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Teaching High-Value Care: Case Vignettes for Pediatric Practice

Lauren LaRue Walker, MD*, Akshata Hopkins, MD, Sahar Nayereh Rooholamini, MD, MPH, Corrie McDaniel, DO, Yemisi Jones, MD, Lisa E. Herrmann, MD, MEd, Vivian Lee, MD, Francine Bynum, MD, Michael Tchou, MD, Jimmy Beck, MD, MEd

*Corresponding author: llwalker@bcm.edu

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Abstract

Introduction: As health care systems recognize the importance of high-value care (HVC), physicians must focus on individualized patient outcomes using economically responsible and evidence-based medicine. The best ways to teach medical trainees HVC principles that can result in meaningful practice and behavior changes are unknown. **Methods:** We designed a case-based curriculum mapping six common pediatric clinical scenarios to HVC principles. Each scenario included learning objectives, small-group activities, educational resources, a facilitator guide, and participant evaluations. After internal and external review, the scenarios were piloted at four teaching institutions (Children's Hospital Los Angeles, Johns Hopkins All Children's Hospital, Seattle Children's Hospital, and Texas Children's Hospital). Facilitators were encouraged to adapt each vignette to learner needs and site-specific conference characteristics. All participants were asked to complete anonymous case-specific evaluations at the end of each session. **Results:** Approximately 331 individuals (students, residents, attendings) participated, with an evaluation response rate of 76% ($n = 253$). Participants across all sites acknowledged the sessions as a valuable use of time (range: 4.2-4.6 on a 5-point Likert scale) and identified HVC principles that could be applied daily in clinical practice (range: 4.4-4.6). **Discussion:** Implementation of six case-based HVC vignettes at four pilot institutions was both feasible and well received by a diverse group of learners. The curriculum was perceived as valuable and applicable to learners' clinical practice. Next steps include longitudinal assessments of learners and the development of tools measuring HVC-related behaviors to understand better the impact of the curriculum on clinical practice.

Keywords

Pediatrics, High-Value Care

Educational Objectives

By the end of the activity, learners will be able to:

1. Identify examples of common areas of misuse and overuse in pediatric care.
2. Identify available tools with which to practice high-value care.
3. Utilize statistics in making appropriate decisions about diagnosis and treatment.
4. Discuss strategies for care discussions involving high-value care principles with patients and families.

Introduction

Recent efforts to control health care expenditures have shifted from a focus on the costs and benefits of interventions to the value of care provided. Delivering high-value care (HVC) is the practice of individualized care focused on patient outcomes, using evidence-based medicine that is economically responsible.¹ Value-driven care is integral to optimal patient care and health care sustainability in this country.²

Physician contribution to health care waste accounts for over a quarter of a trillion dollars per year.³ As physician practice habits acquired in residency can persist for decades,^{4,5} effectively imparting HVC practices to trainees represents a growing priority for educators.^{6,7} In 2011, the American College of

Appendices

- A. Complex Care Facilitator Guide.docx
- B. Complex Care Learner Worksheet.docx
- C. Complex Care Eval Form .doc
- D. BRUE Facilitator Guide .docx
- E. BRUE Learner Worksheet .docx
- F. BRUE Eval Form.doc
- G. Hyperbili Facilitator Guide .docx
- H. Hyperbili Learner Worksheet.docx
- I. Hyperbili Eval Form.doc
- J. SSTIs Facilitator Guide .docx
- K. SSTIs Learner Worksheet .docx
- L. SSTIs Eval Form.doc
- M. Blood Cultures Facilitator Guide.docx
- N. Blood Cultures Learner Worksheet.docx
- O. Blood Cultures Eval Form .doc
- P. Pneumonia Facilitator Guide.docx
- Q. Pneumonia Learner Worksheet.docx
- R. Pneumonia Eval Form.doc

All appendices are peer reviewed as integral parts of the Original Publication.

Physicians' president encouraged the American College of Graduate Medical Education to make "cost consciousness and stewardship of resources" a seventh general competency,⁸ and the Association of Pediatric Program Directors identified HVC education as one of its top three priorities in 2015.

