
**REMINDER-BASED OR ON-DEMAND DECISION SUPPORT
SYSTEMS : A PRELIMINARY STUDY IN PRIMARY CARE
WITH THE MANAGEMENT OF HYPERTENSION**

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**ONE SIZE DOES NOT FIT ALL : A PRELIMINARY STUDY IN
PRIMARY CARE WITH THE MANAGEMENT OF
HYPERTENSION**

Computer-based guideline implementation systems

- Considerable effort for the development and dissemination of CPGs
 - low levels of physicians' compliance with guidelines
- Computer-based DSSs have proved to be effective in improving physicians' performance
- Systematic reviews give mixed results
 - success is not guaranteed
 - some studies failed to show any effect of reminder-based computer interventions
 - “negative comments about the DSS significantly outweighed the positive or neutral comments” (Rousseau *et al.* ^a)

^a*BMJ*, Vol 326 8 february 2003

Are there successful design factors ?

- Published studies fail to describe systems in sufficient details
 - success of proactive approaches based on automatically triggered reminders
 - “on-demand” information sources more positively viewed than alerts (Rousseau *et al.*)
- Working hypothesis
 - one size does not fit all
 - deaveraging guideline implementation models used in DSSs
 - fit physicians’ needs of clinical information
- Design factors are not absolute factors of success
 - proactive approaches based on reminders are successful design factors for supporting the management of simple patient conditions
 - on-demand approaches based on physicians’ initiative to search for information are successful design factors for supporting the management of complex patient conditions

Recommendations for uncomplicated hypertension (1/2)

- Simple patient case ($adult < 60$) \wedge ($uncomplicated_HT$) \wedge ($no_contraindication$)
 1. **Initial therapy should be monotherapy with a thiazide diuretic, preferably at a low dose, a β -adrenergic antagonist or an angiotensin-converting-enzyme (ACE) inhibitor (grade A).** *If the response is inadequate or there are adverse effects, substitute another drug from the initial drug therapy group (grade D).*
 2. *Combination therapy, either with a thiazide diuretic and a β -adrenergic antagonist or with a thiazide diuretic and an ACE inhibitor, should be used if there is only a partial response to monotherapy (grade A).*
 3. *If blood pressure is still not controlled, or there are adverse effects, try other classes of antihypertensive drugs (calcium-channel blockers, angiotensin II receptor antagonists, alpha-adrenergic antagonists or centrally acting agents) either as monotherapy or in combination (grade D). Consider possible reasons for a poor response to therapy, such as noncompliance, secondary causes of hypertension or interactions between prescribed treatment and diet or other drugs (grade D).*
- Straightforward recommendation :
 $monotherapy \wedge ((TD_low_dose) \vee (\beta - adrenergic_antagonist) \vee (ACE_in))$

Recommendations for uncomplicated hypertension (2/2)

- Complex patient case :

(adult < 60) \wedge (uncomplicated_HT) \wedge (no_contraindication)

\wedge (response_to_initial_therapy_is_inadequate)

\wedge (substitution_of_another_drug_from_the_initial_drug_therapy_group_is_inadequate)

\wedge (combination_therapy_with_thiazide_diuretic_and_β_adrenergic_antagonist_is_inadequate)

\wedge (combination_therapy_with_thiazide_diuretic_and_ACE_inhibitor_is_inadequate)

1. *Initial therapy should be monotherapy with a thiazide diuretic, preferably at a low dose, a β-adrenergic antagonist or an angiotensin-converting-enzyme (ACE) inhibitor (grade A). If the response is inadequate or there are adverse effects, substitute another drug from the initial drug therapy group (grade D).*
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Management of simple patient cases

- Physicians' attitude
 - they think they have no difficulty to establish the right therapy
 - they don't need decision support
 - they may be wrong when they think they know
- Computer-based decision support should be reminder-based to alert physicians when prescription does not comply with guidelines
 - data needed to characterize simple conditions involve
 - only few data
 - currently available
 - relevant triggering of reminders
 - provide recommendations with the right level of specificity

