A generic system for critiquing physicians' prescriptions: usability, satisfaction and lessons learnt

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Introduction

- Clinical guidelines contain useful recommendations for physicians
- But physicians do not have the time to read during consultation

=> Decision Support Systems (DSS)

- The ASTI project: a DSS for the treatment of chronic diseases (type 2 diabetes, hypertension)
- The ASTI critiquing module: a DSS that automatically raises an alert when the physician prescribe a drug treatment that is not conform with the recommendations
  - Integrated into Electronic Health Records (éO généraliste)
ASTI critiquing module
Introduction

- ASTI DSS aims at being generic enough to cover all chronic diseases

**Objectives:** evaluate the usability and satisfaction with the ASTI critiquing module on a newly implemented guideline concerning dyslipaemia, and discuss the lessons learnt and the difficulties encountered when building a generic DSS
Methods: implementation of a new guideline

- The clinical guideline for **dyslipaemia** from the French health authority (HAS)

- Model of the guideline's recommendations
  - *e.g.* For patient with hypercholesterolemia without comorbidity, one should prescribe non-drug treatments as first-line treatment, and statine as second-line treatment.

- Automatically translated into critiquing rules
  - *e.g.* If patient has hypercholesterolemia and no comorbidity, and physician has prescribed fibrate, then raise alert “**fibrate are not recommended, please consider non-drug treatment or statine**”.

- 28 decision criteria, 15 drug treatments, 17 recommendations => 73 critiquing rules
Methods:
usability evaluation

• Evaluated in laboratory by 33 voluntary GPs using éO, briefly introduced in the use of the critiquing module

• Based on simulated cases derived from real patients, selected by experts in order to cover the various recommendations

• For each simulated cases, the GP has to:
  - Code the patient's data in the electronic health record
  - Prescribe the prescription he would normally perform
  - Prescribe a prescription he considers as non-conform to the recommendations

• For each of the two prescriptions, the GP was asked to indicate:
  - Whether an alert was raised by the critiquing module, or not
  - Whether the alert (or the absence of alert) was justified
  - Whether the text of the alert message was adequate
Methods:
satisfaction evaluation

• Performed just after the GPs used ASTI during usability evaluation
• Seven sentences, such as “The ASTI critiquing module is easy to use”
• For each sentence, GPs have to choose one response out of four:
  - Strong agreement
  - Weak agreement
  - Weak disagreement
  - Strong disagreement
• Followed by a focus group
Results: usability evaluation

- Specificity 94 ± 1.4%, Sensitivity 84 ± 2.1%
- For 84 ± 2.1% of the alert messages, GPs considered the explanations and treatment proposals as appropriate
- In 80 ± 2.3% of cases, the system raised an appropriate alert or was silent with good reason
Results:
satisfaction evaluation

<table>
<thead>
<tr>
<th>Question</th>
<th>Agreement</th>
<th>Disagreement</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Strong</td>
<td>Weak</td>
</tr>
<tr>
<td>I would like to receive automatic criticisms or suggestions relating to my prescriptions</td>
<td>39%</td>
<td>58</td>
</tr>
<tr>
<td>The ASTI critiquing module is easy to use</td>
<td>3</td>
<td>88</td>
</tr>
<tr>
<td>The response time of the ASTI critiquing module is satisfactory</td>
<td>73</td>
<td>24</td>
</tr>
<tr>
<td>The ASTI critiquing module is ergonomic</td>
<td>18</td>
<td>73</td>
</tr>
<tr>
<td>The ASTI critiquing module can be effectively integrated into my daily practice</td>
<td>28</td>
<td>66</td>
</tr>
<tr>
<td>The ASTI critiquing module interferes little with my relationship with the patient</td>
<td>0</td>
<td>27</td>
</tr>
<tr>
<td>Extending the ASTI critiquing module to other guidelines would be a major step forward</td>
<td>33</td>
<td>64</td>
</tr>
</tbody>
</table>

- **Interference with the patient relationship:** The focus group showed that the problem is related to the time needed to enter patient data during the first consultation
The ASTI critiquing module was generic enough to support dyslipaemia in addition to hypertension and type 2 diabetes

Lesson 1: it is possible to design generic DSS
- Despite the heterogeneity of guidelines' strategies
  - “Waterfall strategy” e.g. type 2 diabetes
  - “Star strategy” e.g. dyslipaemia
- A few DSS achieved a high genericity: Asbru,...

Lesson 2: physicians are interested in receiving automatic alerts during the consultation
- They tend to prefer automatic “background” DSS over “on-demand” DSS
Discussion

- **Lesson 3: alert messages should not be limited to clinical guidelines excerpts**
  - The recommendations in clinical guidelines do not explain why the physician's decision is not the best one

- **Lesson 4: an automatic DSS requires integration with EHR**
  - For obtaining patient data without asking them to GP

- Integration with multiple EHR from various vendors
  - Integration with a second EHR, ALMA Pro
  - Difficulties were organisational rather than scientific

- Semantic interoperability was not a big problem in this situation
  - Limited number of decision criteria (28 here)
Discussion

• **Difficulty 1: coding the patient's clinical conditions**
  - Guideline's decision criteria are not always found in existing terminologies, *e.g.*:
    • family antecedent of myocardial infarction in the father before the age of 55
  - Physicians often use free text for clinical conditions in EHR
  - They might understand the interest of systematically coding important diseases like type 2 diabetes
  - But they are unlikely to systematically code complex criteria!

• Coding drug prescriptions and lab test results is easier
  - Limited number of clearly defined drugs and tests
  - Drug databases are available and used for prescribing by at least some physicians
Difficulty 2: clinical guidelines do not always provide clear recommendations

“Food for thought”, which is not sufficient for critiquing

Guidelines usually do not provide a recommendation for all patients

In some situations, two CG may be contradictory
- e.g. the French CG for hypertension and for dyslipaemia give different formulas for determining cardiovascular risk level

Formalizing CG during their development may help to resolve these problems
Conclusion

• The ASTI critiquing module, initially developed for hypertension and type 2 diabetes
  - obtain good results for implementing a clinical guideline related to dyslipaemia
  - interests the physicians

• Perspectives for solving the problem of coding clinical conditions
  - graphical user interfaces or automated text processing tools helping physicians with data entry
  - interactive alert messages, allowing the physician to code clinical conditions in response to an alert
  - graphical presentation rather than full execution of the clinical guideline