

1. Value-Based Healthcare: The movement towards outcome measurement based on what matters to patients

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SPECIAL SESSION

KEYWORDS: value-based healthcare, multidisciplinary approach, patient centered care

SESSION AIM

Healthcare systems worldwide are constantly evolving to adapt to the societal and technological advances that the changing healthcare needs of patients require. A promising concept to solve potential new challenges our healthcare systems are facing is Value-based healthcare. Value-based healthcare is a concept with the aim of organizing health care around patients in the form of care chains that add value. Delivering valuable care for all patients is at the essence of every healthcare organization. Value-based healthcare connects quality and costs in order to focus on what really matters for the patient. One of the core ingredients

of value-based healthcare are integrated practice units as an approach of restructuring healthcare organizations to facilitate optimal collaboration between multidisciplinary teams to achieve value. The concept has gained increasing popularity over the past decade as it fosters collaboration between different disciplines in health care with the outcomes that matter to the patients in mind.

This symposium aims to share scientific knowledge of the value-based healthcare movement of the past decade and current research developments, and how the concept contributes to add value to patients.

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1.1 An outcome-based mapping approach to facilitate participation and negotiation among multiple stakeholders

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KEYWORDS: *healthcare systems, participatory ergonomics, outcomes, systems mapping, network analysis*

SUMMARY

This presentation describes the research to develop an outcome-based participatory mapping approach to facilitate a holistic understanding and negotiation of multiple healthcare outcomes. It offers a new perspective on the role of outcomes for the (re)design of healthcare systems and provides practical applications and guidance.

BACKGROUND

Healthcare systems worldwide are facing critical and complex situations due to multiple driving forces emerging from different stakeholders' purposes, values, outcomes, and regulations. These driving forces are sometimes conflicting, and stakeholders should dedicate time to understand and negotiate them. A participatory understanding of how outcomes are valued/prioritised by different stakeholders is needed to (re)design safer and better-quality healthcare systems; gain a holistic perspective of multiple outcomes, needs, and values; promote a sense of ownership, and engage stakeholders in long-term changes.

Human Factors-based systems analysis frameworks such as the Systems Engineering Initiative for Patient Safety (SEIPS) and Cognitive Work Analysis (CWA) have recognised outcomes as an essential part of system analysis. However, there is still a need to provide a holistic understanding of outcome interactions and define their role in healthcare systems design. Furthermore, limited practical approaches exist to understand, gather, discuss, negotiate, and communicate outcomes as interrelated systems.

Given this situation, this research aimed to fill that gap by investigating the role of healthcare outcomes as a system to be applied in the (re) design of healthcare systems and developed an outcome-based mapping approach for multiple stakeholder negotiation.

METHODS

This research followed the Design Research Methodology (DRM) (Figure 1). First, the literature was reviewed to define a wide range of healthcare outcomes that concentrate on priorities, needs, values, and aims of patients with long-term conditions, families, healthcare providers and authorities. Existing mapping methods in the literature were then critically analysed to develop an initial approach. Subsequently, the outcome-based mapping approach was refined through multiple participatory studies (i.e., graphic facilitated interviews and mapping workshops) in the UK. Overall, 87 participants took part in this research. Data that emerged from these studies were analysed in two ways. First, visual data (i.e., outcome-based maps) were synthesised through a bespoke network analysis to build outcome-based networks. Second, narratives and observations of the mapping process and visualisations were analysed using content analysis and map reconstructions to build a robust understanding of participants' reasoning. Finally, values were analysed by applying the Schwartz values framework.

