Effectiveness of a Multicomponent Pharmacist Intervention at Hospital Discharge for Drug-Related Problems: A Cluster Randomised Cross-over Trial

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Abstract

Objective: To assess whether a pharmaceutical intervention associating medication reconciliation at discharge and a link to the community pharmacist reduces drug-related problems during the 7 days after hospital discharge.

Design: Cluster randomised cross-over superiority trial with hospital units as the cluster unit.

Setting: Medical and surgical units in French general and university hospitals.

Participants: Inpatients older than 18 years returning home after hospitalization. Patients with a hospital length of stay of more than 21 days were excluded.

Interventions: Each cluster was involved during two consecutive 14-day periods randomly assigned as experimental or control (usual care) periods. During the experimental period, the medication reconciliation performed by a hospital pharmacist was transmitted along with medication modifications to the patient's community pharmacist.

Main outcome measures: The primary outcome was a composite of any kind of drug-related problems (prescription/dispensation, gap due to patient error or no medication available) during the 7 days after discharge, assessed by phone with the patient and community pharmacist. Secondary outcomes were self-reported unplanned hospitalizations at day 35 after discharge and severe iatrogenic problems (score of 2 or 3 on the Bayliff scale).

Results: 1,092 patients were enrolled in 48 units from 22 hospitals (538 in the experimental periods and 554 in the control periods). Three patients refused to have their data analysed and were excluded from the analyses. As compared with usual care, the pharmaceutical intervention led to a lower proportion of patients with at least one drug-related problem (44.0% vs 50.6%; odds ratio [OR] 0.77, 95% confidence interval [CI] 0.61 to 0.98) and severe iatrogenic problems (5.2% vs 8.7%; OR 0.57, 95% CI 0.35 to 0.93) but no significant difference in unplanned hospitalizations at day 35 (5.8% vs 4.5%; OR 1.46, 95% CI 0.91 to 2.35).

Conclusion: Medication reconciliation associated with communication between the hospital and community pharmacist may decrease patient exposure to drug-related problems and severe iatrogenic problems but not unplanned hospitalization. However, this intervention could be recommended in heath policies to improve drug management for patients.

Trial registration: NCT02006797

330 words

Key words: Community pharmacist, hospital pharmacist, drug-related problem, communication, cluster randomised cross-over trial, hospital discharge, medication reconciliation

What this paper adds?

What is already known on this subject?

- *Patients discharged from hospital are frequently exposed to drug-related problems.*
- *Information transmission between the hospital and community pharmacist about any modification in patient medication at discharge is lacking.*
- *Medication reconciliation at discharge may reduce drug-related problems linked to prescriptions.*

What this study adds

- *Medication reconciliation at discharge associated with communication between hospital and community pharmacists may decrease patient exposure to harmful drug-related problems*
- *Medication reconciliation at discharge associated with communication between hospital and community pharmacists is effective in reducing prescription and dispensing errors and improving drug patients' ability to receive the drugs.*

Introduction

Drug-related problems are defined as an "*event or circumstance involving drug therapy that actually or potentially interferes with desired health outcomes*" [1]. Hospital discharge studies suggest that at least 50% of patients experience drug-related problems, and 19% to 23% experience an adverse event that could be partially avoided [2,3]. In the United States, 34% of Medicare patients are readmitted to the hospital within 30 days of discharge. Most readmissions are avoidable, and only 10% are planned [4].

At hospital discharge, complete prescription of medications and a full understanding of prescriptions by the patient are part of the continuum of care. This is the purpose of medication reconciliation, defined as the formal process of checking the complete, accurate list of a patient's previous medications and comparing it with the prescriptions after a transition of care (on admission, after transfer to another medical unit, and at discharge) [5]. Medication reconciliation before discharge was found effective in decreasing drug-related problems by 50%, with higher efficiency when performed by a pharmacist versus a physician or nurse [6-9]. The process has been recommended to prevent errors since 2005 by the US Joint Commission on Accreditation [10].

However, deficits in communication and information transfer between hospital discharge and community care have been demonstrated in several studies [3]. Several experiments have been conducted in North America or Europe to increase the quality of information at discharge, considering that well-informed patients and/or caregivers can manage the drug treatment on their own [11, 12]. However, few studies have focused on the role of the community pharmacist at discharge [13-15]. In France, many patients always go to the same community pharmacy, which offers a great opportunity for community pharmacists to play an important role.

Our trial investigated the impact of a complex intervention associating both medication reconciliation at discharge and communication between the hospital and community pharmacist about drug modifications, both activities performed by hospital pharmacists. We assessed whether such a complex intervention affects the incidence of drug-related problems in patients during the 7 days after discharge. Secondary objectives were to assess the impact on severe iatrogenic problems, unplanned hospitalizations at 35 days, and patient and pharmacist satisfaction.

METHODS

This study was registered at ClinicalTrials.gov (NCT02006797) on December 5, 2013, and the protocol was previously published [16]. A complete description of the different steps is reported in Figure 1 using the Timeline cluster tool of Caille et al. [17]

Design

We designed a superiority cluster randomised cross-over controlled trial. Clusters were hospital units, each involved during two consecutive 14-day periods. Randomising clusters rather than patients allowed us to provide differential information to patients according to the group they were recruited in. Indeed, complete information for patients, before randomisation, would have probably increased contamination between groups. This process is described in the table given with Figure 1. Randomizing patients would probably also have resulted in several patients refusing to be recruited because of the very nature of the intervention assessed (cf infra). The cross-over feature of the design was motivated by the gain in power and the expected benefit in a baseline characteristic balance between groups. It was considered possible because of minimal risk of a carry-over effect.

