacists (NEW) AHRQ 2013. *Making Health Care Safer II: An Updated Critical Analysis of the Evidence for Patient Safety Practices. Comparative Effectiveness Review No. 211. (Prepared by the Southern California-RAND Evidence-based Practice Center under Contract No. 290-2007-10062-I.) AHRQ Publication No. 13-E001-EF.* Rockville, MD: Agency for Healthcare Research and Quality, 2013.
- 3 Gleason KM, Groszek JM, Sullivan C, et al. Reconciliation of discrepancies in medication histories and admission orders of newly hospitalized patients. *Am J Health Syst Pharm* 2004;61:1689–95.
- 4 Cornish PL, Knowles SR, Marchesano R, et al. Unintended medication discrepancies at the time of hospital admission. *Arch Intern Med* 2005;165:424–9.
- 5 González-García L, Salmerón-García A, García-Lirola M, et al. Medication reconciliation at admission to surgical departments. *J Eval Clin Pract* 2016;22:20–5.
- 6 Fitzsimons M, Grimes T, Galvin M. Sources of pre-admission medication information: observational study of accuracy and availability. *Int J Pharm Pract* 2011;19:408–16.
- 7 Vira T, Colquhoun M, Etchells E. Reconcilable differences: correcting medication errors at hospital admission and discharge. *Qual Saf Health Care* 2006;15:122–6.
- 8 Mueller SK, Sponsler KC, Kripalani S, et al. Hospital-based medication reconciliation practices: a systematic review. *Arch Intern Med* 2012;172:1057–69.
- 9 Kwan JL, Lo L, Sampson M, et al. Medication reconciliation during transitions of care as a patient safety strategy: a systematic review. *Ann Intern Med* 2013;158:397–403.
- 10 Mekonnen AB, McLachlan AJ, Brien JA. Effectiveness of pharmacist-led medication reconciliation programmes on clinical outcomes at hospital transitions: a systematic review and meta-analysis. *BMJ Open* 2016;6:e010003.
- 11 Bondesson A, Holmdahl L, Midlöv P, et al. Acceptance and importance of clinical pharmacists' LMM-based recommendations. *Int J Clin Pharm* 2012;34:272–6.
- 12 Hicks RW, Wanzer L, Goeckner B. Perioperative pharmacology: a framework for perioperative medication safety. *AORN J* 2011;93:136–42.
- 13 Buckley MS, Harinstein LM, Clark KB, et al. Impact of a clinical pharmacy admission medication reconciliation program on medication errors in "high-risk" patients. *Ann Pharmacother* 2013;47:1599–610.
- 14 Grupo de Trabajo de la SEC para la Guía de Práctica Clínica de la ESC/ESA 2014 sobre Cirugía no Cardíaca: Evaluación y Manejo Cardiovascular. Comentarios a la guía de práctica clínica de la ESC/ESA 2014 sobre cirugía no cardíaca: evaluación y manejo cardiovascular. *Rev Esp Cardiol* 2014;67:980–5.
- 15 Lehnbohm EC, Stewart MJ, Manias E, et al. Impact of medication reconciliation and review on clinical outcomes. *Ann Pharmacother* 2014;48:1298–312.
- 16 Calderón Hernanz B, Oliver Noguera A, Tomás Vecina S, et al. Conciliación de los medicamentos en los servicios de urgencias. *Emergencias* 2013;25:204–17.