Yet, despite growing recognition of the importance of training new physicians in HVC practices, the best way to promote and teach HVC that results in meaningful changes in practice and attitude remains elusive. Stammen and colleagues in 2015 identified three main components for HVC education for trainees: (1) specific knowledge transmission, (2) reflection on health care decisions, and (3) a supportive environment and role models within HVC decision making.⁹

To address this need, we designed an educational curriculum for trainees (clinical medical students and pediatric residents) highlighting key topics within HVC and targeting the practical application of HVC principles. Incorporating each of the three main components outlined by Stammen and colleagues for effective HVC educational interventions for trainees, we developed a curriculum consisting of six case-based scenarios designed for medical students and pediatric residents in a morning report or small-group teaching setting. Each case focuses on a unique aspect of HVC while having the unifying theme of value. Each clinical scenario packet includes a case description, facilitator guide, participant guide and evaluation form.

Additionally, as there are few peer-reviewed pediatric-specific HVC curricula,¹⁰⁻¹² there are distinct gaps surrounding practical application for clinical inpatient pediatric scenarios. Our curriculum fills this void by providing high-frequency, specialty-specific, inpatient case scenarios targeted at recognizing and applying HVC principles within pediatric medicine. Our unique curriculum provides a flexible format to allow for the accommodation of varying group sizes, settings, and time limitations.

Methods

The six case-based scenarios were developed via a three-part process. First, a working group of hospitalists from the American Academy of Pediatrics Section on Hospital Medicine's Subcommittee of Pediatric Hospital Medicine Educators developed global goals and objectives for the curriculum. A literature review was conducted to identify gaps in previously developed HVC curricula, resulting in the identification of six common pediatric clinical scenarios suited for HVC discussions: a positive blood culture in a febrile preteen, a child with medical complexity, and patients with the following diagnoses: skin and soft tissue infection (SSTI), community-acquired pneumonia (CAP), brief resolved unexplained event (BRUE), and neonatal hyperbilirubinemia. The six conditions were developed into case-based scenarios, mapping the overall learning objectives to each case. Facilitator guides (Appendices A, D, G, J, M, P) and learner worksheets (Appendices B, E, H, K, N, Q) were developed for each case vignette.

Case formatting was standardized as follows:

- Individual case learning objectives.
- Optional prework to allow for a flipped classroom experience if desired.
- Equipment required.
- Case presentation/vignette.
- Three to four group questions, followed by group leader facilitation discussion points.
- Conclusions and key points.
- References for further reading.

Each case went through an internal revision process in order to ensure consistency between cases in formatting, approach, and depth of topic discussion.

In the second part of the case-development process, two national experts in each topic area, defined as having published, presented, or developed national guidelines in that subject, reviewed each case.

Reviewers provided feedback regarding content, accuracy, and consistency; subsequently, the cases were revised based on the expert review.

Third, institutional review board approval was obtained at participating institutions, and the six scenarios, intended to last 30-60 minutes per scenario, were piloted at four large freestanding academic children's hospitals in several settings: morning report, noon conference, and nighttime teaching. Participants included clinical medical students; pediatric, family practice, and general rotating internship residents; and pediatric faculty members. The cases were iteratively revised throughout the piloting process based on both facilitator and learner feedback.

Each scenario consisted of a facilitator guiding the learners through one of the case vignettes and discussing questions that highlighted concepts related to the practice of HVC. The facilitator guide for each scenario included a case, multiple-choice and free-response questions, answers to those questions, and a list of references. The learner guide included the case and questions. Each case could be completed in one 60-minute session. However, given time constraints, in some instances, one scenario was divided into two separate 30-minute sessions. Facilitators were encouraged to adapt each vignette, focusing on various aspects of the case based on the needs of their learners. The vignettes were designed to be meaningful even when presented in isolation as stand-alone cases, although the learning objectives build upon each other in order of their presentation as appendices. Prerequisite knowledge of the basic concepts of HVC was helpful but not essential to facilitating these sessions. If desired, further background information regarding HVC can be obtained.¹³ The learners required no prerequisite knowledge of HVC to participate in these sessions. Included in each case were optional prereading assignments for the learners. Completing these prereading assignments would allow a learner to focus less on disease-specific key points and more on HVC concepts during the group session. Audiovisual equipment was recommended for group viewing of the cases in a larger group setting but was not necessary with smaller groups.

