Author's response to reviews

Title: Do decision support systems influence variation in prescription?

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Version: 4 Date: 21 January 2009

Dear editors,

We are pleased that the reviewer states that he would like to see the paper published. However, the reviewer still has some concerns that we would like to address. A point by point reaction to the comments is given below.

Yours sincerely, on behalf of all authors,
Judith D. de Jong

1) The paper still contains a number of redundant sentences. You make the same statement in more than one place. One example is the next to last sentence just above the results section on page 11.

Authors’ response:
We removed redundant sentences as much as possible.

2) My major concern still deals with the concept of variation. First, what do the authors mean by variation. Does it mean variation in prescribing to similar patients with the same diagnoses? Does it mean, for those MDS using DSS, a prescribing difference in what the guideline suggests? Do you mean inconsistency in prescribing? Does variation mean choosing a different drug out of the recommended set? I am still not sure what your results mean?

Authors’ response:
With variation we mean the fact that patients with the same medically relevant characteristics are not treated similarly. We added a sentence to the introduction: “Physicians will have to explain why there is variation. Meaning that they will have to explain why similar patients with the same diagnosis are treated differently.”

3) There are many legitimate reasons with prescribing different medications to different patients with the same disease – including personal preference, drug
availability, adverse reactions, drug interactions, or severity of symptoms. None of these reasons are even acknowledged in the paper. The word appropriate is never used. If a MD was 100% following the DSS recommendation, would the variation in prescribing still be present? How much variation is inherent in the guidelines themselves?

Authors’ response:

We agree, variation in prescribing in itself is not remarkable. Patients differ and this is, if differences are medically relevant, taken into account in the treatment they receive. Furthermore, patients can have different preferences concerning medical treatment that might influence medical decisions. However, these patient factors make up only part of the variation in medical treatment. The other part is caused by other, non-medical, factors. It is that part of variation that we are interested in and it is that part of variation that should be influenced. It is also that part of variation that seems difficult to change. Therefore, we were interested in examining whether DSS is an instrument of influencing medical behavior. DSS is introduced to increase evidence based prescribing.

4) The biggest problem is trying to understand what appropriate behavior on the part of the MDs is and what is not. Do you have any statistics on how often MD prescribing was inappropriate? In my opinion, you measure the wrong things. I would be interesting in understanding if the use of DSS results in more appropriate and correct prescribing. I see nothing in the paper that addresses this issue. In fact, that statistic would be useful for the MDs not using DSS. Your comment in the middle of page 4 suggests that you think cost-effective treatment is inappropriate.

Authors’ response:

That would definitely be interesting to study. It refers to the relation between variation in medical practice and quality. In this article we were primarily interested in increasing the theory on medical practice variation and on how medical behavior can be influenced. A next step might be to search for the relation with quality of care. Knowledge on the relation between medical practice variation and quality of care is necessary for developing policy that is aimed at limiting medical practice variation while increasing quality.

5) I have a problem in accepting your premise that evoked sets are bad or incorrect.

Most evoked sets are likely to result from experience and education. Even advertising contributes to awareness and appropriate prescribing. You include no data to support your statement “The evoked set should become less important or should even be avoided.” Part of the value of DSS would be altering the evoked sets. You also include no numbers or evidence for illegitimate variation in prescribing. What is the basis for inferring the variation in prescribing is illegitimate.

Authors’ response:
Evidence on medical practice variations implicates that there might be inappropriate servicing, waste of resources and maybe even harm to patients. It is therefore interesting to examine if medical behavior can be influenced in ways that could at the same time increase the quality of care. The problem with evoked sets is that physicians do not consider all treatment options and that the evoked set is difficult to change. Change of the evoked set is necessary when prescribing should be evidence based and scientific knowledge is increasing or changing. In modern health care, appropriate prescribing of new and expensive drugs is a big challenge as the number of available drugs is increasing, making choice more complex. DSS can help physicians making (evidence based) choices. In the article we wrote: “Prescription of drugs has great importance in modern health care; the development of new and effective drugs has contributed to the increase of the health status in the OECD countries [8]. In modern health care, appropriate prescribing of new and expensive drugs is a big challenge as the number of available drugs is increasing, making choice more complex.” “In order to change the drugs physicians prescribe, the evoked set of physicians has to be changed, or its role in decision making should be changed. The evoked set should become less important or should even be avoided when a change in prescribing behavior is necessary. That is where DSSs come in. Instead of relying on the evoked set of drugs for physicians to choose one in a specific situation, the DSS proposes one or more drugs of preference, based on characteristics of the patient and professional guidelines. The introduction of DSSs is expected to result in more rational prescribing and less unexplained and illegitimate variation in prescribing between physicians [12, 14, 15, 16].”

6) A short description of the system would be useful. You do refer the reader to another paper, but a short descriptive comment would be helpful. Does the DSS provide a list of appropriate drugs, given the diagnoses? How difficult is it for the MD to select a drug outside of the recommended set?