Settings and participants

Hospitals all over France — half university hospitals — were involved. In each hospital, a hospital pharmacist was asked to select two units (one surgical and one medical). Units for which a pharmaceutical reconciliation procedure at discharge was already in place were not eligible. All adult patients were eligible, except those with length of stay of more than 21 days, who did not return home, who were near the end of life, or who were not able to understand the topic according to their medical record. All French community pharmacists were informed of the study, but we included only those who typically dispensed drugs to at least one of the patients enrolled in the study.

Intervention

In each group, the intervention was applied at the patient level. For some hospitals, hospital pharmacists were recruited specifically for the study. To standardize this nonpharmacological intervention over the different hospitals [18], hospital pharmacists received a one day training in the reconciliation procedure by an experienced clinical pharmacist accredited by the French Society of Clinical Pharmacy (SFPC).

Experimental intervention (Figure 2)

For patients included during experimental periods, hospital pharmacists performed the medication reconciliation at discharge. Then they completed a short form documenting the reason for hospitalization, home medication modifications, new medication and laboratory results necessary to understand and/or accept the prescription (estimated glomerular filtration rate, Na and K levels, coagulation results, etc.). They also controlled the discharge prescription and, if needed, discussed it with the physician recording the prescription on the SFPC card [19]. Then, they explained the treatment to the patient and the modifications to the home medication. They phoned the patient's community pharmacist to explain the patient's inclusion in the study, the discharge time, and the modifications in treatment. They also sent the community pharmacist the prescription sheet via a secure email before patient discharge. The community pharmacist then received visits from the patient or caregiver as usual.

Control intervention

For the control group, patients received the usual care both at the hospital and by their community pharmacist.

Outcomes

The primary outcome was assessed at day 7 (±2 days) after discharge. Two pharmacists specifically recruited for the study contacted all included patients (or their caregiver) by phone to identify any problem or dysfunction related to drugs observed during the 7 days after discharge. The primary outcome was a composite defined as the presence of any of the following problems: 1) the drug was not the correct one (name, form, route, or dose) because of prescription and/or dispensing error; 2) the patient did not take what was prescribed and/or took treatments that should have been stopped (patient error); and 3) the patient could not obtain the medication when visiting the pharmacy, which caused a gap in the continuity and duration of therapy (treatment gap). We considered that a dysfunction was present whenever one of these problems was identified for one of the drugs the patient had to take, whatever the drug. Also at day 7 (±2), community pharmacists were phoned to identify the drug not delivered, which corresponded to the third part of the composite outcome.

For secondary outcomes, each identified drug-related problem dysfunction, an expert committee composed of physicians (one nephrologist, one cardiologist, one gastroenterologist, and one clinical pharmacist) a posteriori assessed the potential medical

impact of drug-related problems in terms of severity (from 0, no problem, to 3, life-threatening) by the Bayliff scale [20]. As well, each component of the primary outcome (i.e., the three types of problems) was considered a secondary outcome. We also assessed the number of unplanned hospitalizations during the 35 days after discharge (declared by patients or their caregiver) as well as patient and community pharmacist satisfaction by using a four-point Likert scale . In addition, we assessed the time taken by the hospital pharmacist to perform the intervention (medication reconciliation and communication to the community pharmacist) and the proportion of drug prescriptions modified by the hospital pharmacist at discharge.

Blinding

The very nature of the assessed intervention did not allow for blinding, except for the members of the expert committee who assessed the potential medical impact of the identified dysfunctions. Pharmacists who contacted patients by phone at days 7 and 35 were not blinded. Indeed, we considered that blinding would have been compromised very easily during the phone contacts. However, although patients recruited during experimental periods were fully informed of the study, its aim, and the intervention assessed, patients recruited during control periods were just asked whether they would agree to be contacted by phone at days 7 and 35.

Randomisation

For each unit, we randomly assigned the order of the two periods. Randomisation was stratified by hospital, for logistical convenience. Because we expected to include two units per hospital, one unit was first included in the experimental period and the other in the control period. The randomisation sequence was generated by a statistician from INSERM CIC 1415 by using a computerized process. Units were randomised all at once. However, for logistical reasons, hospitals were activated sequentially, in an order that was randomly defined. Doing so allowed for the easiest implementation of the study in the different hospitals and easier management of outcome assessment, which was centralised and done by phone.

Ethical issues

The study was approved by the local ethics committee who agreed on a waiver of patient written consent. Thus, patients were informed, differentially according to the group they were recruited in, and were included after oral consent.

Sample size

We expected a reduction in dysfunction rate of drug-related problems from 60% [21] to 45%. Considering 90% power and a 5% two-sided alpha level, we needed 235 patients per group with a trial of two parallel, individually randomised groups (nQuery Advisor [2005] v6.0, Los Angeles, CA.). We applied an inflation factor, taking into account that the trial was clustered and it was a cross-over trial [22-23]. We considered a high value for the intraclass correlation coefficient (ICC) because of a process primary outcome and because of the expected incidence of about 50% [23]. Thus, we selected a 0.2 value for the ICC and further assumed a 0.1 correlation for the intra-cluster inter-period correlation, that is, half the intra-cluster intra-period correlation. We initially expected to involve 42 units, for a required number of 10.2 patients in each unit for each period. Because we aimed to perform a statistical analysis on the completer population, we planned to recruit 14 patients in each unit in each period, for a total of 1,176 patients.

Statistical analysis

Data are reported as median (interquartile range [IQR]), number (%) and odds ratios (ORs) or relative risk (RR), with 95% confidence intervals (CIs). Data analysis was based on an "intention-to-treat" strategy. Missing data were handled considering a best-case scenario (i.e., a missing outcome, meaning no dysfunction). The number of dysfunctions was analysed by using a mixed logistic model with both the group and the period considered as fixed effects and the cluster and the interaction terms cluster*period as random effects. ICCs were estimated per group by using the Zou et al. approach [24]. We performed a sensitivity analysis excluding patients with missing data and also pre-specified subgroup analyses (medical vs surgical units; patients < 75 vs ≥ 75 years old; patients with < 5 vs ≥ 5 drugs prescribed at discharge). Secondary outcomes were analysed by using the same approach as for the primary outcome except for the number of dysfunctions per patients for which a mixed Poisson model was fitted. Analyses involved use of SAS v9.2 and R v3.1.2.

