Patient engagement through shared decision-making (SDM) is increasingly seen as a key component for patient safety, patient satisfaction, and quality of care. Current SDM models do not adequately account for medical and environmental contexts, which may influence medical decisions in the hospital. We identified leading SDM models and reviews to inductively construct a novel SDM model appropriate for the inpatient setting. A team of medicine and pediatric hospitalists reviewed the literature to integrate core SDM concepts and processes and iteratively constructed a synthesized draft model. We then solicited broad SDM expert feedback on the draft model for validation and further refinement. The SDM 3 Circle Model identifies 3 core categories of variables that dynamically interact within an “environmental frame.” The resulting Venn diagram includes overlapping circles for (1) patient/family, (2) provider/team, and (3) medical context. The environmental frame includes all external, contextual factors that may influence any of the 3 circles. Existing multistep SDM process models were then rearticulated and contextualized to illustrate how a shared decision might be made. The SDM 3 Circle Model accounts for important environmental and contextual characteristics that vary across settings. The visual emphasis generated by each “circle” and by the environmental frame direct attention to often overlooked interactive forces and has the potential to more precisely define, promote, and improve SDM. This model provides a framework to develop interventions to improve quality and patient safety through SDM and patient engagement for hospitalists. Journal of Hospital Medicine 2017;12:1001-1008. Published online first October 18, 2017. © 2017 Society of Hospital Medicine
tematic reviews of SDM models have attempted to identify common elements, language, and processes.\textsuperscript{2,25,26}

Although published SDM models demonstrate varying emphases—eg, evidence-based medicine,\textsuperscript{2} provider-patient relationships,\textsuperscript{3} interprofessional practices and environmental influences,\textsuperscript{24} or patient contextual factors—\textsuperscript{7,8}—none specifically address hospitalization and the issues that impact decisions as a patients’ clinical condition and care needs change. Studies of SDM in hospitalized patients have relied on either general theoretical frameworks for patient engagement or conceptual models developed specifically for outpatient care.\textsuperscript{16,27,28} Although the key tenets of SDM are relevant across clinical settings, hospitalization introduces a number of unique and highly relevant factors that may influence all aspects of the SDM process. Table 1 provides several examples from the authors of how inpatient and outpatient SDM may differ.

This study reviews leading SDM models to construct a more environmentally and contextually sensitive model that attends to environmental and systems context, provider/team factors, patient factors, and disease/medical variables is highly relevant in any setting where SDM occurs.

**METHODS**

We constructed a model that is appropriate for SDM across the care continuum through the following 3-part, iterative group process: (1) a comprehensive literature review of existing SDM models, (2) synthesis and inductive development of a new draft model, and (3) modification of the new model using feedback from SDM experts.

**Narrative Literature Review**

We performed a structured, comprehensive literature review\textsuperscript{29} to compare and contrast existing SDM models and frameworks. Leading models and key concepts were first identified using 2 systematic reviews\textsuperscript{25,26} and a comprehensive review.\textsuperscript{2} In order to extend the search to 2016 and include any overlooked articles, a PubMed search was performed using the terms “shared decision-making” or “medical decision-making” AND “model” or “theory” or “framework” for...
Laidley TL, Levinson W. 1999. Landmark studies that described a framework for shared decision-making based on a physician-patient partnership in the decision-making process. The process included sharing of information including treatment preferences and agreement on a decision.

Elwyn G, Frosch D, Thomson R, et al. 2012. Authors describe an SDM model for treatment decision in primary care. The model focuses on patient’s active involvement in the process, exploration of expectations and options, teach back and follow up. Three key steps include choice talk, option talk and decision talk.

Elwyn G, Lloyd A, May C, et al. 2014. Authors describe the collaborative deliberation model of decision-making based on 5 communicative efforts of constructive interpersonal engagement, recognition of alternative actions, comparative learning, preference construction and elicitation and preference integration. The model could apply to different types of communication in healthcare including motivational interviewing, SDM, goal setting and action planning.

