Are Residents' Decisions Influenced More by a Decision Aid or a Specialist's Opinion? A Randomized Controlled Trial

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BACKGROUND: Physicians are reluctant to use decision aids despite their ability to improve care. A potential reason may be that physicians do not believe decision aid advice.

OBJECTIVE: To determine whether internal medicine residents lend more credence to contradictory decision aid or human advice.

DESIGN: Randomized controlled trial. Residents read a scenario of a patient with community-acquired pneumonia and were asked whether they would admit the patient to the intensive care unit or the floor. Residents were randomized to receive contrary advice from either a referenced decision aid or an anonymous pulmonologist. They were then asked, in light of this new information, where they would admit the patient.

PARTICIPANTS: One hundred eight internal medicine residents.

MEASUREMENTS: The percentage of residents who changed their admission location and the change in confidence in the decision.

MAIN RESULTS: Residents were more likely to change their original admission location (OR 2.3, 95% CI 1.04 to 5.1, $P=0.04$) and to reduce their confidence in the decision (adjusted difference between means -12.9% , 95% CI -3.0% to -22.8% , $P=0.011$) in response to the referenced decision aid than to the anonymous pulmonologist. Confidence in their decision was more likely to change if they initially chose to admit the patient to the floor.

CONCLUSIONS: In a hypothetical case of community-acquired pneumonia, physicians were influenced more by contrary advice from a referenced decision aid than an

anonymous specialist. Whether this holds for advice from a respected specialist or in actual practice remains to be studied.

KEY WORDS: decision aid; judgment; choice behavior; internship and residency.

J Gen Intern Med 25(4):316–20

DOI: 10.1007/s11606-010-1251-y

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Physicians are reluctant to use medical decision aids, despite their documented ability to improve the quality of patient care^{1–6}. For example, Garg's systematic review¹ found that clinical decision support systems improved performance in 64% of the 97 studies identified. Yet physicians do not use decision aids. Only 4% of physicians in a recent national survey of ambulatory physicians had access to a fully functional electronic health record that offered rudimentary decision support (medication warnings, out-of-range laboratory indications and guideline-based reminders).⁷ Even physicians exposed to a helpful aid in a randomized controlled trial and who experienced its benefits did not continue to use it after the trial⁸. Factors relating to this underutilization are commonly classified as pertaining to the clinical problem, patient factors, provider traits, system characteristics and the health-care environment⁹. We have been exploring issues affecting the psychological perspective of the provider on the use of decision aids^{10,11}. Perhaps physicians simply do not put as much credence in the recommendation of a decision aid compared with the advice of a colleague. Dreiseitl and Binder¹² found that dermatologists changed their decisions in only a quarter of the cases when a decision aid contradicted them. To ensure conflict between the physicians and the decision aid, their system purposefully gave an incorrect diagnosis in about a third of the cases presented.

To further test the hypothesis that physicians may not believe decision aids as much as they believe colleagues, in the present study we gave internal medicine resident physicians a case scenario of a patient with pneumonia and asked them whether they would admit the patient to the floor or the intensive care unit (ICU). We then presented them with contradictory advice from either a referenced decision aid or an anonymous pulmonologist and again asked, in light of the new advice, to which location they would admit the patient. No subterfuge was needed in this scenario—two validated decision aids made different recommendations based on the same data.

Presented at the 31st Annual Meeting of the Society for Medical Decision Making, October 18–21, 2009, and the 30th Annual Conference of the Society for Judgment and Decision Making, November 21–23, 2009.

Support: The Program in Decision, Risk, and Management Science at the National Science Foundation (NSF).

Electronic supplementary material The online version of this article (doi:10.1007/s11606-010-1251-y) contains supplementary material, which is available to authorized users.

Received December 2, 2008

Revised May 27, 2009

Accepted December 21, 2009

Published online January 30, 2010

METHODS

Research Question

Do physicians, when confronted with contradictory advice, lend more credence to a referenced decision aid or an anonymous specialist?