RESULTS

Participants

We enrolled 1,092 patients in 48 units from 22 hospitals: 538 in the intervention group and 554 in the control group (Figure 3). Twelve hospitals were university hospitals, nine were general hospitals and one was a military teaching hospital. Twenty-nine units were medical units and 19 were surgical ones. Three patients (2 in the intervention group and one in the control group) refused their data to be used and were thus excluded from any analyses. The median number of patients per period per cluster in the intervention and control groups was 11.5 (IQR 7.0-15.0) and 11.5 (7.5-15.0). Patient characteristics are reported in Table 1. The median number of drugs at discharge in the intervention and control groups was 5 (IQR 3-8) and 5 (2-8).

Primary outcome

The number of patients with at least one drug-related problem dysfunction in the intervention and control groups was 236 (44.0%) and 280 (50.6%) (OR 0.77, 95% CI 0.61 to 0.98). The frequency of prescription and/or dispensing problems, patient error and treatment gap was reduced with the intervention versus usual care (OR 0.52, 95% CI 0.29 to 0.93; 0.84, 95% CI 0.66 to 1.07; 0.65, 95% CI 0.43 to 0.99, respectively; Table 2). Sensitivity analyses excluded 39 patients (18 and 21 in the intervention and control groups) and led to consistent results. Subgroup analyses are reported in Figure 4. We found no significant interaction. The number of patient errors was significantly lower in the intervention than control group (RR 0.78, 95% CI 0.67 to 0.96) (Table 3).

Potential iatrogenic exposure

Considering severe iatrogenic drug-related problems (score 2 or 3 on the Bayliff scale), 28 (5.2%) and 48 (8.7%) patients in the intervention and control groups had at least one severe iatrogenic problem (OR 0.57, 95% CI 0.35 to 0.93) (Table 4).

Secondary outcomes

Unplanned hospitalizations at day 35

At day 35, 31 (5.8%) versus 25 (4.5%) patients in the intervention and controls groups had an unplanned hospitalization (OR 1.46, 95% CI 0.91 to 2.35). For 9 patients, we could not conclude on a planned or unplanned hospitalization.

Proportion of drug prescriptions modified by the hospital pharmacist at discharge

In the intervention group, hospital pharmacists modified the drug prescription at discharge for 99 patients (18.5%, 95% CI 12.8 to 25.1).

Time spent by hospital pharmacist

The median time dedicated by the hospital pharmacist for medication reconciliation at discharge and communication to the community pharmacist was 20 min (IQR 15 to 30). The estimated ICC was 0.493 (95% CI 0.419 to 0.577), so 49.3% of the variability in time spent was due to inter-hospital variability and the remaining 50.7% to patient variability.

Satisfaction

Overall, 465 out of 494 responders (94.1%, 95% CI 91.7 to 96.0) patients in the intervention group were very satisfied or satisfied with their medication management, 439/447 (98.2%, 95% CI 96.1 to 99.4) were very satisfied or satisfied that their prescriptions had been transmitted to their community pharmacist, and 391/397 (98.5%, 95% CI 96.0 to 99.8) were very satisfied or satisfied with the explanations given by the hospital pharmacist before their discharge. In the control group 494 out of 524 patients who answered (94.3%, 95% CI 91.5 to 96.4) were globally very satisfied or satisfied with the pharmaceutical care they received. Among 409 community pharmacists for the intervention group who answered, 390 (95.4%, 95% CI 92.8 to 97.2) were very satisfied or satisfied with the process.

Discussion

In this cluster randomised superiority trial, associating medication reconciliation and communication from the hospital to the community pharmacist decreased drug-related problems and severe iatrogenic problems but did not significantly affect unplanned hospitalizations at day 35.

In terms of the parts of our composite outcome, we observed a significant effect on prescribing/dispensing problems and medication shortage but not patient errors. Nevertheless, although the proportion of patients with at least one home medication error did not significantly decrease, overall, the number of errors significantly decreased by 22% (RR 0.78, 95% CI 0.67 to 0.96). When implementing a liaison from the hospital to community pharmacist associated with systematic medication reconciliation, Van Hollebeke et al. observed a large decrease in proportion of patients with at least one medication shortage during the 7 days after discharge (from 22% to 2%) [25]. However, this study was a single-centre trial, which limits its external validity. Walker et al. assessed an intervention including therapy assessment, medication reconciliation, counselling and education and finally post-discharge follow-up in patients with more than three prescribed drugs [21]. The authors observed a decrease from 59.6% to 33.5% in the proportion of patients with at least one discrepancy. Nevertheless, this study took place in the United States, whose heath system differs from that in France, where drugs are free of charge.

We observed a greater effect among surgical than medical hospital units (OR 0.64 vs 0.86), although the difference was not significant, probably because of lack of power. Sebaaly et al. identified more medication errors at discharge in surgery than medical units, although the difference was also not significant [26]. We also observed a smaller effect for patients ≥ 75 versus < 75 years old, although once again, the difference was not significant. Finally, the effect did not appear to be related to the number of drugs, with similar ORs for ≥ 5 and < 5 drug subgroups. These latter results do not fully agree with the Hias et al. study, finding the number of drugs at admission and patient age associated with drug-related problems at admission [27].

Our trial shows a reduction in severe iatrogenic problems with the intervention. A similar result was observed in the Phatak et al. randomised trial assessing a complex intervention associating several clinical pharmacy activities and finding the proportion of adverse drug events reduced from 12.8% to 8% [12]. Sebaaly et al. classified as serious or lethal 6% of

medication errors with their intervention [28]. These results confirm the relevance of our intervention to decrease patient exposure to serious drug-related problems.

