



# The effect of registry-based performance feedback via short text messages and traditional postal letters on prescribing parenteral steroids by general practitioners—A randomized controlled trial



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## ARTICLE INFO

### Article history:

Received 2 April 2015

Received in revised form 8 December 2015

Accepted 11 December 2015

### Keywords:

Performance feedback  
Short Text Message  
Prescription quality  
Drug rationalization  
Steroids

## ABSTRACT

**Background:** It is conjectured that providing feedback on physicians' prescribing behavior improves quality of drug prescriptions. However, the effectiveness of feedback provision and mode of feedback delivery is not well understood. The objective of this study was to assess and compare the effect of traditional paper letters (TPL) and short text message (STM) feedback on general practitioners' prescribing behavior of parenteral steroids (PSs).

**Methods:** In a single-blind randomized controlled trial, 906 general practitioners (GPs) having at least 10 monthly prescriptions were randomly recruited into two intervention and one control study arms with 1:1 allocation, stratified by percentage of prescriptions. The intervention was the provision of 3 feedback messages containing prescribing indices in TPL and STM (in the first two arms) versus the control arm (CG) with an interval of 3 months between these messages. We calculated the PS Defined Daily Dose (DDD) for every GP, every month, and compared between the 3 arms, before and after the interventions. The expected primary outcome was to reduce prescription of parenteral steroids by participants. The study was performed in the Kerman Social Security Organization in Iran.

**Results:** A total of 906 GPs were selected for the trial, but only 721 of them (TPL = 191, STM = 228, CG = 302) were recruited for the 1st feedback. The mean age of GPs was 44 and 59% of them were male. The prescribed parenteral steroid DDDs at baseline were similar (TPL = 121.62, STM = 127.49, CG = 115.68,  $P > 0.5$ ). At the end of the study, DDDs in the TPL and STM arms were similar (TPL = 104.38, STM = 101.90,  $P > 0.9$ ) but DDDs in each intervention arm was statistically significantly lower than in CG (CG = 156.17,  $P < 0.0001$ ). Being in TPL and STM arms resulted in 36.1 and 41.7 units of decrease in DDD respectively, compared to the control arm ( $P < 0.02$  and  $P < 0.005$ ) after the one-year duration of the study.

**Conclusion:** Feedback by TPLs and STMs on prescribing performance effectively reduced prescribing PSs by GPs. STM, being a cheap and fast tool, is potentially powerful and efficient for drug prescription rationalization.

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## 1. Introduction

Rational use of drugs is an important topic in medicine. Physicians' prescribing is one of the most frequent medical interventions affecting care outcomes and costs [1–3]. Several studies have

focused on physicians' prescribing behavior. Audit and feedback have the potential to improve prescribing behavior but studies showed they have little to moderate effect on improving professional practice [3–7]. According to a Cochrane Review, audit and feedback are defined as providing a summary of the clinical performance of healthcare provider(s) over a specified period of time [6]. Yet, evidence about the feedback effect is inconclusive due to contradictory results [8–11]. In addition, absolute effects of audit and feedback are likely to be larger when baseline adherence to

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recommended practice is low and intensity of audit and feedback is high [4,8].

Several reports in Iran have shown inappropriate prescribing and usage of corticosteroid drugs in the last decade. Corticosteroid prescribing was reported to have an incidence ranging between ten to fifty percent according to publications from different regions of Iran [5,12,13]. It increased nationwide from 12.7% in 1998 to 23% in 2007 [14], based on about 100 million prescriptions [14]. Among steroids, Dexamethasone Phosphate Ampule (8 mg/2 ml) was prescribed in roughly 12% of about 85 million prescriptions in Iranian patients. It has also been placed in the top ten prescribed drugs of any type in Iran over recent years. When not adequately monitored, usage of these drugs may lead to unsafe side effects. Both governmental and other health care organizations are putting much effort in improving the quality of prescriptions.

To ensure the appropriateness of prescription drug use, third party payers widely use retrospective drug utilization reviews [9]. Kerman is the largest province in Iran with around three million people living in its cities and villages. About half of these are covered by insurance via the Kerman Social Security Organization (SSO). More than 1800 general practitioners practice in the province and work together with the SSO. The SSO has a special office called Medical Documents Audit Office (MDAO). In MDAO, the Research and Scientific Council (RSC), run by official staff members, specialists and honorary members, focuses on checking the validity and correctness of diverse medical documents from all medical sections, e.g., medical labs, pharmacies, hospitals, private offices, governmental and private clinics. The main aim of MDAO and RSC is minimizing and preventing prescription drug violations and errors in medical documenting procedures.