Subjects

One hundred eight residents in The Ohio State University (OSU) Medical Center's internal medicine residency program (preliminary, categorical, combined Medicine/Pediatrics and chief residents) were recruited in November 2007. Subjects were recruited through a written letter and an oral request at a conference. They were e-mailed occasional reminders if they did not complete the survey and a thank-you note when they completed the survey. To augment our enrollment we used a convenience sample of internal medicine residents from MetroHealth Medical Center, recruited by one of their chief residents with a single solicitation in June 2008. They completed the survey in July. All participants were paid \$50.

Procedure

The study was conducted electronically over the World Wide Web. Each resident was presented the case of community-acquired pneumonia (CAP) and asked if the patient should be admitted to the floor or the ICU (figure in online-only Appendix). The case was carefully constructed such that the two major decision aids for CAP offer different recommendations. The PORT (Pneumonia Patient Outcomes Research Team) Score¹³ suggests a floor admission, while the CURB-65 (Confusion, Urea, Respiratory Rate, Blood Pressure and age 65 or older)¹⁴ suggests an ICU admission. After reading the case subjects were asked:

- (a) Do you feel that Ms. J should be admitted to the intensive care unit (ICU) or to the floor? (Please choose one option.)
- (b) Please indicate your confidence in your decision by selecting a level below from 50% (no confidence) to 100% (complete confidence).

After answering these two questions, subjects were then presented with contradictory advice. For example, if they decided to admit the patient to the floor, they were presented with advice to admit the patient to the ICU. Each subject was randomized by computer to get this contradictory advice from either (a) a referenced decision aid (DA) or (b) an anonymous pulmonologist.

An example of the advice from the decision aid is "A severity score has been developed for community acquired pneumonia (Fine MJ, Auble TE, Yealy DM, et al., "A Prediction Rule to Identify Low-Risk Patients with Community-Acquired Pneumonia." *N Engl J Med.* 1997 Jan 23;336 (4):243–50). The community-acquired severity score classifies this case as Class IV, for which hospital admission is advised, but ICU admission is not necessary."

An example of the advice from the anonymous pulmonologist is, "As you are getting ready to admit the patient, you run into a pulmonologist and decide to ask their advice. After you present the patient, you ask the pulmonologist whether Ms. J should be admitted to the ICU or to the floor. The pulmonologist suggests a floor admission."

After reading the contradictory advice, the subjects were again asked whether the patient should be admitted to the intensive care unit (ICU) or to the floor, and for their confidence in that decision.

Analysis

The primary endpoint was the comparison of the number of subjects that switched their decision about the admission location (e.g., floor to ICU) when given the decision aid or pulmonologist's advice (randomized), stratified by their initial decision (self-selected, i.e., floor or ICU). We used a logistic regression model to check the independent statistical significance of the change in the admission location with respect to (1) the source of the advice (randomized) and (2) the initial admission location (self-selected). We used a full model with all interaction terms among the initial admission location, source of advice and residency program to determine if any of the interaction terms were statistically significant.

The secondary endpoint was the change in confidence in the decision. Confidence change was calculated as the change in confidence between the final and initial confidence indicated by the subjects, adjusted for changes of location. The change in confidence was analyzed with an analysis of variance (ANOVA) model including the source of advice (randomized) and the initial admission location (self-selected). A full model, with all the interaction terms, was also tested.

All statistical tests were two-sided with $\alpha=0.05$. The analysis was done with R version 2.9.2¹⁵.

Sample Size

We would need 65 subjects in each group (130 total subjects) to have 90% power to detect a difference in the proportion of residents who changed their admission location from 5% to 25%, with a two-sided α of 0.05. We had enough incentive funds to survey 110 subjects; therefore, that was our target enrollment with 84% power to find the hypothesized difference.

Institutional Review and Funding

The study was approved by The Ohio State Institutional Review Board.

RESULTS

Subjects

Of the 108 residents solicited from OSU, 85 responded, 2 with incomplete data (77% response rate). Twenty-five of 99 solicited residents from MetroHealth completed the survey. Thus, there was a total of 108 participants. The subjects were mostly categorical internal medicine (71) and combined internal medicine-pediatrics (24) residents. Fifty-two subjects were randomized to receive contrary advice from the decision aid and 56 from the pulmonologist (Table 1).