Concerning the time spent by the hospital pharmacist on the intervention, Zemaitis et al. found a mean of 10.1 min dedicated to medication reconciliation at discharge and 6.6 min to medication reconciliation at admission [4]. In our study, the median time spent by the hospital pharmacist was 20 min for the whole process, including communication with the community pharmacist. However, such a global median masks very different situations with high inter-hospital variability in time spent.

As in other studies [28; 31], we did not demonstrate a reduction in unplanned hospitalizations at day 35 after discharge. Overall, we observed a global rate of unplanned hospitalizations of 5.1% as compared with the 2.7% and 2.8% at 7 and 30 days, respectively, previously reported for all causes of hospitalizations except recovery and psychiatric stays in France [29-30]. However, because we assessed this outcome directly from the patient, we faced many difficulties due to misunderstandings. Thus, some patients confused emergency room stay and hospitalization, some hospitalizations were actually planned by the physician but considered unplanned by the patient, and for some patients, recovery stays were wrongly considered unplanned hospitalization. Undoubtedly, such an outcome would better be assessed by directly collecting this information from the hospital administrative system. However, such an approach would require considering all the hospitals in which the patient could have been admitted, rather than only the hospital in which the patient was hospitalized. In their review, Christensen and Lundh explained the lack of evidence on unplanned hospitalizations as being due to low-quality trials and too-short follow-up: 1 year would be a better follow-up [32]. Arnold et al. observed a decrease from 19.5% to 9.2% in readmission rate at day 30 after discharge, but data were collected from physicians or pharmacists involved in clinical pharmacy, rather than from patients themselves [33]. Moreover, only patients with a high risk of readmission (i.e., with > 5 prescribed drugs and/or > 50 years old and/or multiple chronic diseases) were included in the Arnold et al. study. Zemaitis et al., in a before–after prospective study in a single medicine unit, observed a decrease of 27% in readmission at day 30, but, in addition to medication reconciliation, the hospital pharmacist also provided patient education and phone-call follow-up [4].

Generalizability

Our study involved hospital pharmacists from 22 university and general hospitals. Units were representative of existing medical or surgical specialities, and eligibility patient criteria were sufficiently large for intervention generalization in French hospitals. Community pharmacists were not "recruited" for the study: their involvement depended on whether the patients they typically provide drugs to were recruited in the study. These elements offer good external validity to our trial. Otherwise, each cluster was its own comparator because of the cross-over design, which helped to achieve good baseline balance in this non-blinded study, thus limiting bias.

Limitations

Medication reconciliation at admission is considered good practice [34]; therefore, we did not exclude units in which it was usual care. Hence, we included both units with and without medication reconciliation at admission. Nevertheless, because the study was cross-over, there is no reason to believe that it was source of bias.

We did not communicate the medication reconciliation synthesis to the patient's general practitioner, who was not involved in the present study. General practitioners receive a hospitalization report with information about their patient's hospital stay, but this generally occurs 1 to 4 weeks after hospital discharge. Actually, our aim was to focus on the patient community pharmacist, who generally is the first healthcare person the patient meets after hospital discharge.

For logistical convenience, units were sequentially activated. As a consequence, when the last unit was activated, patient recruitment in the first unit had ended for more than 12 months. Such a situation may have induced between-unit contamination but remains highly theoretical because units activated at different times were from different hospitals, with different hospital pharmacists. This sequential activation may have also affected how the intervention was applied, because hospital pharmacists were all informed together about the intervention, at the beginning of the study. To limit this problem, before activation of each unit, a phone meeting was organized to remind how the study had to be conducted and to remind about the intervention components.

Future research

Although we demonstrated the efficiency of our pharmaceutical intervention for drug-related problems, we failed to observe a benefit for unplanned hospitalization. As explained, this outcome was assessed in a non-optimal way (asking patients or their caregiver) and after a too-short follow-up. More work is undoubtedly needed on this outcome, relating it to severe iatrogenic problems, and considering a longer follow-up, as suggested by Christansen et al. [32].

Conclusion

This first study on clinical pharmacy practice in France with a large population and a methodology aimed at preventing bias as much as possible will help change patient discharge management. Conducting systematic medication reconciliation at discharge along with community-pharmacist contact is beneficial for patients. Since the end of this trial and the first results communicated in different meetings, medication reconciliation at discharge has become mandatory in French hospitals.

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Contributors: XP, BA, BB, AD, MF, VG, JG, JMH, CRM, BG designed the study, produced the protocol and obtained funding for the study. XP, CRM and BG managed the study. CL and BG analysed the data. XP and BG produced the first complete draft and updated subsequent drafts. CL, BA, BB, AD, MF, VG, JG, JMH and CRM contributed to and approved all drafts. XP is guarantor for the trial report.

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Data sharing: Data are available from the lead author on request.

Transparency: The guarantor (XP) affirms that the manuscript is an honest, accurate, and transparent account of the study bring reported; that no important aspects of the study have been omitted; and that any discrepancies from the study as planned (and, if relevant, registered) have been explained.

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Competing interest declaration

Xavier Pourrat is vice-president of French society of clinical pharmacy (SFPC)
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Jean-Michel Halimi: none
Clarisse Roux-Marson: none
Bruno Giraudeau: none
Xavier Pourrat guarantees accuracy of the above information.

Protocol

The initial protocol was in French, Xavier Pourrat may send it as needed. Also it was published in Trials (Trials. 2014 Jun 30;15:260) and the corresponding article is linked to this paper.

Submission

This is the first submission for this article.

