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Abstract
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Reference

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Omitted and unjustified medications in the discharge summary

A Perren, M Previsdomini, B Cerutti, D Soldini, D Donghi, C Marone

ABSTRACT

Background: Limited information exists in regard to drug omissions and unjustified medications in the hospital discharge summary (DS).

Objective: To evaluate the incidence and types of drug omissions and unjustified medications in the DS, and to assess their potential impact on patient health.

Methods: A prospective observational review of the DSs of all patients discharged from our Internal Medicine Department over a 3-month period. Data assessment was made by internists using a structured form.

Results: Of the 577 evaluated DSs, 66% contained at least one inconsistency accounting for a total of 1012 irregularities. There were 393 drug omissions affecting 251 patients, 32% of which were potentially harmful. Seventeen per cent of all medications (619/3691) were unjustified, affecting 318 patients. The unjustified medication was potentially harmful in 16% of cases, occurred significantly more frequent in women than in men (61% vs 50%; p = 0.008) and increased linearly with the number of drugs prescribed (p<0.001). Drug omission had a twofold higher potential to cause harm than unjustified medication.

Conclusions: Drug omissions and unjustified medications are frequent, and systemic changes are required to substantially reduce these inconsistencies.

The discharge summary (DS) is a summation of a patient’s hospital stay and an essential tool for relaying relevant information about a patient when that patient is discharged or transferred to another department or hospital. The list of all diagnoses and prescribed drugs is an important aspect of the DS, since subsequently involved physicians may base future actions upon it.

Prescription errors are frequent in both inpatient and outpatient treatment, with about 9% of these errors resulting in adverse drug events (ADE). However, the real rate of ADE is difficult to establish, as they are generally poorly documented in the medical record. Thirteen per cent of all patients experience an ADE within the first month following hospital discharge. The consequences of ADEs range from minor complaints to unnecessary treatment/hospitalisation or even disability or death. Furthermore, ADEs result in a considerable financial burden to society.

Few studies have analysed the occurrence of inaccurate documentation of medications on discharge. One of these also reported unjustified prescriptions, but to our knowledge no studies have examined the frequency or impact of omitted medications on patients. These inconsistencies or gaps in documentation may be critical for the patient, as forgotten or unnecessary pharmacological therapy may entail inaccurate prophylaxis or treatment of diseases, or provoke preventable ADEs.

We therefore reviewed the DSs of all patients discharged from our Internal Medicine Department over a 3-month period in order to: (1) ascertain the accuracy and consistency of prescription lists, (2) quantify omitted and unjustified medications, and (3) evaluate the possible outcomes of these errors on patients.

METHODS

Site and subjects

This prospective, observational study was performed in the General Internal Medicine Department of a regional teaching hospital in southern Switzerland. Our protocol and methods were approved by the hospital Ethics Committee. The DSs of consecutive patients discharged between December 2005 and February 2006 were eligible for inclusion; we excluded those who died during hospitalisation (no discharge medications).

Data sources and collection methods

The DSs were reviewed using a structured form, developed previously for this study. Following pilot testing during which four physicians analysed 20 DSs each, we refined the form and selected review criteria. Evaluation of each DS was carried out after it had been signed by the involved physicians and sent to the general practitioner. The data collection then proceeded in two steps (see data quality assurance); the initial step served for assessment of accuracy between reviewers, allowing for determination of κ-statistics. We assessed: (1) general patient information; (2) relevant diagnoses (ie, requiring a therapy during/after hospitalisation or requiring a change in medication; and (3) inconsistencies between relevant diagnoses and pharmaceutical therapy (omitted and unjustified medications; see definitions).

Data quality assurance

During the first 2 weeks of the project, two experienced, board-registered internists independently examined the same 40 summaries. Reliability across reviewers was subsequently assessed by a third physician and scored utilising a previous reported scale; agreement was determined to be nearly equivalent for the classification of unjustified medication (κ = 0.85), and substantial for the reviewers’ judgements of diagnoses implicating drug therapy and diagnoses with drug omission (κ = 0.74 and 0.76, respectively). Reliability was only moderate for the reviewers’ classification of defendable drug omission (κ = 0.39). Globally, the κ value was 0.81. During
the second step of the review process (10 weeks, 557 DSs), two internists jointly performed the analysis in order to improve agreement of low κ-values (defendable drug omission). Thus, differences between the reviewers’ judgements were resolved by discussion, and a consensus was achieved.