RESULTS AND DISCUSSION

The research resulted in an outcome-based

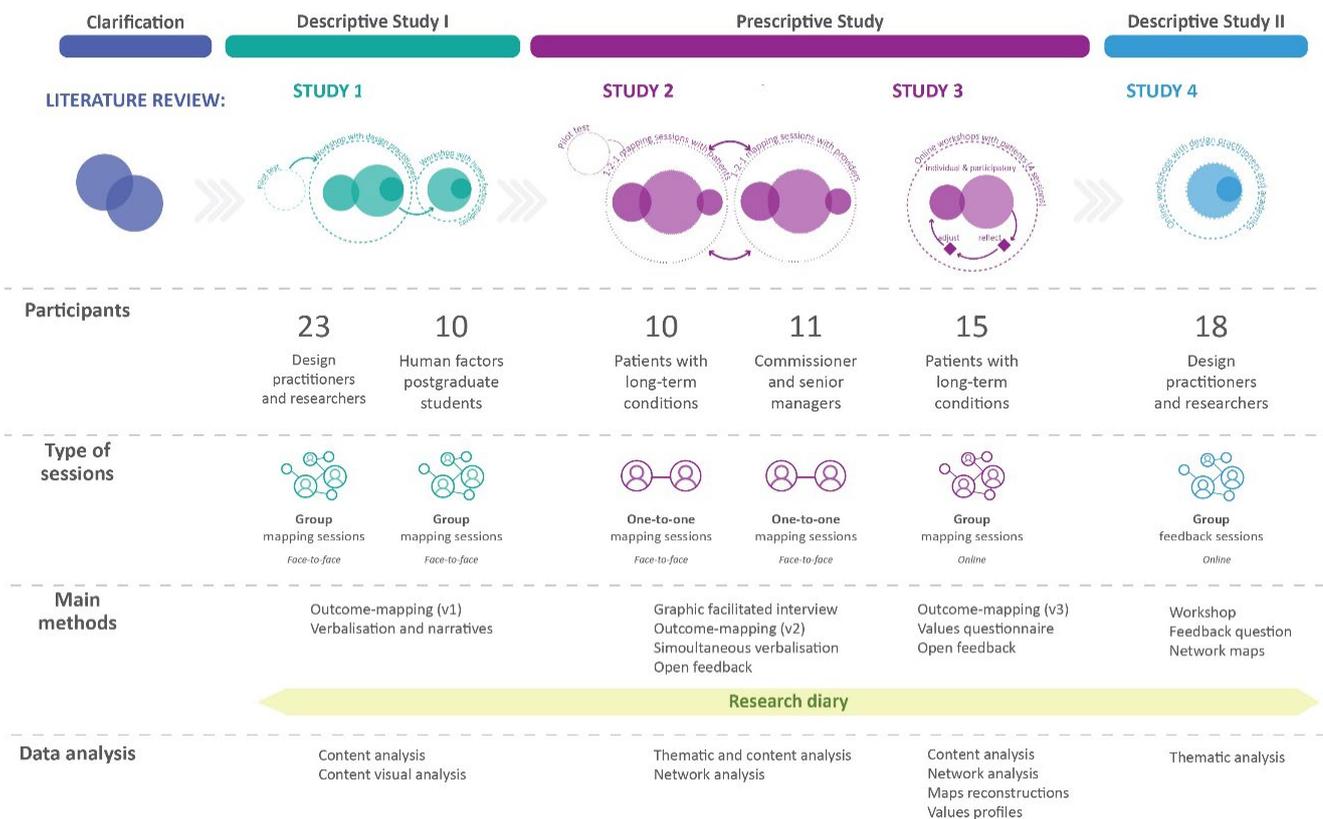


Figure 1. Summary of the methodology

approach that i) proposes a reconceptualisation of healthcare outcomes and ii) offers a practical dialogical mapping method to understand and negotiate outcomes with multiple stakeholders. First, the reconceptualisation acknowledges that outcomes are value-dependent, continuous adaptable and may not respond to the short/long-term structure. The bespoke network analysis accompanying the approach reveals tacit knowledge about outcomes ‘as a system’ that guides the identification of critical outcomes which can create propagation or become brokers. Furthermore, it identifies the implications of considering wellbeing as the system’s purpose. In addition, the clarified role of values enriches participation (complexity sampling) and agrees upon high-level commitments. Secondly, the mapping method discards imposing a visual structure and instead, combines an open mapping strategy and promotes values reflection. This method encourages stakeholders to freely make sense of their priorities and negotiate their

conflicts, trade-offs and enduring needs whilst balancing the power dynamics of participation.

CONCLUSION

This research offers a new perspective on the role of outcomes for the (re)design of healthcare systems and translates that knowledge into a practical approach. This approach helps to make sense of multiple outcomes, encourages value-level conversation, and redistributes decision-making.