MDAO members monitor the practice of physicians continuously. Important data about any individual prescription is recorded in a web based application when dispensed in pharmacy and all data are collected instantly into the comprehensive registry of SSO. In MDAO, the RSC members have weekly meetings for assessing the prescriptions based on reports extracted from the prescription registry. Based on these reports, the RSC director provides feedback letters about many prescribing indices. These letters may include comparison to other providers and advice or appreciation to the recipient. However, the number of weekly letters did not exceed 20, and there was no effort to evaluate their effect. The MDAO hypothesized that systematically sending feedback letters or face to face visits by inviting physicians to MDAO or even going to their offices are effective measures to change physicians' behavior. They hence sought to scientifically evaluate this hypothesis.

In this study we conducted a randomized controlled trial (RCT) aimed to assess whether registry based feedback to general practitioners (GPs) about their professional practice may affect their prescribing of parenteral steroids (PSS). We considered two types of feedback to improve prescribing behavior for PSS: by traditional postal letters (TPLs) and by short text messages (STMs). Also we compared the efficiency of STMs and TPLs. We hypothesized that STM could be a simple, rapid and effective way for providing actionable feedback in the form of quantitative and qualitative indices to the physicians, while respecting privacy and having low cost. The rationale is that these actions would improve their prescribing quality and hence also healthcare outcome.

## 2. Methods and materials

### 2.1. Overview and study timeline

In this randomized controlled trial, we evaluate the effect of providing performance feedback by traditional postal letters (TPLs) or mobile short text messages (STMs) compared to the control group

(CG) with the normal feedback as usual on physicians' behavior in prescribing PSS. The study timeline is shown in Fig. 1a.

### 2.2. Recruitment of participants

There were 1886 GPs practicing in Kerman province at the recruitment phase of the study. In order to find an assumed improvement of at least 10% absolute decrease after the intervention, the calculated sample size was 150 for each group, but due to foreseen limitations like inaccessibility to mobile numbers and correct postal addresses we doubled this number. The target population was those having 10 or more prescriptions for patients with SSO insurance coverage of their total prescriptions during the last month before the first feedback. Based on the percentage of the monthly prescriptions of PSS, they were stratified into four strata and then 906 of them (based on calculated sample size) were randomly selected and assigned to three equally sized study arms, TPL, STM and CG. To be divisible by 3, we added 6 cases to those four strata and finally had 302 in each study arm (See Fig. 1b).

### 2.3. Letter and STM templates

In MDAO, to communicate with the physicians, there was already a routine procedure of sending feedback letters once or twice a year about the prescribing indices like ratio of antibiotics, parenteral drugs, and systemic steroids. In the current study, we revised the template of routine letters for the TPL arm and added STMs as the second arm, to provide feedback specifically for prescribing parenteral steroids, and intensified the provision of feedback. First, we identified all of the items to be included in the letters/STMs. These items were: each physician's first and last name, physician's Medical Council Number (MCN), the place of practicing, the number of written prescriptions in predefined periods, the number of prescriptions with at least one PS, percentage of PS among all monthly prescriptions, and name and count of the top two prescribed PSS among all prescriptions. In the next step, we categorized the feedback into four different levels as proxy to quantify the quality of prescription behavior based on the ratio of PS prescribing indices from organizational protocols (not further reported in this paper).

All the TPLs and STMs were individualized for each participant according to the above items using the mail merge tool available in Microsoft Word® and Microsoft Excel® 2013. A message's length ranged from 80 to 120 words (average 110). Finally, all messages were double-checked by the first two authors, once in the MS-Excel® 2013 file and then in the MS-Word® template to prevent errors or missing phrases or unstructured text. All letters were posted by registered mail, and STMs were sent by the official short message server of MDAO.

### 2.4. Merging the required data

There were several tasks required for pre-processing the raw data files from the registry to prepare them for analysis. First, we extracted files in MS-Excel® format (file extension = .xls) as built-in reports of the "Tamin Comprehensive Medical Documentation System" (TCMDS). TCMDS is the integrated system in SSO to collect and retrieve the prescription data in the province. We had one .xls file for each PS in each month containing the data of monthly prescriptions. For each intervention, we extracted data of the three previous months to prepare the feedback messages. After the third intervention, we waited for another five months to be able to extract the last required data. Finally, 165 .xls files, containing individual records of more than 12 million recorded prescriptions, were all merged

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