All participants were asked to anonymously and voluntarily complete an evaluation specific to that particular scenario at the end of the session (Appendices C, F, I, L, O, R). Developed by the authors, the evaluation forms (individualized for each case) utilized a 5-point Likert scale to assess participant response (1 = *strongly disagree*, 5 = *strongly agree*) and assessed three items: (1) the participants' perception of the value of the session, (2) a measure of transference of knowledge unique to one of the learning objectives for each scenario, and (3) identification of any changes in practice the participant planned to make as a result of the session, with the goal of assessing potential behavior change.

Further details regarding the individual cases follow.

Pediatric HVC Vignette: Complex Care—The Complexity of the Complex Patient (Appendix A): This vignette walked learners through a case in which a patient with complex medical needs presented for medical care in respiratory distress. Learners explored the definitions of quality, cost, and value. The distinction between indirect and direct costs was discussed and compared with charges. The concept of a comprehensive care plan for complex patients was introduced, and the idea of shared decision making (SDM) was explored through the introduction of the SHARE Approach developed by the Agency of Healthcare Research and Quality. A whiteboard or flip chart with markers was recommended. Alternatively, facilitators could use a computer with internet access and a projector for the presentation. A learner worksheet (Appendix B) and an evaluation form (Appendix C) were available as well.

Pediatric HVC Vignette: Brief Resolved Unexplained Events—What's BRUEing? (Appendix D): In this scenario, learners were asked to apply HVC concepts to the case of an infant presenting to the emergency department after a BRUE episode. Through these vignettes, value was defined, and participants compared and contrasted an apparent life-threatening event with a BRUE. A table similar to the one in the SSTIs session (Appendix J) was introduced, providing the learners with a framework for

guiding value-based decisions. At the end of the session, SDM concepts were introduced, and learners were given the opportunity to role-play SDM conversations with families. A whiteboard or flip chart with markers was recommended. Alternatively, facilitators could use a computer with internet access and a projector for the presentation. A learner worksheet (Appendix E) and an evaluation form (Appendix F) were available as well.

Pediatric HVC Vignette: Hyperbilirubinemia (Appendix G): Learners participated in the case of a neonate presenting with hyperbilirubinemia. They were prompted to assess the next best steps in the initial evaluation of an infant with jaundice and in this process learned about national and institutional guidelines as a resource for practicing HVC. A framework helpful when determining which tests to order was introduced, as were resources available to identify cost information. A whiteboard or flip chart with markers was recommended. Alternatively, facilitators could use a computer with internet access and a projector for the presentation. A learner worksheet (Appendix H) and an evaluation form (Appendix I) were available as well.

Pediatric HVC Vignette: Skin and Soft Tissue Infections (Appendix J): In this vignette, learners walked through several cases of patients presenting with an SSTI. Through this process, the definition of an SSTI was distilled, and learners were asked to apply HVC concepts to decide next steps in the evaluation and management of the patients as well as the appropriate therapeutic intervention. Tools helpful for practicing HVC were introduced, including tables in which pretest probability, quality, cost, and value for each intervention were compared. A whiteboard or flip chart with markers was recommended. Alternatively, facilitators could use a computer with internet access and a projector for the presentation. A learner worksheet (Appendix K) and an evaluation form (Appendix L) were available as well.