Definitions and classification

Omitted and unjustified medications were defined (table 1) in accordance to the classification system proposed by Dean et al. Assignment of drug omission was based on good clinical practice retrieved from textbooks, current recommendations or on-line literature. Differentiation between defendable and undefendable drug omission (table 1) was achieved by separate assessment. Medication errors were judged potentially harmful if the omission or unjustified prescription could have resulted in increased morbidity/mortality or in an ADE, respectively. As recommended by Morimoto et al., we classified the unjustified medications with potential for ADE into fatal/life-threatening, serious or significant.

Table 1 Definitions used for the collection, elaboration and presentation of data

<table>
<thead>
<tr>
<th>Definition</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Omitted medication</td>
<td>Unintentionally not prescribing a drug for a clinical condition for which medication is indicated; the judgement was based on common recommendations</td>
</tr>
<tr>
<td>Defendable omission</td>
<td>Intentional omission, that is, omission justified by a potential and documented contraindication (eg, atrial fibrillation without warfarin but notation of concurrent peptic ulcer disease)</td>
</tr>
<tr>
<td>Undefendable omission</td>
<td>Omission without documented contraindication</td>
</tr>
<tr>
<td>Potentially harmful omission</td>
<td>Omission presumably leading to increased mortality or morbidity (eg, ongoing pneumonia without antibiotics or arterial hypertension without antihypertensive drug)</td>
</tr>
<tr>
<td>Unjustified medication</td>
<td>Prescribing a drug for which there is no indication for that patient (not documented corresponding diagnosis)</td>
</tr>
<tr>
<td>Potentially harmful unjustified medication</td>
<td>A medication which, for a given patient, could have resulted in an ADE</td>
</tr>
<tr>
<td>Harmless unjustified medication</td>
<td>Largely prescribed and generally well-tolerated medication</td>
</tr>
</tbody>
</table>

RESULTS

Of 610 patients, 577 were eligible for our study; 33 were excluded because of intra-hospital death. They had (mean (SD)) 4.6 (2.4) relevant diagnoses (5.6 (2.0) diagnoses requiring medications) and a length of stay of 8.5 (8.6) days. Women in the study were older than male subjects (69.1 (17.3) vs 64.1 (16.6); p<0.001) and were prescribed more drugs (6.8 (4.2) vs 6.1 (3.5); p = 0.018). Cardiovascular disorders were the most prevalent discharge diagnoses.

Thirty-four per cent (198/577) of the DSs were error-free. In the remaining 66% (379/577), a total of 1012 inconsistencies were identified (table 2); 19% of them were considered potentially harmful. Patients had, on average, 0.7 drug omissions (0.5 defendable and 0.4 undefendable) and 1.1 unjustified medications.

We detected 393 drug omissions (table 2); among them, 58% were not defendable. In 126 cases (32%), the omission had a potential for harm. The types of diagnoses most frequently affected by this phenomenon were hypercholesterolaemia in 21 cases (15%), chronic renal failure and psychiatric diseases (14 cases each; 9%), haematological disorders and non-ischaemic cardiac diseases (11 cases each; 7%), diabetes mellitus and arterial hypertension (13 cases each; 8%) as well as coronary heart disease (eight cases; 5%).

Among 3691 prescriptions, 619 (17%) were unjustified drug prescriptions (table 2). Unjustified medication affected 50% of the men and 61% of the women (p = 0.008), and increased significantly (p<0.001) along with the number of prescribed drugs. Table 3 reports the drug classes most frequently involved in unjustified therapies. Sixteen per cent of these errors (100 cases concerning 73 patients) were potentially harmful. Unjustified medications with the potential for significant ADE occurred in 15%, and the most common drugs identified were acetylsalicylic acid (16 cases), neuroleptic agents (10), antiarrhythmics (7) and antibiotics (7). Two unjustified medications were classified as potentially life-threatening, and an additional five had the potential for a serious ADE (box 1).

COMMENT

This prospective study was performed in order to quantify the phenomenon of omitted and unjustified therapy with reference to the documented diagnoses, as well as to evaluate the possible consequences of these inaccuracies to the well-being of the patient.