REFERENCES

- Landa-Avila IC, Escobar-Tello C, Jun GT, Cain R. (2021) Multiple outcome interactions in healthcare systems: a participatory outcome mapping approach. *Ergonomics*; 65(3):362-383. doi: 10.1080/00140139.2021.1961018.
- Lowe, T. (2013). New development: The paradox of outcomes—the more we measure, the less we understand. *Public Money & Management*, 33(3), 213–216. Doi: 10.1080/09540962.2013.785707

1.2 Consensus on bringing value-based healthcare into outpatient consultations

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KEYWORDS: *value-based healthcare, VBHC
consultation room, delphi, group concept
mapping, conceptual map, operationalization*

SUMMARY

The aim of this study was to reach consensus among clinicians about their and their patients' activities that underlay the ideal value-based outpatient consultation through a systematic approach, i.e. a Delphi study. After three rounds, an expert panel embracing 19 clinicians reached consensus on 63 activities to be important, two activities to be unimportant and they lacked agreement on 11 activities. Activities were thematically clustered into nine themes regarding: 1) empowerment, 2) patient reported biopsychosocial outcomes, 3) the patient as a person, 4) the patient's kin, 5) shared power and responsibility, 6) optimization, 7) coordination, 8) therapeutic relationships and 9) responsiveness to scarcity of resources in the health system. We conclude that value-based outpatient consultations require contextual decision-making, are person-centered and focus chronic attention to care optimization and wise allocation of scarce resources that benefits patient care as a whole. Results of this study contribute to calibrating, facilitating and strengthening clinicians' and patients' activities in Value-Based HealthCare.

BACKGROUND

Value-based HealthCare (VBHC) aims to organize healthcare around the multidimensional concept of 'value' (Porter & Teisberg, 2006). Overall, VBHC is about equitable provision of healthcare that matters to patients while using resources sustainably. To provide healthcare that matters to patients, clinicians and patients are sought to communicate

about value(s) (van Weert & Hazelzet, 2021). These discussions play a prominent role in outpatient consultations, which is hence considered an important place to pursue VBHC. To date, however, ambiguity prevails regarding what a value-based outpatient consultation ideally entails. This study seeks to reach consensus among clinicians about their and their patients' activities that underlay the ideal value-based outpatient consultation.

METHODS

A three-round online Delphi study was conducted in a Dutch university hospital that identifies itself as being at the national forefront in VBHC. The study took place between March 2022 and June 2022. For the first round, a list with activities was informed by content analysis of internal policy documents, video-recorded discussions and co-reflection with stakeholders. Subsequently, a purposive sample of nineteen clinicians from frontrunner VBHC teams judged each activity dichotomously in terms of importance, i.e. as being important or unimportant, and/or provided a comment. Experts could also suggest new activities. Consensus was declared at 80 per cent agreement. In the second and third round, response rates were 100 per cent and nearly 90 per cent respectively. Finally, thematic analysis was used to derive conceptual themes (Braun & Clarke, 2006).

RESULTS

The expert panel agreed upon 63 activities to be important and two activities to be unimportant

for the ideal value-based consultation. The latter pertained the burden of care for society and for the climate. No group agreement was reached on 11 activities. Disparity pertained, among others, regarding the role of experience measures, aggregated data and cost-consciousness. Thematic analysis of the activities that were considered important revealed nine themes regarding: 1) empowerment, 2) patient reported biopsychosocial outcomes, 3) the patient as a person, 4) the patient's kin, 5) shared power and responsibility, 6) optimization, 7) coordination, 8) therapeutic relationships and 9) responsiveness to scarcity of resources in the health system.

Qualitative analysis of experts' comments showed that not all 63 activities are brought into practice in every consultation. On the one hand, clinicians practiced contextual decision-making by selecting activities that are appropriate for the individual patient in a particular situation. On the other hand, consultation system impediments, e.g. the lack of time and flexibility, withheld clinicians in enacting the full range of activities that they deemed value-enhancing.

DISCUSSION

This study reveals that a value-based outpatient consultation embraces a multitude of activities. Context determines what activities are brought into practice. A comparison of our results with previous care concepts shows that a value-based outpatient consultation is person-centered. Next to that, VBHC seeks clinicians to contribute chronic attention to improving care for the individual patient and allocating resources wisely. This implies that clinicians can build upon their person-centered care behaviors in their pursuit of value, supporting the care philosophy 'Person-Centered, Value-Based HealthCare' (PCVBHC) (Bedlington et al., 2021). Tensions may arise between humane care for the individual patient and cost-consciousness. Clinicians seem to circumvent these tensions by focusing on wise resource allocation that results in similar or improved patient outcomes.