Epstein RM, Grantling RE. 2013. Review of the SDM in the context of complex and uncertain situations and the role of preference, relationship and the concept of shared attentional focus. Authors also include the role of information technology, healthcare teams and health systems in decision-making.

Hoffmann TC, Montoli VM, Del Mar C. 2014. Authors highlight the interconnection between evidence-based medicine (EBM) and SDM - each is necessary in combination to improve patient care. Calls for SDM and EBM to be included in practice guidelines and future research.

Holzmueller CG, Wu AW, Pronovost PJ. 2012. Framework for physicians to determine patient involvement in decision-making and includes patient-related factors. The framework further delineates situations when patients should decide and when physicians should decide.

Kon, AA. 2010. Commentary describes SDM as a continuum with one end being patient driven and the opposite physician driven with a middle being both as equal partners. Different decisions and situations call for varying degrees of patient and physician input in the process.

Légaré F, Stacey D, Pouliot S, et al. 2011. The model describes an interprofessional approach to SDM. Each professional works either in collaboration with other providers or sequentially with the patient. The model includes the role of environment in SDM and includes clarification of values and feasibility of options.

Makoul G, Clayman ML. 2006. Literature review of SDM models and propose a model based on 9 essential elements. The elements include: define/explain problem, present options, discuss pros/cons, patient preferences/values, patient ability, physician recommendations, checking for understandings, make/defer decision and arrange follow up. Authors also include ideal elements and general qualities that promote SDM.

Moumjid N, Gafni A, Bremond A, et al. 2007. Explores if there is a clear definition of SDM, whether authors provide a definition of SDM when they use the term, and whether they are consistent in doing so.

Mueller-Engelmann M, Keller H, Donner-Banzhoff N, Krones T. 2013. This paper investigates current social norms regarding the appropriateness of SDM in different situations. The authors find that SDM is considered most important in severe illness and chronic condition. SDM was also indicated as necessary when there is more than 1 therapeutic option without one being clearly superior.

Rapley T. 2008. Describes a framework for how to conceptualize decision-making as an evolving series of encounters over time interacting with several different individuals, knowledge acquisitions and technologies.

Stacey D, Légaré F, Pouliot S, et al. 2010. Comprehensive theory analysis of SDM conceptual models to determine how relevant they are to interprofessional collaboration in clinical practice. They concluded that most SDM models did not utilize an interprofessional approach. This highlights the need for a model that is more inclusive of other health professionals.

Torke AM, Petronio S, Sachs GA, et al. 2012. This article uses literature from medicine, communication studies, and medical ethics to build a conceptual model of the role of communication in decision-making. Information processing and relationship building were found to be 2 major elements of interpersonal communication.

Towel A, Godolphin W. 2006. Model is developed from proposed physician and patient competencies for learning and teaching SDM. The competencies include developing a physician-patient partnership, explicit discussion around patient preference and readiness, role of the patient in the decision-making process, developing an action plan and resolving conflict.

Weiner SJ, Schwartz A, Sharma G, et al. 2013. Observational study using a protocol of medical chart audits and audiotaped provider encounters at internal medicine clinics at 2 VA hospitals to evaluate for contextualizing care (also called patient-centered decision-making), providers were scored on their ability to incorporate contextual factors such as barriers to treatment into care planning. The developed protocol could be used to assess physician performance around contextualized decision-making.

Whitney SN. 2003. This article proposes a model of medical decisions based on importance and clarity. It also identifies 3 types of decisions that are less well suited to a collaborative decision: major decisions with low certainty, minor decisions that have high certainty, and major decisions that have high certainty when patients and physicians disagree.
complete descriptions of a conceptual model or framework. Additional publications suggested by experts (eg, perspective pieces or terminology summaries) were also reviewed.