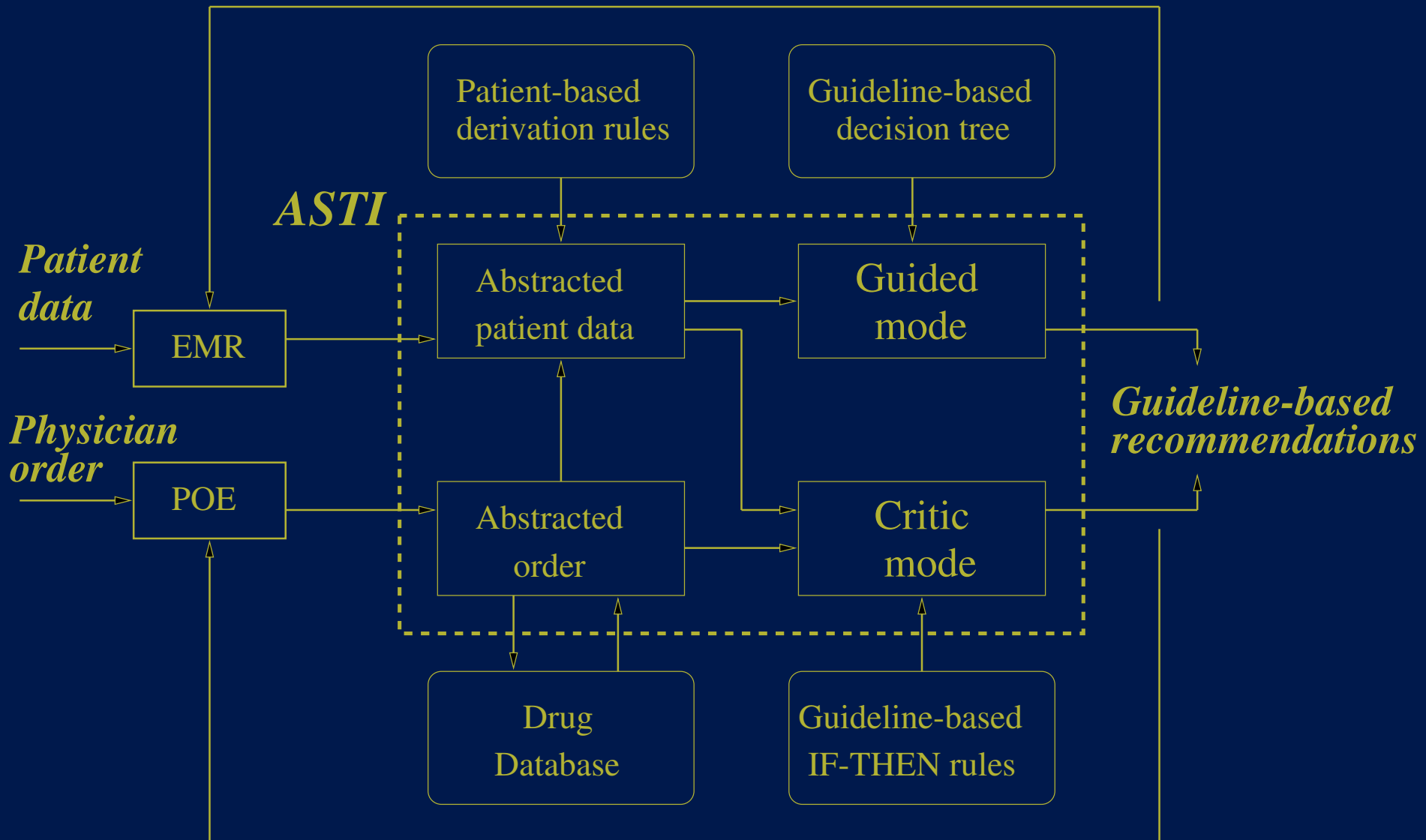
Management of complex patient cases

- Physicians' attitude
 - they recognize they have difficulties to establish the recommended therapy
 - they need decision support
 - they look for information including the advice of colleagues or the consultation of online resources
- Computer-based decision support should be “on-demand”
 - complex conditions rely on decisions and actions that lead to dependent changes in patient states over time
 - data needed to characterise the whole picture of a patient state involve a lot of current and previous data
 - formally matching individual patient characteristics to the computerized version of guidelines may lead to inappropriate recommendations
 - documentary paradigm of decision support (proposed with OncoDoc) is an improved version of “on-demand” approaches that may answer the difficulty

ASTI, a mixed guideline-based DSS for therapeutic prescribing in primary care

- Critic mode
 - automatically works from the input of a physician's prescription
 - evaluates the prescription by comparison with guideline recommendations
 - alerts about the recommended therapy if necessary
 - displays the corresponding part of narrative guidelines as explanations
- Guided mode
 - starts on the physician's initiative
 - no initial prescription is necessary
 - hypertextual navigation through the knowledge base (decision tree)