Pediatric HVC Vignette: Blood Cultures—Fever, Fight Songs, and Fagan Nomograms (Appendix M): This vignette allowed for the discussion of the drivers of overuse among health care professionals and practitioners' desire to reach a diagnosis. The case suggested shifting the goal from finding the answer to asking, "What can I do to make the patient better?" A script offering learners a means to ascertain and address families' values and goals was provided. The case also prompted reflection on SDM skills and gave learners the opportunity to apply HVC concepts to the management of a patient with a positive blood culture. Lastly, the case introduced statistical tools such as the likelihood ratio and Fagan nomogram to guide high-value management decisions. A whiteboard or flip chart with markers was recommended. Alternatively, facilitators could use a computer with internet access and a projector for the presentation. Copies of the Fagan nomogram were recommended. A learner worksheet (Appendix N) and an evaluation form (Appendix O) were available as well.

Pediatric HVC Vignette: Community-Acquired Pneumonia—Know Thy Number Needed to Treat (Appendix P): In this case, participants were asked to analyze the risks and benefits of common interventions seen in patients with CAP, including viral testing, blood cultures, and radiography. Appropriate antibiotic therapy was discussed in the context of the most common microbial etiology of CAP by age group while also considering the benefits and harms of antimicrobial treatment. Statistical tools helpful for providing HVC were introduced, including the number needed to treat and the number needed to harm. A whiteboard or flip chart with markers was recommended. Alternatively, facilitators could use a computer with internet access and a projector for the presentation. A learner worksheet (Appendix Q) and an evaluation form (Appendix R) were available as well.

Results

The six vignettes were piloted at four different institutions—Children's Hospital Los Angeles, Johns Hopkins All Children's Hospital, Seattle Children's Hospital, and Texas Children's Hospital—over a 7-month period from 2016-2017 (Table 1). Approximately 331 individuals (clinical medical students, residents, fellows, attendings) attended the sessions. Of these attendees, 253 completed evaluations, resulting in an overall response rate of 76%. The evaluation forms included three to four questions, depending on the

vignette, and utilized a 5-point Likert scale (1 = *strongly disagree*, 5 = *strongly agree*). Participants across all pilot sites rated the sessions a valuable use of time (overall: 4.2-4.6), identified information that could be applied to daily practice (overall: 4.4-4.6), and endorsed attainment of case-specific objectives (overall: 4.3-4.7; [Table 2](#)).

Table 1. Description of the Four Piloting Institutions

Institution	Setting	Estimated Participants	Evaluations Collected	Response Rate
Seattle Children's Hospital ^a	30-minute morning report	165	Attending: 14 Resident: 69 Student: 51 Total: 134	81%
Children's Hospital Los Angeles ^b	30-minute nighttime teaching session	25	Attending: 2 Resident: 21 Student: 0 Total: 23	92%
Johns Hopkins All Children's Hospital ^a	30-minute morning report	107	Attending: 0 Resident: 59 Student: 10 Total: 69	64%
Texas Children's Hospital ^c	30-minute morning report and 60-minute noon conference	34	Attending: 0 Resident: 23 Student: 4 Total: 27	79%
Total		331	253	76%

^aAll six vignettes (1: Blood Culture, 2: Brief Resolved Unexplained Events, 3: Complex Care, 4: Skin and Soft Tissue Infections, 5: Pneumonia, and 6: Hyperbilirubinemia) were tested here.

^bVignette 2: Brief Resolved Unexplained Events was not tested here.

^cOnly Vignettes 1: Blood Culture and 6: Hyperbilirubinemia were tested here.

Table 2. Evaluation of the HVC Vignettes by the Four Institutions on a 5-Point Likert Scale (1 = *Strongly Disagree*, 5 = *Strongly Agree*)