Results of this study contribute to calibrating clinicians' and patients' activities in value-based outpatient consultations. Education may focus

on how to deal with value trade-offs. Managers and designers may give thought to establishing supportive contextual conditions for VBHC. Implementers and researchers should acknowledge the multidimensionality of VBHC. Moreover, they should account for context, i.e. value depends on the appropriateness of activities as well as the quality of enacting these activities rather than the quantity of value-enhancing activities. Lastly, implementers may question to what extent it is realistic to 'implement' VBHC in its totality or whether their approach should be focused on strengthening value-enhancing behaviors.

CONCLUSIONS

A value-based outpatient consultation requires contextual decision-making, is person-centered and focusses chronic attention to care optimization and wise resource allocation that benefits patient care as a whole. To unleash the potential of VBHC in outpatient care, collaborative effort of clinicians, patients, educators, managers, designers and researchers is warranted.

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REFERENCES

- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101. <https://doi.org/10.1191/1478088706qp063oa>
- Bedlington, N., Kelley, T., Kidanemariam, M., Lewis, S., Stiggelbout, A., Allvin, T., Bos, WJ., Bruins, B., Collins, A., Davey, J., Dedeu, T., Hamson, A., Loehrer, S., McCabe, C., Navarro, M., Saunders, C., Sehmi, K., Spieker, N., Stein, AT., Tunis, S., Vaz Carneiro, A., Wai, W. A. (2021). Person-Centred Value-Based Health Care.
- Porter, M. E., & Teisberg, E. O. (2006). *Redefining health Care: Creating Value-Based Competition on Results*. Harvard Business School Press.
- van Weert, N., & Hazelzet, J. (2021). *Personalized Specialty Care*. Springer-Verlag.

1.3 Analyzing the level of and designing interventions for child participation at a Dutch pediatric hospital by combining health management and industrial design

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KEYWORDS: *pediatrics, child participation, value-based healthcare, health management, industrial design*

SUMMARY

Child participation in pediatric care is generally considered insufficient, even though its value is acknowledged. Therefore, in this research we evaluate the current level of child participation at an academic pediatric hospital, and design interventions to improve it. Our results show that forcefully aiming for high levels of participation is unwanted. Rather, pediatric hospitals should strive for a better execution of desired participation. Our interventions stimulate desired participation by enabling the child to set goals for the meeting, prepare questions and provide personalized input through child-centered PROMS.

BACKGROUND

The value of child participation in healthcare is increasingly recognized in Dutch hospitals. Children do not only want to participate in their care, child participation also positively affects patient outcomes (e.g. Moore and Kirk, 2010). Child participation is a broad concept, which includes listening to the child and a range of decision involvement. In this research, we use the model of Shier (2001), who describes child participation at five levels: 1) children are listened

to, 2) children are supported in expressing their views, 3) children's views are taken into account, 4) children are involved in decision-making, and 5) children share power and responsibility for decision-making. One author describes specific interventions for child participation: Schalkers (2016) proposes child-friendly information and tools to support the child to express its opinion during the consultation. Besides this, only general approaches for encouraging child participation can be found (see e.g., Coyne 2008). From this literature it can be derived that interventions could be aimed at providing information, or at acquiring or supporting the participation skills for each person in the child-parent-physician triad. Depending on the targeted person, information can either be focused on the condition and treatment or on child participation.

METHODS

The neurosurgery department of a large academic pediatric hospital in The Netherlands aspires to optimize child participation within their outpatient clinics. This study aimed to evaluate the current child participation level within the outpatient clinic patients, aged 6-12 years, and to design interventions to optimize this level of child

participation. To do this, the first three steps of a design study were conducted in this study: problem definition – analysis and diagnosis – solution design. Health management approaches were used in step 1 and 2 to analyze the level of child participation and explore possibilities for improvement. Data collection consisted of three parts: 1) a quantitative child-participation-survey for patients and their parents to evaluate perceived child participation levels; 2) 12 semi-structured interviews with professionals to get an understanding of their perspective on the current participation level and to discuss optimization possibilities; 3) a focus group with children of the Child Advisory Council to discuss interventions on optimizing participation. Hereafter, we used evidence-based industrial design to generate and evaluate interventions for child participation (step 3). Based on all data, we generated design requirements and designed interventions to meet those requirements. The interventions were evaluated by three experts: an industrial designer, medical professional, and educationalist.