Location Change

Overall 48 of the 108 subjects (44.4%, 95% CI: 34.9–54.3%) changed the admission location in response to the contrary

Table 1. Subject Demographics

	Source of contradictory advice	
	Specialist (n=56)	Decision aid (n=52)
Year of training		
1	14	18
2	21	8
3	16	18
4	5	7
5	0	1
Training program		
Internal medicine (preliminary)	5	4
Internal medicine (categorical)	34	37
Internal medicine–pediatrics	14	10
Other	3	1
Site		
MetroHealth	16	9
The Ohio State University	40	43

advice (Table 2). When the resident received advice from the decision aid, the resident changed the admission location in 53.8% of the cases (95% CI: 39.5–67.8%). When the resident received advice from the pulmonologist, the resident changed the admission location in only 35.7% of the cases (95% CI: 23.3–49.6%). The unadjusted relative risk for a subject to change their admission location was 1.51, indicating that subjects were approximately 50% more likely to change their decisions in response to advice from the decision aid than from a specialist. The unadjusted odds ratio (OR) was 2.10. The adjusted OR from the logistic regression model including the initial admission location (the pre-specified primary endpoint) was 2.27 (95% CI: 1.04–5.08; $P=0.04$), indicating that the odds of changing the admission location if given contradictory advice from the decision aid were over two times the odds of changing the decision if given advice from the pulmonologist. In the full logistic regression model with all the interaction terms included, none of the terms (the source of advice, the initial admission and the interaction terms) showed significance. Significance of the interaction terms would have suggested that the effect of one of the terms (e.g., the source of advice) had different effects depending on the value of the other term (e.g., the initial admission location). There was no association between location change and either initial confidence ($P=0.50$) or year of training ($P=0.33$).

Confidence Change

In the ANOVA model exploring changes in confidence, both the subjects' initial admission location and the source of advice were statistically significant. Respondents were more likely to change their confidence in their initial decision towards the

contrary advice after hearing the decision aid's recommendation (unadjusted mean, -36.0% ; $SD=29.7$) than the pulmonologist's recommendation (unadjusted mean, -23.0% ; $SD=22.9$; adjusted difference between means, -12.9% ; 95% CI -3.0% to -22.8% , $P=0.011$), irrespective of their initial admission decision. Second, residents were more likely to lower their confidence in their initial decision if their initial admission location was to the floor (unadjusted mean, -32.8% ; $SD=26.0$) than to the ICU (unadjusted mean, -22.2% ; $SD=28.1$; adjusted difference between means -12.0% , 95% CI -1.5% to -22.4% , $P=0.025$). In the full model including all the interaction terms, the main effects of source of advice and initial admission location were significant ($P\leq 0.025$), whereas the program and the interaction terms were not statistically significant ($P>0.13$).

DISCUSSION

Contradictory advice from a referenced decision aid was more effective in influencing resident physician decisions than contradictory advice from an anonymous specialist, as evidenced by the change in admission location and the change in confidence. Interpretation of this result is complicated by the asymmetry in the description of the alternatives. In designing the study we elected to provide the minimal necessary description of the decision aid, which we felt to be identifying information (i.e., its name and literature citation), and its recommendation (e.g., "The community-acquired severity score classifies this case as Class IV, for which hospital admission is advised, but ICU admission is not necessary."). We purposefully did not repeat data used by the aid (e.g., respiratory rate) or the aid's test characteristics (e.g., positive predictive value). We kept the human opinion anonymous since locally respected leaders can affect adherence¹⁶. Instead, we vested the human in the mantle of a specialist. Thus, the description of the decision aid, although minimal, was more elaborate than that of the human, which could have affected the results. It is unclear if using an anonymous decision aid or a locally respected human would have produced the same results.