Objective	SCH	CHLA ^a	JHACH	TCH ^b	Overall
Vignette 1: Blood Culture					
This session was a valuable use of my time.	4.8	4.5	4.6	4.3	4.6
I learned information that I can use.	4.6	4.7	4.7	4.3	4.6
I can list potential harms and costs of obtaining unnecessary blood cultures.	4.9	4.7	4.4	4.3	4.7
Vignette 2: BRUEs					
This session was a valuable use of my time.	4.4		4.6		4.5
I learned information that I can use.	4.4		4.7		4.5
I am confident I can identify low-risk BRUE patients.	4.6		4.0		4.4
Vignette 3: Complex Care					
This session was a valuable use of my time.	4.7	4.5	4.6		4.6
I learned information that I can use.	4.5	4.8	4.7		4.6
I am confident I will be able to identify ways to practice HVC with medically complex patients.	4.3	4.8	4.1		4.3
Vignette 4: SSTIs					
This session was a valuable use of my time.	4.7	4.0	4.4		4.4
I learned information that I can use.	4.7	4.3	4.6		4.6
I can list indications for imaging and blood tests for a patient with a nonpurulent SSTI.	4.5	4.3	4.3		4.4
I can describe indications for an incision and drainage of an SSTI.	4.4	4.3	4.4		4.4
Vignette 5: Pneumonia					
This session was a valuable use of my time.	4.7	4.0	3.5		4.2
I learned information that I can use.	4.5	4.6	4.1		4.4
I can calculate the number needed to treat and interpret its meaning in a clinical case.	4.7	3.6	4.4		4.5
Vignette 6: Hyperbilirubinemia					
This session was a valuable use of my time.	4.4	4.0	4.2	5.0	4.4
I learned information that I can use.	4.5	4.2	4.2	5.0	4.4
I can list high- and low-value tests when evaluating neonatal hyperbilirubinemia.	4.7	4.0	4.2	4.5	4.5

Abbreviations: BRUE, brief resolved unexplained event; CHLA, Children's Hospital Los Angeles; HVC, high-value care; JHACH, Johns Hopkins

All Children's Hospital; SCH, Seattle Children's Hospital; SSTI, skin and soft tissue infection; TCH, Texas Children's Hospital.

^aVignette 2 was not evaluated here.

^bOnly Vignettes 1 and 6 were evaluated here.

In addition to the three to four Likert-style questions, two open-ended questions at the end of the evaluation form asked participants to identify two changes in behavior as a result of the session: one action that they planned on doing more frequently as a result of the session and one action that they planned on decreasing or stopping as a result of the session.

Examples of actions that participants planned to do more frequently, as reported by resident trainees, included the following:

- “Think about the risks/benefits and pre test probability before ordering tests.”
- “Consider likelihood ratios before ordering tests.”
- “Consider harms of unnecessary tests.”
- “Modify language to avoid making normal things sound like medical problems.”
- “Ask patients what matters most to them (e.g., goals of hospitalization).”
- “Think about consults as ‘diagnostic tests.’”

Examples of actions that participants planned to do less frequently included the following:

- “Decreased ordering of a respiratory viral panel and blood culture for Pneumonia.”
- “Stop feeling like you always have to ‘cave into’ the parent’s request for unnecessary testing.”
- “Treating all ‘positive’ tracheal aspirates with antibiotics.”
- “Ordering a routine CBC for all children with an uncomplicated cellulitis.”
- “Stop ordering blood work and EKG’s for low-risk BRUE patient.”
- “Won’t hold patients in the hospital for 48 hours while awaiting results of blood cultures.”

Discussion

We have shown that implementation of six HVC cases at four separate teaching institutions in the U.S. was both feasible and well received by a diverse group of learners including faculty, residents, and clinical medical students. Cases were presented in a variety of educational settings (morning report, noon conference, and nighttime teaching), most often in 30-minute sessions. Consistently positive participant ratings (>4 on a 5-point scale) indicate that even with limited time, these cases were perceived to be valuable and applicable to learners’ clinical practice and understanding of HVC. No individual case seems to have performed significantly better than its peers, suggesting all are equally meaningful.

Responses from session participants to open-ended questions indicate that they identified both disease-specific learning points and general HVC principles. Interestingly, the disease-specific learning points tended to reflect actions that participants planned to do less frequently, whereas the HVC concepts were reflected in actions that the learners intend to adopt. This implies that learners absorbed the high-value concept of safely doing less. Furthermore, the content of the comments (which are a sample indicative of the broader comment pool) suggests that the overall objectives were achieved. Several of the comments identified common areas of misuse and overuse in pediatric care, while others identified statistical tools helpful in the practice of HVC.

