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## Continued Learning in Supporting Value-Based Decision Making

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Physicians, researchers, and policymakers aspire to improve the value of healthcare, with reduced overall costs of care and improved outcomes. An important component of increasing healthcare costs in the United States is the rising cost of prescription medications, accounting for an estimated 17% of all spending in healthcare services.<sup>1</sup> One potentially modifiable driver of low-value prescribing is poor awareness of medication cost.<sup>2</sup> While displaying price to the ordering physician has reduced laboratory order volume and associated testing costs,<sup>3,4</sup> applying cost transparency to medication ordering has produced variable results, perhaps reflecting conceptual differences in decision making regarding diagnosis and treatment.<sup>4-6</sup>

In this issue of the *Journal of Hospital Medicine*, Conway et al.<sup>7</sup> performed a retrospective analysis applying interrupted times series models to measure the impact of passive cost display on the ordering frequency of 9 high-cost intravenous (IV) or inhaled medications that were identified as likely overused. For 7 of the IV medications, lower-cost oral alternatives were available; 2 study medications had no clear therapeutic alternatives. It was expected that lower-cost oral alternatives would have a concomitant increase in ordering rate as the order rate of the study medications decreased (eg, oral linezolid use would increase as IV linezolid use decreased). Order rate was the primary outcome, reported each week as treatment orders per 10,000 patient days, and was compared for both the pre- and postimplementation time periods. The particular methodology of segmented regressions allowed the research team to control for preintervention trends in medication ordering, as well as to analyze both immediate and delayed effects of the cost-display intervention. The research team framed the cost display as a passive approach. The intervention displayed average wholesale cost data and lower-cost oral alternatives on the ordering screen, which did not significantly reduce the ordering rate. Over the course of the study, outside influences led to 2 more active approaches to higher-cost medications, and Conway et al. wisely measured their effect as well. Specifically, the IV pantoprazole ordering rate decreased after restrictions secondary to a national medication shortage, and the oral voriconazole ordering rate decreased following an oncology order set change from oral voriconazole to oral posaconazole. These ordering-rate decreases were not temporally related to the implementation of the cost display intervention.

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It is important to note several limitations of this study, some of which the authors discuss in the manuscript. Because 2 of the medications studied (eculizumab and calcitonin) do not have direct therapeutic alternatives, it is not surprising that price display alone would have no effect. The ordering providers who received this cost information had a more complex decision to make than they would in a scenario with a lower-cost alternative, essentially requiring them to ask “Does this patient need this class of medications at all?” rather than simply, “Is a lower-cost alternative appropriate?” Similarly, choosing medication alternatives that would require different routes of administration (ie, IV and oral) may have limited the effectiveness of a price intervention, given that factors such as illness severity also may influence the decision between IV and oral agents. Thus, the lack of an effect for the price display intervention for these specific medications may not be generalizable to all other medication decisions. Additionally, this manuscript offers limited data on the context in which the intervention was implemented and what adaptations, if any, were made based on early findings. The results may have varied greatly based on the visual design and how the cost display was presented within the electronic medical record. The wider organizational context may also have affected the intervention’s impact. A cost-display intervention appearing in isolation could understandably have a different impact, compared with an intervention within the context of a broader cost/value curriculum directed at house staff and faculty.

In summary, Conway et al. found that just displaying cost data did little to change prescribing patterns, but that more active approaches were quite efficacious. So where does this leave value-minded hospitalists looking to reduce overuse? Relatedly, what are the next steps for research and improvement science? We think there are 3 key strategic areas on which to focus. First, behavioral economics offers a critically important middle ground between the passive approaches studied here and more heavy-handed approaches that may limit provider autonomy, such as restricting drug use at the formulary.<sup>8</sup> An improved choice architecture that presents the preferred higher-value option as the default selection may result in improved adoption of the high-value choice while also preserving provider autonomy and expertise required when clinical circumstances make the higher-cost drug the better choice.<sup>9,10</sup> The second consideration is to minimize ethical tensions between cost displays that discourage use and a provider’s belief that a treatment is beneficial. Using available ethical frameworks for high-value care that engage both patient and societal concerns may help us choose and design interventions with more successful outcomes.<sup>11</sup> Finally, research has shown that providers have poor knowledge of both cost and the relative benefits and harms of treatments and testing.<sup>12</sup> Thus, the third opportunity for improvement is to provide appropriate clinical information (ie, relative therapeutic equivalency or adverse effects in alternative therapies) to support decision making at the point of order entry. Encouraging data already exists regarding how drug facts boxes can help patients understand benefits and side effects.<sup>13</sup> A similar approach may aid physicians and may prove an easier task than improving patient understanding, given physicians’ substantial existing knowledge. These strategies may help guide providers to make a more informed value determination and obviate some ethical concerns related to clinical decisions based on cost alone. Despite their negative results, Conway et al.<sup>7</sup> provided additional evidence that influencing complex decision making is not easy. However, we believe that continuing research into the factors

that lead to successful value interventions has incredible potential for supporting high-value decision making in the future.

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