Consort check-list

1a. Title
Identification as a randomised trial in the title. **Yes (page 1)**
1b. Abstract
Structured summary of trial design, methods, results, and conclusions yes (page 3)

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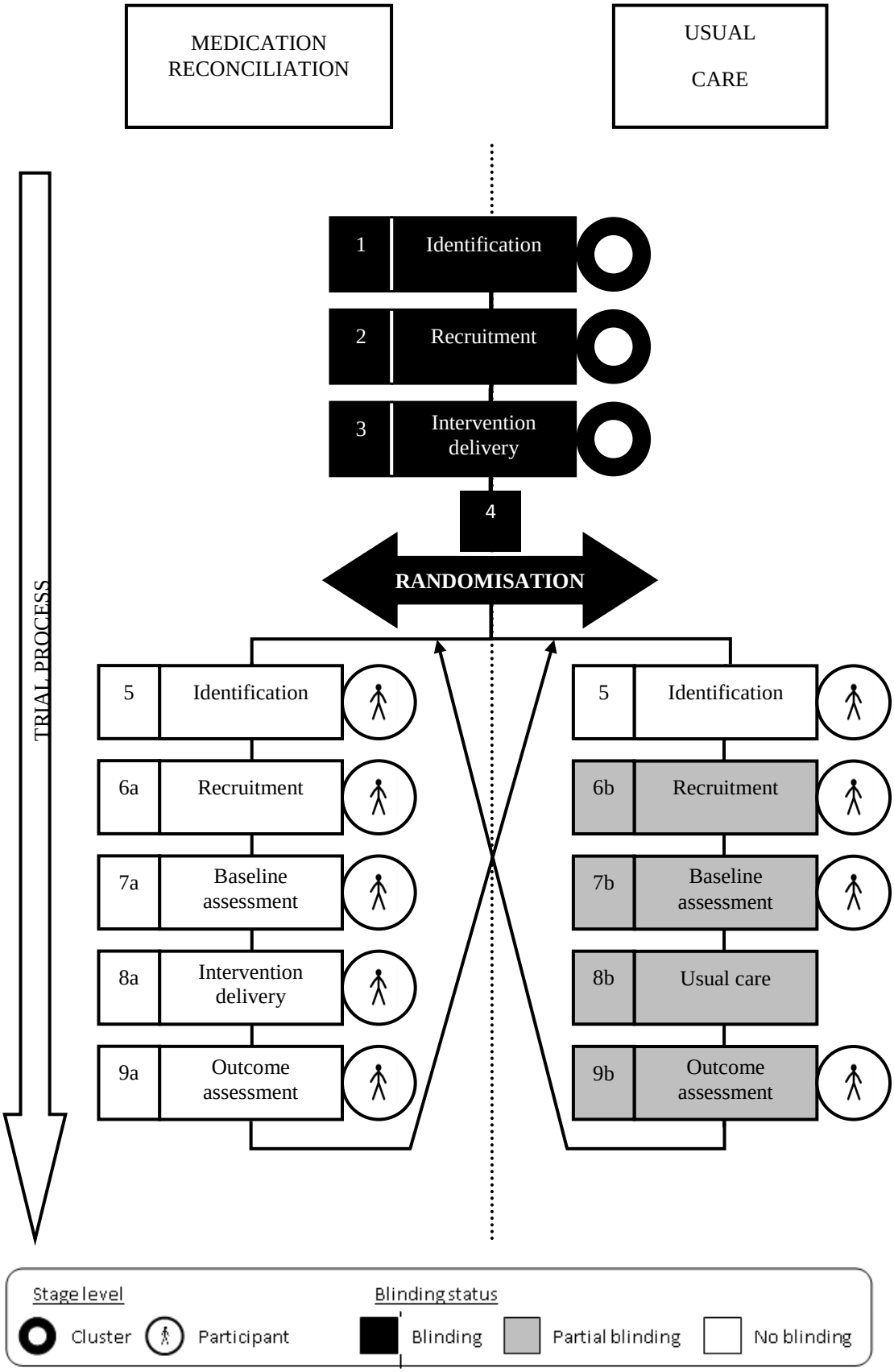
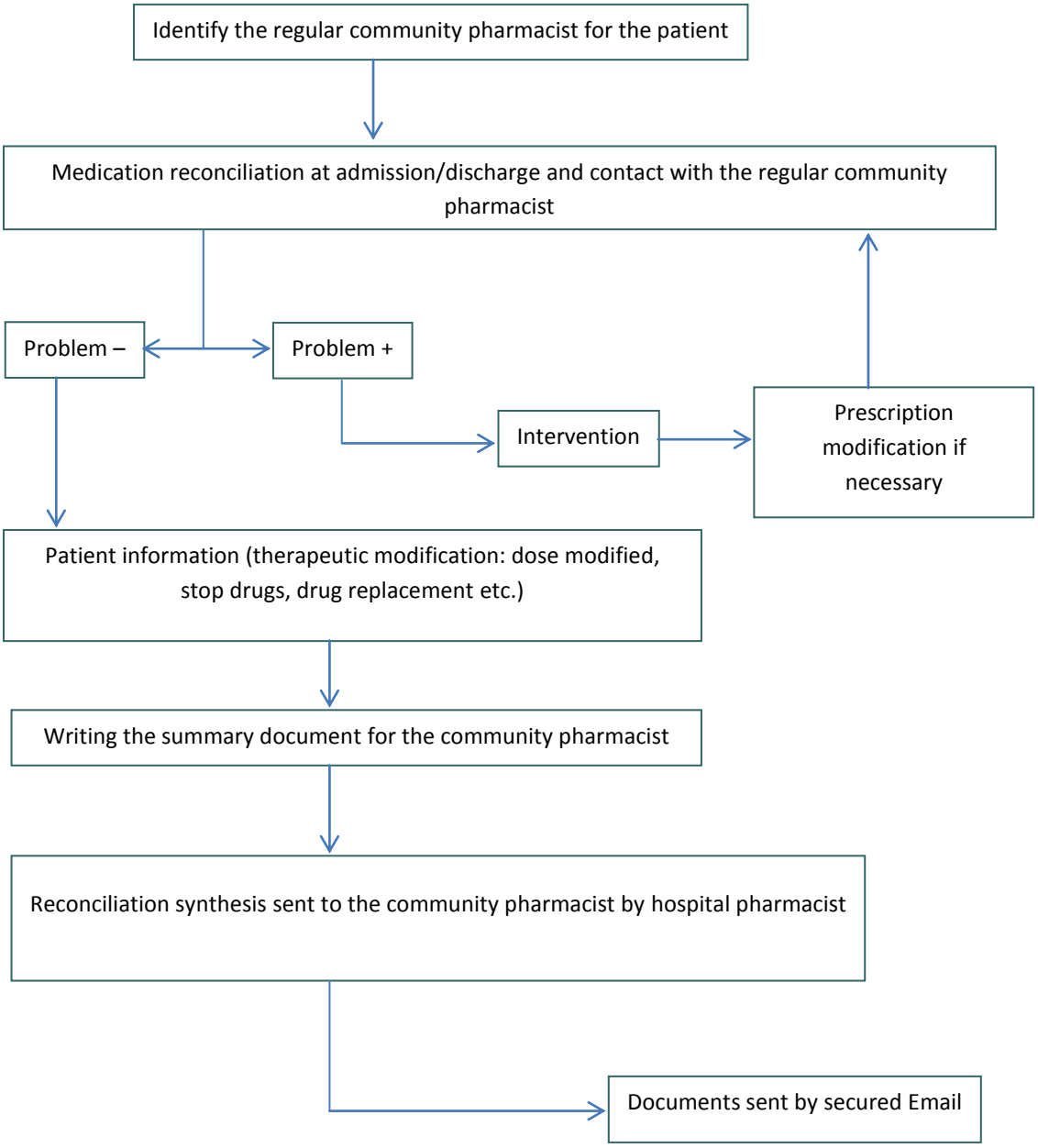
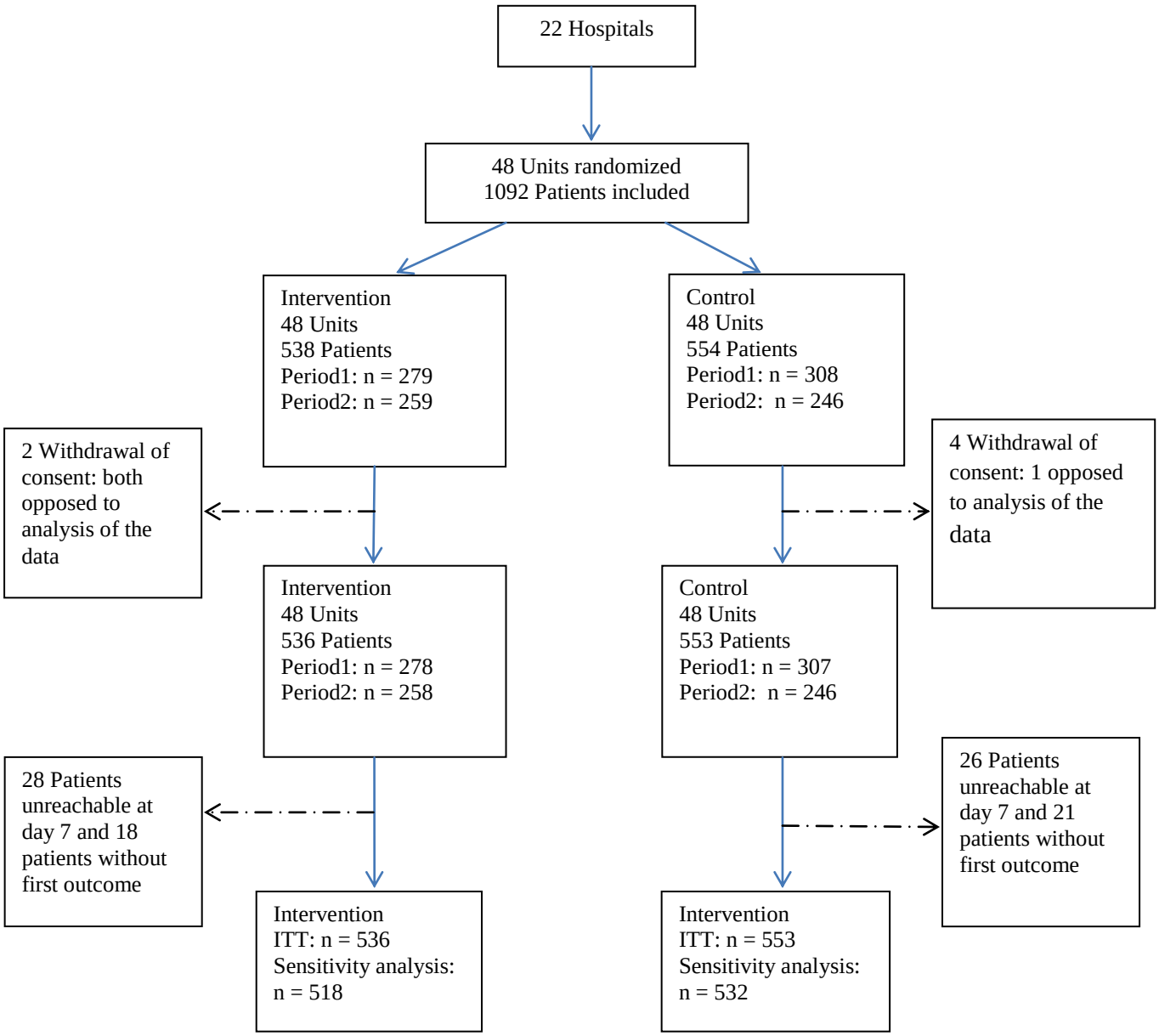
Figures