Residents rather than medical students submitted the majority of the free-text responses. This potentially illustrates that residents rather than clinical medical students better understand the nuances of HVC as it relates to clinical care. Further studies are necessary to elucidate the impact of learner level on the ability to comprehend and practice HVC. Although we lack the ability to separate Table 2 data by learner type, the overall high average suggests that the sessions were still meaningful to all levels of learners.

Our project has several limitations. Our biggest limitation is that we do not yet know whether or how these sessions have impacted patient care. In general, few concrete and specific HVC outcome measures exist, making it difficult to measure the extent of HVC integration into clinical practice. To address this gap, next steps could include the development of value-driven quality metrics that reflect HVC practices. Tracking HVC outcome measures could then be used to measure behavior change following an educational intervention such as these vignettes. However, linking individual trainee action with an outcome measure also is challenging as multiple factors out of the trainees’ control (e.g., attending preference) drive outcomes. To overcome this barrier, direct observation of clinical teams, such as in the form of a secret shopper, could allow assessment of a trainee’s individual approach and adherence to HVC principles.

Additional next steps could include the development of a validated assessment tool that measures level of learner engagement in HVC principles during rounds and/or patient care activities.

However, it is also possible that simply discussing HVC in the setting of small-group exercises will not lead to practice change. A more comprehensive curricular effort that extends beyond the traditional teaching of morning report and noon conference may be necessary. Additional HVC curricular gaps include a lack of tools supporting HVC teaching at the bedside and a lack of knowledge about engaging families in HVC discussions. Next steps could include the development of a tool kit for teaching HVC at the bedside and primers on navigating value discussions with families. Further next steps in HVC curricular development might include the longitudinal assessment of learners (e.g., from clerkships through residency graduation) to better understand how knowledge, skills, and attitudes related to HVC evolve over time.

Another limitation includes the fact that all participating institutions are freestanding, academic, tertiary or quaternary care children's hospitals. This potentially limits the generalizability of our results to smaller and community-based settings. However, as the cases were applied in a variety of diverse educational and geographic settings, one can infer that they are adaptable to diverse clinical practice settings.

Furthermore, in the process of writing and revising these cases, our group both utilized internal peer-to-peer feedback and received external editing from colleagues with national expertise in the specified topic areas. This iterative process ensures broad applicability across institutions.

Lauren LaRue Walker, MD: Assistant Professor, Department of Pediatrics, Baylor College of Medicine

Akshata Hopkins, MD: Assistant Professor, Department of Pediatrics, Johns Hopkins All Children's Hospital

Sahar Nayereh Rooholamini, MD, MPH: Acting Assistant Professor, Department of Pediatrics, University of Washington School of Medicine

Corrie McDaniel, DO: Clinical Assistant Professor, Department of Pediatrics, University of Washington School of Medicine

Yemisi Jones, MD: Assistant Professor, Department of Pediatrics, Cincinnati Children's Hospital Medical Center

Lisa E. Herrmann, MD, MEd: Assistant Professor, Department of Pediatrics, Cincinnati Children's Hospital Medical Center

Vivian Lee, MD: Assistant Professor of Clinical Pediatrics, Department of Pediatrics, Keck School of Medicine of the University of Southern California

Francine Bynum, MD: Assistant Professor of Clinical Pediatrics, Department of Pediatrics, Keck School of Medicine of the University of Southern California

Michael Tchou, MD: Clinical Fellow, Division of Hospital Medicine, Department of Pediatrics, Cincinnati Children's Hospital Medical Center

Jimmy Beck, MD, MEd: Assistant Professor, Department of Pediatrics, University of Washington School of Medicine

Disclosures

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Ethical Approval

The Institutional Review Boards at the Children's Hospital Los Angeles, the Johns Hopkins All Children's Hospital, the Seattle Children's Hospital, and the Baylor College of Medicine approved this study.

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