Keeping Pace with Emerging Good Practices: Interview with Deborah Marshall, PhD

Value & Outcomes Spotlight had the opportunity to catch-up with **Deborah Marshall, PhD**, Chair of the ISPOR Dynamic Simulation Modeling Emerging Good Practices Task Force and Associate Professor, University of Calgary; Calgary, Alberta, Canada, to discuss the two recent ISPOR Task Force reports, "Applying Dynamic Simulation Modeling Methods in Health Care Delivery Research – The SIMULATE Checklist: Report of the ISPOR Simulation Modeling Emerging Good Practices Task Force" **and** "Selecting a Dynamic Simulation Modeling Method for Health Care Delivery Research Report of the ISPOR Simulation Modeling Emerging Good Practices Task Force." Our conversation on this intriguing subject of dynamic simulation modeling follows.

David Thompson: How did you get interested in this topic? It is relatively new.

Deborah Marshall: Dynamic simulation modeling methods (DSMs) have actually been available for quite a while. System dynamics and discrete-event simulation were developed in the 1950s and agent-based modeling in the 1970s. Most DSM applications started out in industrial, engineering and business environments. Health and health care applications have come more recently. These applications have shown us that for some of the complex problems we need to address in health care and service delivery, traditional health technology assessment and related modeling methods, such as decision trees and Markov models, are not always suitable.

Even though there is substantial literature regarding health care applications, DSM is not well known. We thought that an ISPOR Task Force could help identify the types of health care and service delivery problems that are suitable for DSMs. Providing guidance on how to select the right methods for the specific problem and scope would help close the knowledge gap, provide potential solutions and increase awareness of these methods.

We find that these modeling approaches also fit well with the challenges that many leaders are emphasizing in health care delivery science. For instance, patient-centered care is becoming a more important aspect of providing evidence-based medicine. DSMs provide opportunities to model patient-level problems through very complex situations. Furthermore, DSMs are consistent with the Triple Aim Framework that former Administrator of the Centers for Medicare and Medicaid Services (CMS), Donald Berwick, has emphasized to provide high-quality, low-cost care to improve population health. This aim is inherently complex since it relies on the interdependent tasks of many entities in health care. DSMs provide an interface to model these interdependencies and actually evaluate interventions that could contribute to the Triple Aim.

Thompson: Who will benefit from these ISPOR emerging good practice guidelines?

Marshall: The reports are targeted to a diverse audience including researchers and decision makers. We wanted them to be available for people who are new to dynamic simulation modeling and interested in learning more about its applications in health care delivery. Importantly, we hope that students training in outcomes research will consider these methods to bring a broad systems lens to studies of health care delivery. Hopefully they will develop innovative new applications and methodological advancement of DSMs in their work as ISPOR continues to grow.

Thompson: How are these good practice guidelines valuable to researchers and decision makers?

Marshall: The first report encourages researchers and decision makers to reflect on the specific problem they are addressing and to use the SIMULATE (System, Interactions, Multilevel, Understanding, Loops, Agents, Time, Emergence) checklist to establish whether using DSMs, particularly system dynamics, discrete-event simulation or agent-based modelling, is appropriate. This, I believe, is quite helpful since we usually hear the question about how to decide whether these methods are appropriate or when to use them. >

In addition, this report offers readers the main characteristics of these methods. It explains what differentiates them from other methods typically used in health technology assessment applications. This is valuable and core to reflection on what the problem is and the questions that they are looking to answer.

The second report dives into the differentiating details between the three methods, compares them and identifies criteria for selecting the most suitable method to address a problem. This is useful for researchers and decision makers that want to know more details, both conceptual and technical, regarding each of the methods to decide which one to use.

Thompson: What kinds of problems will researchers and decision makers be able to answer?

Marshall: DSMs can contribute to addressing many kinds of problems and questions that researchers and decision makers may have. We have created categories and typologies for many problems by system level. Usually, at the strategic level we find types of problems related to policy; whereas, at the tactical level the problems turn out to be more of a managerial kind, and at the operational level the problems regarding logistics and scheduling.

The aspect worth highlighting is that within each problem, these methods allow us to evaluate the interdependencies of various factors that are involved and the potential outcomes of different scenarios. This feature gives researchers and decision makers the ability to identify behaviors that may be counterintuitive and their consequences; thereby, making more informed decisions.

Thompson: When will these good practice guidelines have the most impact in the health delivery systems development process?

Marshall: These guidelines have an impact from the beginning of the development process. In a way, it all comes down to defining the problem and questions that will be answered and then using the guidelines to establish whether these dynamic simulation methods are appropriate and could be used to inform the development of the health delivery system in question in a better, more efficient way than other methods could.

Thompson: I understand that you and your co-authors are planning another ISPOR Task Force report on this topic. Can you tell us about it?

Marshall: It is a related topic. There are other operations research methods like optimization methods, such as linear, non-linear, integer and dynamic programming, which can have great applicability to some types of health care problems. Optimization methods are at about the same level of maturity as DSMs methods, but have not been extensively used in health care applications. We would like to increase awareness and appropriate application of these useful methods in health care delivery and outcomes research to inform decision making and health care planning.

Thompson: Thanks Deborah for this interview and for chairing this most beneficial ISPOR Task Force. ■

Additional information:

Refer to William Padula's article, "Dynamic Simulation Modeling to Evaluate Complex System Interventions for Health Care Delivery Research – What Methods for What Problems?" on page 12 for further information.

You may also access the Simulation Modeling Emerging Good Practices Task Force Reports at: http://www.ispor.org/simulation-modeling-apps-hc-delivery.asp.

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