RESULTS

The results from our survey shows that children participate at level 1-3 in Shier's model where they are listed to and their opinion is important but where they do not play a large role in decision making itself (n=31). Interviews with the professionals (n=12) suggest that such a role is not always desired and striving for the highest possible level of participation is unwanted. Our interviews with professionals and focus group with children (n=5) resulted in suggestions to improve child participation, which should focus on better execution of the desired participation levels. The professionals suggest that interventions that develop children's participation skills are needed, as well as child-friendly information about their condition and the upcoming visit. The children also want to develop their skills, especially for preparing the visit, and they want information that is directed at them instead of their parents. Besides this, children want a consultation with the professional

without their parent. Our evidence-based industrial design process resulted in three interventions which are best combined for a better execution of the desired level of child participation, namely: a personal pre-visit agenda-setting document, a topic and question preparation aid and a child-appealing PROM.

DISCUSSION

Our results show that in pediatric hospitals, children should be listed to, asked for their opinion and their opinion should be considered in decision making; involving them in decision making and sharing decision power seems to be of lesser importance. This may be because of the complex nature of the healthcare decisions being made in pediatric hospitals, especially the neurosurgery department. Moving on to the interventions, we are the second to propose a child focused solution. Our solutions differ from that of Schalkers (2015) as it gives the child information personal information on its own visit, and it focuses on the acquiring of participation skills before the consultation. We propose to implement and evaluate both interventions in future research (steps 4 and 5 of a design study), to compare their effect on child participation. As the strength of this study is that the triad of child-parent-physician was involved, we advise to involve all stakeholders in implementation and evaluation as well. Limitations to our work also exist, the most prominent being the small sample size for the survey.

CONCLUSIONS

Based on our research, we suggest that interventions for child participation should not forcefully strive to involve children in decision making and to share power for decision making with them. Rather, they should improve the way children are asked for their opinion, listened to and the way their opinion is take into consideration. Interventions that are suitable for this focus on giving personal information and preparing the consultation.

REFERENCES

- Coyne I. Children's participation in consultations and decision-making at health service level: a review of the literature. *International journal of nursing studies*. 2008;45(11):1682-9.
- Franklin A, Sloper P. Listening and responding? Children's participation in health care within England. *The International Journal of Children's Rights*. 2005;13.
- Moore L, Kirk S. A literature review of children's and young people's participation in decisions relating to health care. *Journal of clinical nursing*. 2010;19(15-16):2215-25.
- Schalkers I. *Quality of Paediatric Hospital Care Understanding the Perspectives of Children and Families* [PhD]: Vrije Universiteit Amsterdam; 2016.
- Shier H. Pathways to participation: Openings, opportunities and obligations. *Children & Society*. 2001;15:107-17.

1.4 Applying the concept of value-based healthcare in insurance medicine: opportunities and challenges

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KEYWORDS: *value-based healthcare, occupational health, insurance medicine*

SUMMARY

The objective of this study is to identify opportunities and challenges in applying the concept of value-based healthcare within the practice of insurance medicine in The Netherlands. Professionals with an expertise in the field of insurance medicine (N=10) and professionals with expertise in the field of the VBHC concept (N=5) participated in both semi-structured individual interviews (N=15) and focus groups (N=2), for which preparatory information was provided. From the transcripts, opportunities and challenges for applying the VBHC concept in insurance medicine were deductively analysed based on the principles and components of the VBHC concept, including collaboration with other stakeholders, measure and learn from outcomes, measure and get insights in costs, payment system with the incentive towards value creation, and supporting IT platform. Identified opportunities included e.g.: the current

client-centeredness within insurance medicine, the space for implementation of this concept given by politics, the improving acknowledgment of the importance of the topic work by the curative care, and the shift towards task delegation in sake of efficiency. However, the challenges considered included e.g.: the value of society does not always match with the clients individual values, limiting laws and privacy regulations, absence of an standardized client-centred outcome set, absence of financial incentive stimulating value creation, and difficulty to specialize on disease groups due to frequent comorbidity. Nonetheless, overall the considerations of the participants to apply the VBHC concept in the practice of insurance medicine were promising.