MEDICATION RECONCILIATION
USUAL CARE
TRIAL PROCESS
1 Identification
2 Recruitment
3 Intervention delivery
4
RANDOMISATION
5 Identification
6a Recruitment
7a Baseline assessment
8a Intervention delivery
9a Outcome assessment
5 Identification
6b Recruitment
7b Baseline assessment
8b Usual care
9b Outcome assessment
Stage level
Cluster
Participant
Blinding status
Blinding
Partial blinding
No blinding

1	Cluster identification French hospital pharmacists are approached by the study team. Each hospital pharmacist who agrees to participate in the trial identifies 2 units from their hospital, one surgical and one medical unit.
2	Cluster recruitment Medical heads from hospital units receive information and provide written consent to take part to the study.
3	Intervention delivery at cluster level Hospital pharmacists are trained in medication reconciliation. Community pharmacists working in nearby participating hospital units are informed of the study in 3 ways: an article in a professional journal supported by the pharmacist unions, in a professional journal supported by the national council of the order of pharmacists, and a letter from the study scientific committee distributed by wholesale drug distributors.
4	Randomisation: cross-over design Randomisation is performed in a 1:1 ratio by an independent statistician with stratification on the hospital. Each hospital unit is randomised to perform medication reconciliation or usual care for a first 14-day period and is crossed over to the other group for a second 14-day period.
5	Participant identification In each hospital unit, unblinded hospital pharmacists identify eligible patients.
6a	Participant recruitment in the medication reconciliation group Participants are recruited by unblinded hospital pharmacists. They receive complete information and provide oral consent for intervention and for data collection.
6b	Participant recruitment in the usual care group Participants are recruited by unblinded hospital pharmacists. They receive partial information because they are not aware of the existence of the medication reconciliation group and provide oral consent for data collection.
7a	Participant baseline data collection in the medication reconciliation group Baseline data are collected by the unblinded hospital pharmacists. There is no blinding for patients. Contact details for the patient's community pharmacist are collected.
7b	Participant baseline data collection in the usual care group Baseline data are collected by the unblinded hospital pharmacists. Patients are not aware of the existence of the medication reconciliation group. Contact details for the patient's community pharmacist are collected.
8a	Intervention delivery Medication reconciliation at patient discharge is performed by a hospital pharmacist, followed by phone transmission of treatment modification to the patient's community pharmacist. No blinding for hospital pharmacists, community pharmacists and patients.
8b	Usual care No blinding for community pharmacists, but they are not aware that the patient is involved in a trial. No blinding for patients, but they are not aware of the existence of the medication reconciliation group.
9a	Participant outcome assessment in the medication reconciliation group Drug-related problem within 7 days after discharge assessed by a research pharmacist recruited for the study, using a standardized evaluation form. Assessment is centralised and performed by a phone call to both the participant and community pharmacist. No blinding for the research pharmacist, community pharmacists and patients.
9b	Participant outcome assessment in the usual care group Drug-related problem within 7 days after discharge assessed by a research pharmacist recruited for the study, using a standardized evaluation form. Assessment is centralised and performed by a phone call to both the participant and the community pharmacist. No blinding for the research pharmacist, community pharmacists are not aware that the patient is involved in a trial and patients are not aware of the existence of the medication reconciliation group.


Identify the regular community pharmacist for the patient
Medication reconciliation at admission/discharge and contact with the regular community pharmacist
Problem –
Problem +
Intervention
Prescription modification if necessary
Patient information (therapeutic modification: dose modified, stop drugs, drug replacement etc.)
Writing the summary document for the community pharmacist
Reconciliation synthesis sent to the community pharmacist by hospital pharmacist
Documents sent by secured Email