 - dynamic physician-controlled instantiation of patient parameters
 - takes the physician to the best recommended patient-specific therapy

Architecture of the system



Preliminary evaluation of ASTI

- 15 actual clinical cases
- 10 general practitioners (GPs)
- 2 phases : without and with ASTI (before/after design)
 - without ASTI : prescriptions established from narrative description of clinical cases
 - with ASTI : 3 periods
 - ASTI critic mode (5 clinical cases)
 - ASTI guided mode (5 clinical cases)
 - ASTI free use (5 clinical cases)
- choice of operating modality is always active (physicians control the triggering of both critic and guided modes)
- analysis of the 50 prescriptions established with ASTI free use

Complexity score of clinical cases

- Clinical complexity
 - Number of diseases or risk factors associated to hypertension
 - $CC_{(\text{uncomplicated hypertension})} = 0$, $CC_{(\text{hypertension+diabetes})} = 1$, etc.
- Therapeutic complexity
 - Number of treatments previously administered in terms of therapeutic classes
 - $TC_{(\text{never treated})} = 0$, $TC_{(\text{ACE inhibitors})} = 1$, $TC_{(\text{ACE inhibitors,ACE inhibitors+thiazide})} = 2$, etc.
- Complexity score
 - $CS = CC + TC$
- Qualitative complexity levels

<i>Low</i>	<i>Medium</i>	<i>High</i>
$CS < 2$	$CS = 2$	$CS > 2$

Results

<i>Complexity level</i>	<i># of decisions</i>	<i>Critic mode</i>	<i>Guided mode</i>	<i>None</i>
Low	10 (100%)	6 (60%)	2 (20%)	2 (20%)