Model Development and Expert Review

An electronic SDM reference library and annotated bibliography of the selected articles (Table 2) was created to guide the synthesis of SDM models and highlight needed revisions for hospital medicine. In a process similar to Legaré,24 a group of 8 pediatric and adult medicine hospitalists, a palliative care physician, a cognitive psychologist, a biostatistician, and 3 medical trainees reviewed the selected SDM publications and models30 and independently created their own adapted inpatient SDM models. Through an iterative, consensus-building group process, each model was discussed to select key elements or features to be integrated into a synthesized model. This model was guided by principles of social ecological theory, which emphasizes the role of the individual as influenced by and interactive with systems and the environment.31

The draft model and a standardized set of questions (supplementary Appendix A) were then emailed to all first and last authors of the reviewed studies (Table 2). Expert responses were compiled, coded, and analyzed independently by 3 coauthors. Inductive coding techniques and a constant comparative approach were used to code the qualitative data.32 Preliminary findings were shared among the 3 reviewers and discussed until consensus was reached on emerging themes and implications for the new SDM model and multistep SDM pathway. A master list of suggested revisions was shared with the larger authorship team and the model was refined accordingly.

RESULTS

Two previously published systematic reviews25,26 identified 494 articles, 161 conceptual definitions of SDM, and over 30 separate key concepts. The additional PubMed search garnered 1957 publications (with many overlapping from the systematic reviews). A manual search of the systematic reviews and PubMed abstracts identified 16 unique and complete decision-making models for further review. Hand searches of their citations yielded an additional 6 models for a total of 22 models.3,4,13,23,33-51 The majority of excluded articles described specific decision aids and small clinical studies, focused on only one step of the decision-making process, or were not otherwise relevant. The first (SR) and senior authors (JS) reviewed the 22 models for SDM relevance, generalizability, and content saturation, yielding a final sample of 9 SDM models. A subsequent Google Scholar search did not identify any new SDM models but 2 SDM theory papers15,16 and 2 commentaries35,54 were selected based on influence (ie, number of citations), expert recommendation, or coverage of a novel aspect of SDM. A total of 15 studies (9 SDM models + 6 reviews; Table 2) were used by our development team to create a synthesized SDM model. A 10th SDM model15 and 3 additional descriptive and normative studies8,56,57 were later added based on expert feedback and incorporated into our final SDM 3 Circle Model.

Expert Feedback

Twenty-one of 27 (78%) SDM expert authors responded to our e-mail request for feedback. The majority (62%) agreed with the basic elements of the model, including the environmental frame and the 3 domains. Some respondents viewed SDM as strictly a process between patient and provider independent of the disease, leading to refinement of the medical context category. Several experts emphasized the importance of SDM “set-up,” which includes the elicitation of patient preferences in how decisions are made and the extent of patient and/or surrogate involvement.

Several respondents identified time constraints (N = 2), acuity of disease (N = 3), and presence of multiple teams (N = 6) to be the significant factors distinguishing inpatient from outpatient SDM. For some experts, “team” referred to the interprofessional care team, whereas others referred to it as the collaboration among attending physicians and trainees. Experts noted that although the intensity and frequency of inpatient interactions could promote SDM, higher patient acuity and the urgency of decisions could negatively influence SDM and/or the patient’s ability to participate. Similarly, the presence of other team members may either impede or promote SDM by either contributing to miscommunication or bringing well-trained SDM experts to the bedside. Financial impact on patients and resource constraints were also noted as relevant. All of these elements have been incorporated into the final SDM 3 Circle Model and multistep SDM Pathway (Supplemental Appendix A and B).

The SDM 3 Circle Model

The SDM 3 Circle Model comprises 3 categories of SDM barriers and facilitators that intersect within the environmental frame of an inpatient ward or other setting: (1) provider/team, (2) patient/family, and (3) medical context. A Venn diagram visually represents the conceptual overlaps and distinctions among these categories that are all affected by the environment in which they occur (Supplemental Appendix A).