Table 2 Incidence of inconsistencies in 577 examined discharge summaries and corresponding number of potentially harmful cases

<table>
<thead>
<tr>
<th>Inconsistency</th>
<th>Total</th>
<th>Severe cases</th>
<th>Patients concerned</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unjustified medications</td>
<td>619</td>
<td>100 (16)</td>
<td>318 (55)</td>
</tr>
<tr>
<td>Drug omissions</td>
<td>393</td>
<td>126 (32)</td>
<td>251 (44)</td>
</tr>
<tr>
<td>Defendable</td>
<td>165</td>
<td>10 (6)</td>
<td>117 (20)</td>
</tr>
<tr>
<td>Undefendable</td>
<td>228</td>
<td>116 (51)</td>
<td>162 (28)</td>
</tr>
<tr>
<td>Total</td>
<td>1012</td>
<td>226 (22)</td>
<td>379 (66)</td>
</tr>
</tbody>
</table>

Data shown are in absolute values (%).

Table 3 Drug classes implicated in unjustified medication: 619 cases from 318 patients

<table>
<thead>
<tr>
<th>Drug classes</th>
<th>Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Statins</td>
<td>20 (6)</td>
</tr>
<tr>
<td>Antiarrhythmics</td>
<td>12 (4)</td>
</tr>
<tr>
<td>Electrolytes</td>
<td>39 (12)</td>
</tr>
<tr>
<td>Statins</td>
<td>29 (9)</td>
</tr>
<tr>
<td>Acetylsalicylic acid</td>
<td>27 (8)</td>
</tr>
<tr>
<td>Vitamins</td>
<td>45 (14)</td>
</tr>
<tr>
<td>Laxatives</td>
<td>40 (13)</td>
</tr>
<tr>
<td>Neuroleptic agents</td>
<td>26 (8)</td>
</tr>
<tr>
<td>Antidepressants</td>
<td>23 (7)</td>
</tr>
<tr>
<td>Others*</td>
<td>166 (52)</td>
</tr>
</tbody>
</table>

Data shown are in absolute values (percentage of patients concerned).

*Drug classes concerning <7% of patients.
Box 1 Unjustified medication with a potential for life-threatening or serious adverse drug events (ADEs)

### Potential for life-threatening ADE (n = 2)
- An 83-year-old man with first-degree atrioventricular block and oral anticoagulation for intermittent atrial fibrillation is admitted for repeated syncopes. Without finding a reversible cause for the latter, he is discharged home with Atenolol 100 mg/day and Phenprocoumon.
- Potential ADE: syncopes (favoured by Atenolol) with risk of cerebral haemorrhage in case of head traumatism.
- A 77-year-old woman is admitted for reiterated lipotimia. There is no arterial hypertension or chronic heart failure. She has ongoing oral anticoagulation without any further indication. The diagnostic work up is inconclusive. Discharge with Digoxine, Valsartane and Phenprocoumon.
- Potential ADE: same as above (Valsartane instead of Atenolol).

### Potential for serious ADE (n = 5)
- A 62-year-old woman with oral anticoagulation for intermittent atrial fibrillation is discharged home with Phenprocoumon and acetylsalicylic acid, the latter without any obvious indication.
- Potential ADE: increased risk for gastro-duodenal haemorrhage (favoured by the synergistic action of the two drugs).
- A 55-year-old man with cerebral metastasis of a lung cancer is admitted for an epileptic attack. He will be discharged home with acetylsalicylic acid for intermittent atrial fibrillation.
- Potential ADE: increased risk for cerebral haemorrhage.
- A 69-year-old woman, anticoagulated with Phenprocoumon for 3 years after a deep venous thrombosis following total hip replacement is admitted for anaemia due to gastric ulcer. Therapy with a proton-pump inhibitor is started and anticoagulation temporarily stopped. She is discharged with Pantoprazole and Phenprocoumon, the latter without any further indication.
- Potential ADE: increased risk for gastro-duodenal haemorrhage.
- An 88-year-old woman with recurrent gastric ulcers is discharged with acetylsalicylic acid, although there is no clear indication for it.
- Potential ADE: increased risk for gastro-duodenal ulcer disease.
- An 86-year-old man is admitted for evaluation of chronic heart failure. He is treated with Amiodarone, for which there is no clear indication.
- Potential ADE: same as above (Valsartane instead of Atenolol).
- A 65-year-old woman, anticoagulated with Phenprocoumon for 3 years after a stroke is discharged with Pantoprazole and Phenprocoumon, the latter without any further indication.
- Potential ADE: increased risk for cerebral haemorrhage.

In 66% of all DSs, we found at least one of the studied inconsistencies. Of the reviewed DSs, 44% were affected by drug omission, leaving every seventh diagnosis at least partially without specific pharmacological treatment, and 55% presented at least one unjustified medication. In general one out of every six medications was without apparent indication, and women had significantly more unjustified medications than men, a fact that partially correlates with the higher number of medications prescribed to women. Even though undefendable drug omissions occurred nearly three times less frequently than unjustified medications, they were considered to have a twofold higher potential for harm.