Authors’ response:
The DDS gives an advice on what to prescribe. The advice is based on guidelines developed by the Dutch College of General Practitioners (see question 8). Physicians can choose a drug from the advice, dependent on the guideline this could include more than one drug, or choose another drug. The only difficulty with choosing a drug that is not advised is that physicians have to think of it. In the article we wrote “In this article we will study a DSS which is used by GPs in the Netherlands as a tool to give advice on prescription when the diagnosis is given. The DSS proposes a prescription, given the diagnosis of the patient, taking into account age, sex and co-morbidity. As mentioned before, four features are associated with the ability to improve clinical practice, it is part of the workflow, support is delivered at the time and location of decision making, actionable recommendations are provided and it is computer based [6]. The DSS for GPs in the Netherlands meets these four features [25]. In the advice patient characteristics, like age, sex, co-morbidities and other drugs prescribed are taken into account. The DSS is integrated in the Electronic Medical Systems (EMS) of the GPs. The advice given is derived from professional-guidelines. These
guidelines are developed by the Dutch College of General Practitioners (NHG) and are widely accepted [26]. Wolters et al. [27] studied the use of the DSS by GPs in the Netherlands. They found that having access to the DSS increased from 20% in 1999 to 71% of GPs in 2001, and daily use from 11% to 40%.”

7) On page 7, you refer to a Table 0; table 0 does not exist.

Authors’ response:
We removed this sentence.

8) I question whether the two hypotheses defined on page 7 are the most appropriate criteria for this study. Characteristics of the DSS and just the fact it is used is likely to influence compliance, unless the MDs thought the guidelines were badly flawed? Nothing in the paper discusses whether the patients benefit from the MD use of DSS and prescribing guidelines.

Authors’ response:
The focus of this article is on variation in prescribing in relation to DSS. We choose DSSs in the Netherlands because they are based on professional guidelines. These guidelines are developed by the Dutch College of General Practitioners (NHG), they have developed and published guidelines since 1989 and are widely accepted. The guidelines were developed in order to improve the quality of physicians’ practice and can be used to support them in their daily practice, protect them from mistakes and legitimize medical behavior. The guidelines relate to diagnostics, treatment, referral, and prescribing. The NHG aims to achieve evidence-based practical guidelines that are widely accepted. In order to increase acceptance, the target group is involved in their development.

The question whether patients benefit should be addressed in an evaluation of the guidelines. It would require a different study including patient outcomes data. In the article we wrote “This article does not question whether or not the professional guidelines, incorporated in the DSS, are adequate and whether or not prescribing quality is better for the users of the DSS. These are different questions from the one discussed in this paper and would require a guideline by guideline analysis of evidence and data. In our article we only tested whether or not over a large domain of diagnoses, there is indeed more conformity to the advice of the DSS among daily users than among non-users.”

9) The comment at the bottom of page 7 that MDs “can more easily prescribe according to professional guidelines, even without having to make a conscious choice” is scary. Obviously the guidelines can never take all factors into consideration, and the human input will always be critical. The guidelines are just that – guidelines. MDs should always make a conscious choice as to the treatment.

Authors’ response:
We agree with the reviewer that to provide good quality care, guidelines should not be followed blindly, but should enhance clinical judgment. We showed that DSSs can influence behavior of physicians and are therefore an instrument to
improve prescribing behavior. It is difficult for physicians to keep up with the latest scientific evidence on prescribing. In the article we wrote: “According to Grol and Grimshaw [1]: “One of the most consistent findings in research of health services is the gap between evidence and practice. Results of studies in the USA and the Netherlands suggest that about 30-40% of patients do not receive care according to present scientific evidence, and about 20-25% of care provided is not needed or is potentially harmful”. These are causes of unwanted variations in health service provision. Introducing evidence and clinical guidelines into daily practice is problematic.” DSSs can be useful tools in medical practice; they can assist physicians in making evidence based decisions and can therefore improve the quality of care.

10) On page 9, the two groups are referred to as the two extremes. Recommend groups be used throughout rather than extremes. Under the Model section, the word “nested” might be replaced with included.

Authors’ response:
Under the Model section, we explain our multilevel model. In explaining multilevel models the word “nested” is common.

11) On page 11, it does appear that using the DSS improves compliance with recommended treatment by 14%. I think this is a positive finding, and is one of the important findings of the study.

Authors’ response:
There is indeed a difference of 14% between both groups. We state that: “…GPs using a DSS are prescribing in accordance with the advice given in the DSS more than GPs not using a DSS. This implicates that compliance with guidelines improves when the DSS is used.”

12) The conclusion section is weak. What are your recommendations? Did patients who were treated by MDs using DSS have better outcomes? What do you intend for your readers to have learned as a result of reading this paper?

Authors’ response:
We studied a DSS which is used by GPs in the Netherlands as a tool to give advice on prescription when the, ICPC-coded, diagnosis is given. The DSS proposes a prescription, given the diagnosis of the patient, taking into account age, sex and co-morbidity.

The use of DSSs was hypothesized to decrease variation between physicians, because physicians make use of the same cognitive framework. DSSs intervene in physicians’ daily routine. They are used to facilitate for instance the use of professional guidelines. The study demonstrated that physicians using a DSS are prescribing conform the advice given in the DSS more than physicians not using a DSS. This, however, did not mean that variation was lower; variation was the same for physicians using and for physicians not using a DSS. This is probably related to the fact that the DSS we studied advises several different drugs or recommends a stepwise treatment starting with one type of drug and changing
that type of drug later on when necessary. Implications of the study are that DSSs can be used to implement guidelines, but that it should not be expected that variation is limited. The study contributed to the theory underlying medical practice variation. This knowledge can be used in order to improve the quality of care.

OTHER POINTS
Ethics/ consent
We included in the Methods section: “The study was carried out in keeping with Dutch legislation on privacy. Compliance with privacy regulations was approved by the Dutch Data Protection Authority. According to Dutch legislation, neither obtaining informed consent nor approval by a medical ethics committee was obligatory for this study.”