BACKGROUND

The value-based healthcare (VBHC) concept, focusing on maximizing the value for the patient,

is explained by essential principles (Porter, 2008) and key components (Lee & Porter, 2013) for implementation within the curative care sector. However, an increasing share of healthcare is provided extramurally, such as large parts of occupational healthcare provision including insurance medicine (IM), for which it can be debated whether the original description of the value-based healthcare concept and its principles fit the extramural healthcare setting. Therefore, the objective of this study is to identify potential challenges and opportunities for applying the VBHC concept within the practice of IM in The Netherlands.

METHODS

An explorative qualitative study was executed, in which two groups representing different perspectives were included: First, a group of participants with expertise in the field of IM (n=10). Second, a group of participants with expertise in the field of the VBHC concept and applying the VBHC concept within healthcare delivery (n=5). All participants (N=15) participated in an individual interview discussing opportunities and challenges, followed-up by focus groups which contained a mix of participants from both groups to combine expertise from both perspectives, reflecting and validating the identified opportunities and challenges. For both the individual interview and focus group, all participants received introductory information about insurance medicine or the VBHC concept respectively and an overview of the results from the individual interviews in advance. All individual interviews and focus groups were transcribed verbatim and thematic coding analysis was performed.

RESULTS

Opportunities and challenges for applying the VBHC concept in insurance medicine are identified for each of the VBHC principles and components, including six main themes: 1) The definition of value within insurance medicine, highlighting the current client-centeredness within insurance medicine and existing focus on quantity, 2)

Collaboration with other stakeholders, promoted by the improving acknowledgment of the importance of the topic work by the curative care sector, and difficulty to specialize on disease groups due to frequent comorbidity in the IM population, 3) Measure and learn from outcomes, highlighting the need for a standardized outcome set and the difficulty of measuring patient satisfaction because of the influence of the disability benefit assessment outcome, 4) Measure and get insights in costs, calling attention on the shift towards task delegation in sake of efficiency and elimination of existing unnecessary care within insurance medicine, 5) Payment system with the incentive towards value creation collaboration and specialism, in which the absence of financial incentive within insurance medicine and the space for implementation of this concept given by politics is highlighted, and 6) A supporting IT platform connecting all stakeholders, in which one common language for all professionals over the full cycle of care is considered possible, however, implementing an IT platform for all these professionals is considered problematic due to limiting laws and regulations.

DISCUSSION

Because of the differences in structure in the practice of IM compared to the curative care sector, it was questioned whether the VBHC principles and its components could be applicable for utilization within IM practice. The opportunities and challenges identified in this study show that it is expected that applying the VBHC concept within IM would improve client-centered outcomes while reducing the healthcare delivery costs, which also applies for implementation in the curative care. However, more research is needed to gain better understanding of how to get around the structural differences with the curative care.

CONCLUSIONS

The application of the VBHC concept within the practice of IM is considered promising as value can be defined and created by the established principles. However, challenges which are identified

during this study need to be overcome before VBHC can be applied.

REFERENCES

- Porter, M.E., (2008). Value-based health care delivery. *Annals of surgery*. 248(4): p. 503-509.
- Lee, T., & Porter, M., (2013). The strategy that will fix healthcare. *Harvard Business Review*. 91(12): p. 24-24.

1.5 Team cognition as a lens to evaluate handoff communication

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KEYWORDS: *handoffs, care transitions, team cognition, epistemic network analysis (ENA)*

SUMMARY

Handoffs are important to patient safety and include communication interactions that are examples of team cognition; thus, approaches to measuring, modeling and improving team cognition may help to measure, model and improve handoffs. In this pilot study, we explore the use of interactive team cognition to evaluate and improve simulated handoffs. Our results show team cognition models may be useful both to evaluate handoffs and to inform the design of improvement interventions.

BACKGROUND

Handoffs are important to safe, high-quality care and involve teams communicating to exchange information, authority and responsibility for patient care (Abraham et al., 2014) – in other words, engaging in team cognition (Wooldridge et al., 2022). Most measures of handoff quality rely on clinical outcomes that may be delayed or perceptions of participating clinicians. Measures of team cognition, based on team communication, would be process-based measures of quality and have been linked to improved team performance in domains outside of health care. In this pilot study, we explore the feasibility of using measures of team cognition measures to evaluate handoff quality.