This result is unexpected given the general reluctance of physicians to utilize decision aids¹⁷. One might have surmised that physicians do not find decision aid advice credible. Yet the physicians in our study were more likely to be influenced by the decision aid. In the clinic physicians might still eschew decision aids because of other problems, such as patient, provider, system and health-care environment factors. By design, we did not examine whether the resident would use a decision aid, the residents' opinions of decision aids or the residents' attitudes about physicians who use decision aids. In a previous study, Arkes et al.¹⁰ showed that patients and

Table 2. Location Change Results

	Initial admission to the ICU		Initial admission to the floor	
	Switched	Did not switch	Switched	Did not switch
Decision aid	9 (9/20=45%)	11 (11/20=55%)	19 (19/32=59%)	13 (13/32=41%)
Specialist	4 (4/16=25%)	12 (12/16=75%)	16 (16/40=40%)	24 (24/40=60%)

ICU = Intensive care unit. Odds ratio for the source of advice (decision aid vs. pulmonologist) 2.3, 95% CI 1.0 to 5.1, $P=0.04$. Odds ratio for the initial admission location (ICU vs. floor) 0.5, 95% CI 0.2 to 1.2, $P=0.15$

medical students derogate physicians who use decision aids. This suggests that physician attitudes about using decision aids and their actions when given (unsolicited) decision aid recommendations diverge.

Only about half of the physicians in training were willing to change their decisions based on advice from a more qualified source. We cannot conclude that the physicians in our study who maintained their initial hypothesis were mistakenly preserving an incorrect one. First a decision to admit to either the ICU or the floor was justified by one of the two reputable decision aids on this topic. Second, assessing the accuracy of management decisions, such as the decision to admit to ICU, is more difficult than assessing the accuracy of diagnostic decisions, as the criterion for accuracy is less definitive. Thus, management decisions may not have an indisputably correct course of action that should resist the contrary guidance of a decision aid or colleague.

Although our research focuses on a management decision, parallels drawn from the literature on diagnostic decisions may inform this discussion. Berner and colleagues¹⁸ found that residents often maintained an unquestionably incorrect diagnosis despite a decision support system's suggestion of the correct diagnosis. They suggested that their findings may have been due to overconfidence on the part of the residents. In support of Berner and colleagues' suggestion, Dreiseitl and Binder¹² found in a study of dermatologists' decision making that there was a negative correlation between a physician's confidence and their propensity to change their decisions. These studies suggest that if a physician is highly confident in his or her diagnosis irrespective of its conformity to or the existence of any gold standard, then any recommendation, regardless of the source, may not be influential. Overconfidence is particularly troubling because confidence is often not highly correlated with accuracy^{19,20}. As a result, a physician who uses his or her confidence as a basis for disregarding advice may be making an ill-advised decision.

There are a few limitations to our study. The major limitation is the asymmetry between the description of the decision aid and the specialist's advice. Absent from written scenarios is the potential social cost of defying a colleague with whom one might have subsequent interactions. Thus, these results may not generalize to cases where the specialist is highly respected or there is a large social cost to defying the advice of the specialist.

Another potential limitation is our use of hypothetical decisions. Hypothetical decisions may not map on to real decisions; however, using a hypothetical scenario allowed us to create a case where two credible decision aids provided contradictory advice. Also, our use of residents may limit our ability to generalize these results to more experienced physicians. However, approximately one third of the residents were at the end of their final year of training, and pneumonia is a common clinical problem that most house-staff become familiar with early in their first year. This suggests that the results might also pertain to more experienced clinicians.

Future studies can attempt to tease out the salient characteristics of the decision aid or human opinion that enhance their credibility.

CONCLUSIONS

Physicians in training treating a scenario depicting community-acquired pneumonia were more influenced by the recommenda-

tion of a referenced decision aid than the recommendation of an anonymous specialist, each of which provided advice that conflicted with the initial admission decision. This suggests that greater adherence to human over decision aid advice is not a cause of decision aid non-use. Future research should further evaluate physician attitudes to decision aid use, the response to respected specialists and how justifications might influence the physician's adherence to the decision aids, as well as confirming and extending the results to other clinical scenarios and physician populations.

Acknowledgements: We are grateful to Drs. Paneez Khoury and Kevin Patel for their help in recruiting participants and to Kenny Olson for his theoretical contribution. The project was supported by a grant from the Program in Decision, Risk, and Management Science at the National Science Foundation (NSF), grant number SES-0326468. The authors report no conflicts of interest.

Conflict of Interest: None disclosed.

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