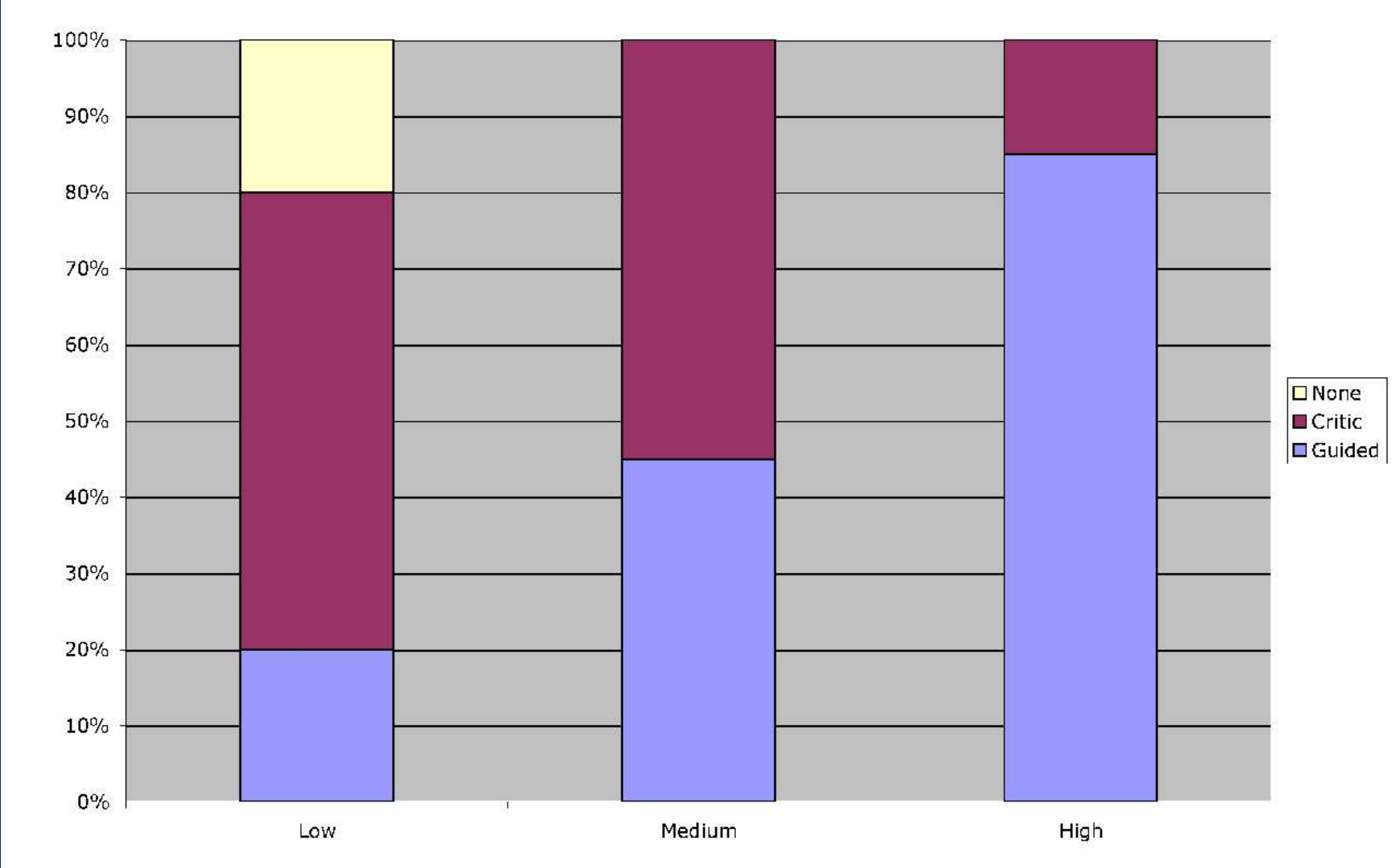
Results

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Medium	20 (100%)	11 (55%)	9 (45%)	0 (0%)

Results

<i>Complexity level</i>	<i># of decisions</i>	<i>Critic mode</i>	<i>Guided mode</i>	<i>None</i>
<i>Low</i>	10 (100%)	6 (60%)	2 (20%)	2 (20%)
<i>Medium</i>	20 (100%)	11 (55%)	9 (45%)	0 (0%)
High	20 (100%)	3 (15%)	17 (85%)	0 (0%)
<i>All</i>	50 (100%)	20 (40%)	28 (56%)	2 (4%)

Results



Conclusions

- Not designed to evaluate the effectiveness of ASTI to change physicians' behaviour
 - *in-vitro* study
 - non randomized design
 - small numbers of clinical cases and GPs
 - perspectives : to evaluate the impact of ASTI on a large randomized before-after study (hypertension and diabetes)
- Designed to test
 - a single mode of implementing guidelines in DSSs
 - does not fit all clinical situations
 - does not fit all physicians' needs of decision support
 - the complementarity of automatically triggered alerts and on-demand paradigms to answer physicians' demands of clinical information (either conscious or not).