METHODS

We conducted five simulated handoffs of a trauma patient from the operating room (OR) to the pediatric intensive care unit (PICU) in a pilot study to relate measures of team cognition with perceived

quality of and satisfaction with handoffs. Each simulation was audio and video recorded and transcribed by a transcription service. We conducted correlation analyses between perceived quality and satisfaction with team cognition measures at the team level (i.e., total number of turns of talk, average number of turns of talk per clinician, average number of words per turn of talk, number of interruptions); we also conducted correlation analyses between perceived quality and satisfaction with the number of clinicians (total), number of clinicians from the OR and number of clinicians from the PICU. Spearman rank correlation was used for all correlation analyses. Each turn of talk was coded with a framework of communication behaviors that constitute interactive team cognition; we then used Epistemic Network Analysis (ENA; Marquart et al., 2018) to quantify and visualize the communication interactions.

RESULTS

We found a significant, negative correlation between the average number of turns of talk per clinician and perceived quality of the simulated handoff. We observed negative correlations between total number of turns of talk, average number of words per turn of talk, number of interruptions, and perceived quality and satisfaction, and positive correlations between the average number of turns of talk per clinician with perceived quality and satisfaction. The network diagrams indicated differing patterns of team cognition. insurance medicine or the VBHC concept and an

overview of the results from the individual interviews in advance.

DISCUSSION

This study shows that measures of team cognition could be viable measures of quality in handoffs; similarly, network diagrams may be useful to visualize and evaluate handoff communication going forward. Further, our results support designing handoffs to include a smaller group of critical clinicians with fewer, longer reports from clinicians in the OR followed by opportunity for read backs and rich interactive discussion to resolve questions. However, reducing the number of clinicians involved in the handoff to the point of creating additional handoffs and limiting interactive discussion could have negative patient safety implications, as each additional handoff is an opportunity for lost and/or incorrect information to be communicated – in other words, there is a tension between including the whole clinical team and overall quality and safety that must be considered.

Of course, this study is limited by the small sample size and nature of the simulated handoffs; further, participants are from one institution in one health care system, necessarily limiting generalizability. However, this was a pilot study to investigate the potential of using interactive team cognition as an approach to study, evaluate and improve handoffs – and our results indicate this is a potentially useful approach. Future work should involve a larger, more rigorously selected and diverse sample, as well as eventually take place in situ. Another potentially promising extension is to engage in more sophisticated, temporal analyses, explore the qualitative content of the handoff (i.e., communication behaviors and content), and relate resulting measures to objective measures of quality.

CONCLUSIONS

Interactive team cognition is a promising approach to study, evaluate and improve handoffs. In this pilot study, we showed that measures of team cognition can be linked to handoff quality – these

may be more objective, real-time evaluative measures than retrospective chart review or perceptions. Further, they provide useful guidance to potentially improve handoffs, such as structuring handoff to include longer reports and rich, interactive discussions. However, as when developing any interventions, we must use system-based approaches to anticipate and minimize or eliminate potential negative consequences (e.g., reducing number of clinicians in a team handoff may increase the overall number of handoffs).

REFERENCES

- Abraham, J., Kannampallil, T., & Patel, V. L. (2014). A systematic review of the literature on the evaluation of handoff tools: implications for research and practice. *J Am Med Inform Assoc*, 21(1), 154-162. <https://doi.org/10.1136/amiajnl-2012-001351>
- Marquart, C. L., Hinojosa, C., Swiecki, Z., Eagan, B., & Shaffer, D. W. (2018). Epistemic Network Analysis. In (Version 1.7.0) <http://app.epistemicnetwork.org>
- Wooldridge, A. R., Carayon, P., Hoonakker, P. L. T., Hose, B.-Z., Shaffer, D. W., Brazelton, T., Eithun, B., Rusy, D., Ross, J., Kohler, J., Kelly, M., Springman, S., & Gurses, A. P. (2022). Team Cognition in Handoffs: Relating System Factors, Team Cognition Functions and Outcomes in Two Handoff Processes. *Hum Factors*. <https://doi.org/https://doi.org/10.1177/00187208221086342>