ITT: intention to treat

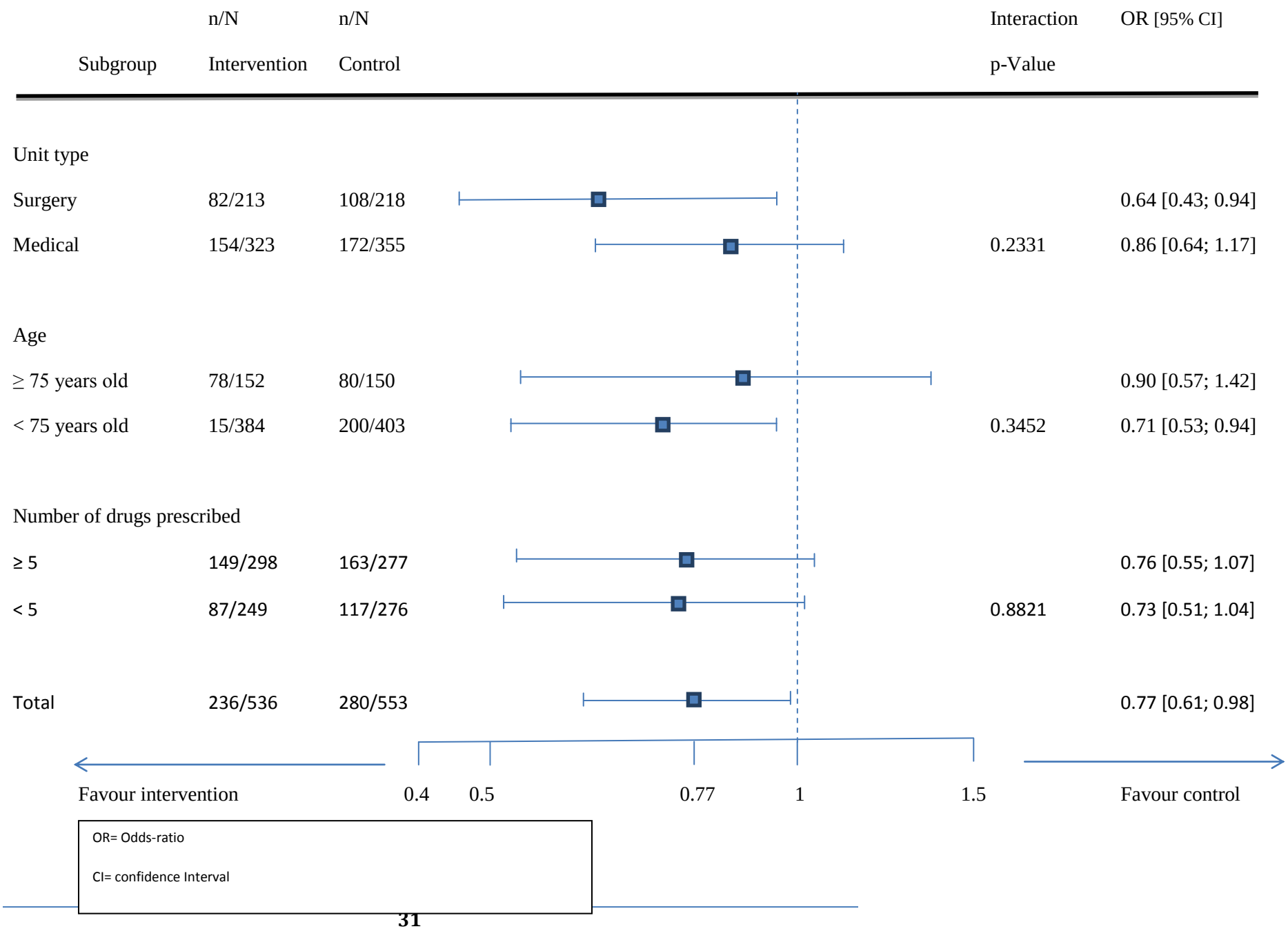

n/N
Intervention
n/N
Control
Interaction
p-Value
OR [95% CI]
Subgroup
Unit type
Surgery 82/213 108/218 0.64 [0.43; 0.94]
Medical 154/323 172/355 0.2331 0.86 [0.64; 1.17]
Age
≥ 75 years old 78/152 80/150 0.90 [0.57; 1.42]
< 75 years old 15/384 200/403 0.3452 0.71 [0.53; 0.94]
Number of drugs prescribed
≥ 5 149/298 163/277 0.76 [0.55; 1.07]
< 5 87/249 117/276 0.8821 0.73 [0.51; 1.04]
Total 236/536 280/553 0.77 [0.61; 0.98]
Favour intervention
0.4
0.5
0.77
1
1.5
Favour control
OR= Odds-ratio
CI= confidence Interval

Table 1: Characteristics of patients in intervention and control groups.

Characteristics	**Intervention (n = 536)**	**Control (n = 553)**
No. of patients – Median (Q1-Q3)	11.5 (7.0-15.0)	11.5 (7.5-15.0)
Men – n (%)	296 (55.2)	302 (54.6)
Age – Mean (SD)	63.2 (16.6)	62.1 (16.7)
Patient autonomous – n (%)	91.2%	93.1%
No. of drugs at admission - Median (Q1-Q3)	5 (3-8)	5 (2-8)
No. of drugs at discharge - Median (Q1-Q3)	5 (3-8)	5 (2-8)
Discharge before 1 pm – n (%)	129 (24.1)	146 (26.5)

Table 2: Problems/dysfunctions observed during the 7 day after hospital discharge

Outcome	Intervention (n = 536)	Control (n = 553)	OR (95% CI)	ICC (95% CI)	
				Intervention	Control
At least one drug-related problem (ITT)	236 (44.0)	280 (50.6)	0.77 (0.61 to 0.98)	0.017 (0 to 0.129)	0.021 (0 to 0.137)
At least one prescription/dispensation problem	18 (3.4)	35 (6.3)	0.52 (0.29 to 0.93)	0.004 (0 to 0.567)	0 (0 to 0.443)
At least one patient error	211 (39.4)	242 (43.8)	0.84 (0.66 to 1.07)	0.015 (0 to 0.135)	0.015 (0 to 0.132)
At least one treatment missing	41 (7.6)	63 (11.4)	0.65 (0.43 to 0.99)	0.073 (0 to 0.475)	0 (0 to 0.326)
At least one drug-related problem (completers)	236/518 (45.6)	280/532 (52.6)	0.76 (0.60 to 0.97)	0.014 (0 to 0.125)	0.022 (0 to 0.140)

Data are n (%) unless indicated.
ITT: Intention to treat; OR: odds ratio; 95% CI: 95% confidence interval; ICC: intraclass correlation coefficient

Table 3: Number of patient errors in the intervention and control groups.

	Intervention (n = 536)	Control (n = 553)
No. of patients with at least one drug medication error after discharge	**211**	**242**
No. of errors per patient		
1	127 (60.2)	118 (48.8)
2	49 (23.2)	73 (30.2)
3	30 (14.2)	35 (14.5)
4	3 (1.4)	9 (3.7)
5	1 (0.5)	2 (0.8)
6	0	5 (2.0)
7	1 (0.5)	0
Total no. of errors	**339**	**445**

Data are n (%).

Table 4: Potential exposure to iatrogenic events by Bayliff scale scores [20] in the intervention and control groups.

Score	Intervention	Control
0, exposure to at least one drug-related problem with zero global impact	66 (12.3)	65 (11.8))
1, exposure to at least one drug-related problem with low global impact	142 (26.5)	167 (30.2)
2, exposure to at least one drug-related problem with global impact that may involve close supervision	28 (5.2)	45 (8.7)
3, exposure to at least one drug-related problem with global impact that may lead to death	0 (0)	2 (0.4)
Patients not exposed to a drug-related problem	300 (56.0)	273 (49.4)
Total	536	553

Data are n (%).