The patient/family circle mirrors prior SDM models that address the role of patient preferences in making decisions,3,4,12 with the explicit addition of the roles of families and surrogates as either decision-makers or influencers. This circle includes personal characteristics, such as cognitions (eg, beliefs, attitudes), emotions (eg, anxiety, hope), behaviors (eg, adherence, assertiveness), illness history (ie, subjective experience and understanding of one’s own medical history), and related social features (eg, culture, education, literacy, social supports).

Patient factors are not static over time or context. They occur within an environmental setting and are likely to be influenced by concurrent provider and medical variables (the second and third circles). Disease exacerbation leading to hospitalization or transfer to a subacute facility could dramati-
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The type of disease or symptom presentation (circle 3—medical context) may further influence patient factors due to stigma, perceived vulnerability, or assumed prognosis.

The provider/team circle includes both individual and team-based factors falling into similar categories as the patient/family domain, such as cognitions, behavior, and social features; however, these factors include both personal (e.g., the provider’s personal history, values, and beliefs) and professional (e.g., past medical training, decision-making style, past experiences treating a disease) characteristics. Decisions may involve an interprofessional team representing a broad range of personal characteristics and professionals. Decisions and decision-making processes may change over time as team composition changes, as level of provider expertise varies, or as environmental, patient, or disease/illness factors influence providers and teams.

Medical context includes factors related to the disease and the potential ways to evaluate or manage it. Examples of disease factors include acuity, symptoms, course, and prognosis. Most obviously, disease factors will influence the content of risk-benefit discussions but may also affect the SDM process through disease stigma or cultural assumptions about etiology. Disease evaluation factors include the psychometrics of diagnostic screens, invasive and noninvasive testing, or a range of different preventive or therapeutic interventions. Treatment variables include the available options, costs, and risk of complications. Medical context variables evolve as evidence-based medicine and biomedical knowledge increase and new treatment options emerge.

Each of the 3 circles operates within the same environmental frame, such as an inpatient medicine ward, which itself operates within a hospital and the broader healthcare system. This frame exerts overt and subtle influences on providers, patients, and even the medical context. Features of the environmental frame include culture (e.g., values, preferences, social norms), university versus community setting,
The SDM 3 Circle Model captures “setting” in both the broader environmental frame and within the provider/team category of variables. The frame also captures health system and broader community variables that may influence the practicality of some medical decisions. Within this essential frame, all 3 categories of patient, provider, and medical context are included as part of the SDM process. A better understanding of their interplay may be of great value for clinicians, researchers, administrators, and policy makers who wish to further study and promote SDM. Both the SDM 3 Circle Model and its accompanying pathway (Figures 1 and 2) highlight opportunities for intervention and research, and may drive quality improvement initiatives to improve clinical outcomes.

Limitations
We did not perform a new systematic review, potentially omitting lesser-known publications. We mitigated this risk by using recent systematic reviews, searching multiple databases, hand searching citation lists, and making inquiries to SDM experts. Our selection of models used as a foundation for the synthesized model was based on consensus, which included an element of subjective, clinical judgment. Our SDM expert sample was small and limited to authors of the papers we reviewed, potentially restricting the range of viewpoints received. Lastly, the SDM 3 Circle Model highlights key concept areas rather than all possible factors that influence SDM.

CONCLUSIONS
We present a peer-reviewed, literature-based SDM model capable of accounting for the unique circumstances and challenges of SDM in the hospital. The SDM 3 Circle Model identifies the primary categories of variables thought to influence SDM, places them in a shared environmental frame, and visually represents their interactive nature. A multistep representation of the SDM process further illustrates how the unique features and challenges of hospitalization might exert influence at various points as patients and providers reach a shared decision. As the interrelationships of patient and provider/team, medical context, and the environmental frame in which they occur are better understood, more effective and targeted interventions to promote SDM can be developed and evaluated.

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