In nearly half of all the examined DSs, we identified at least one untreated diagnosis which we believed required a specific therapy. In most of these cases, no justification for lack of treatment was provided in the DSs. Although it is plausible that, in some cases the treatment was not given according to good clinical judgement, a lack of documentation in itself may pose a problem. More startlingly, 32% of all omissions were considered potentially harmful. This is particularly true of omissions related to hypercholesterolaemia, as we only considered the cases for which a secondary prophylaxis with a lipid-lowering drug was clearly indicated. Adjusting for primary prophylaxis would have considerably increased the result.

Our error rates regarding unjustified medication are slightly higher than those reported elsewhere. However, literature suggests that the rate of ADE after discharge is similar to our findings (12.5% vs 12.6%). In our study we found only seven cases of unjustified medications that were considered to have the potential to cause serious (5) or life-threatening (2) ADEs. The drugs most often prescribed without proper explanation were proton-pump inhibitors (PPIs) and benzodiazepines. While there is some justification for the occasional use of benzodiazepines for frequently occurring symptoms such as insomnia or anxiety, we were surprised by the practice of overprescribing PPIs; improper use of these medications may not be viewed as harmful but clearly increases costs.

Our study is in agreement with previous research, generally confirming that DSs are deficient in all examined fields. What makes these papers and our own especially worrisome is that the accuracy of the data contained in the DSs is often taken for granted. Strategies to overcome this widespread inadequacy should rely on the evidenced causes: in our study we principally revealed inappropriate prescribing and inadequate documentation in the DSs with a reasonable interdependence of these two factors in case of unjustified omission/prescription. As reported elsewhere, medical errors are usually caused by either active failures (directly attributable to the actions of persons) or latent conditions (related to the design of systems). These two types of errors are not mutually exclusive; a variety of corrective actions should be implemented rather than just one punctual improvement. Both documentation of the DSs and prescribing of drugs could be improved by a better physician education, the standardisation of the summary’s format, senior medical staff editing and database created DS production. Overall, an unambiguous relationship between diagnoses and medications should be warranted. Although not proven, it seems conceivable that better instruction might lead to more reliable DSs: one survey reported the almost complete lack of guidance given to junior doctors in preparing them. The implementation of a prescribed dictation template has been shown to result in better and shorter DSs.
little emphasis is placed in the medical literature on senior staff editing of the DSs. Peer reviews by senior house officer will most probably improve the quality and accuracy of these reports under the condition that they are seriously executed and—for didactic purposes—adequately discussed with the junior doctors. However, this review process should be carried out in a timely fashion, as delays in receipt are strongly criticised by general practitioners. Database-generated DS production has been shown to be superior to other methods in the removal of systematic errors. In fact, by means of an Electronic Medical Record (EMR) that restructures and optimises the documents of the previous levels ensuring inter-operability of all documentation systems, the DSs could be suitably prepopulated. However, adoption of an electronic health information technology is still limited, perhaps as a consequence of end-user dissatisfaction.

Inpatient and outpatient physicians, are equally important if harder to systematise.

Between the potentially harmful inconsistencies to clinical outcomes. As an addition, although inter-reviewer reliability was high for unjustified medications, it was lower for defendable omissions, reducing the potential usefulness of that subset of data. Furthermore, during the second phase of data collection, a minimum of three internists rather than two probably have improved assessment when differences in interpretation arose. Third, the justification for drug omissions and medications without diagnosis might theoretically have been documented in other records than the DSs (eg, hospital medical charts). However, as these supplementary sources are never forwarded to the general practitioner, the appropriateness of the prescription list can be evaluated exclusively by the DSs, which by consequence should be edited according to proposed standards.

Finally, there is some uncertainty as to whether our results may be generalised to other institutions, as both our patients and reviewers were from a single hospital.

Our study emphasises that drug omissions and unjustified medications documented in the DSs occur with a high frequency. Although quite common, the reported inconsistencies were mostly potentially harmless. Future work should seek to understand the true impact of these errors, and whether newer initiatives (such as EMR, or medication-reconciliation efforts) can address these gaps in care.

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Competing interests: None.

Ethics approval: Ethics approval was obtained from the hospital (Ospedale Regionale Bellinzona e Valli) Ethics Committee (Comitato Etico Cantonale).

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