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Orthopaedic Healthcare Worldwide: Standardized Clinical Assessment and Management Plans: An Adjunct to Clinical Practice Guidelines

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Practice pattern variations in orthopaedic surgery have resulted in higher costs without measureable improvements in patient safety, experience, or outcomes [4]. The American Academy of Orthopaedic Surgeons (AAOS) has made substantial efforts to improve patient outcomes through the development of evidence-based clinical practice guidelines (CPGs), which are systematically-developed statements designed to support provider and patient decision-making for specific clinical scenarios. Since 2007, the AAOS has developed 17 CPGs, ranging from diagnosis of carpal tunnel syndrome to treatment of knee osteoarthritis [9]. Other professional societies have also developed CPGs relevant to orthopaedic surgery, including the American College of Chest Physicians, which endorses strategies for prevention of deep venous thrombosis and pulmonary embolus following major procedures [9].

Professional societies support the development of CPGs in order to promote evidence-based medicine, standardized practices, and most importantly, improved quality. The dissemination of CPGs has reduced practice pattern variation and improved health outcomes in targeted populations [5, 7].

While evidence-based CPGs have the potential to distill high-quality evidence into clinical recommendations [9], they have several shortcomings that can trigger resistance among providers [2, 6, 9, 11]. Most CPGs, including those issued by the AAOS, make recommendations that are graded based on the strength of supporting evidence. The overall quality of a CPG is therefore dependent on the strength of the underlying evidence, which is often deficient in orthopaedics. In one recent AAOS CPG, 12 of 16 recommendations

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were considered "Limited" or "Inconclusive" due to gaps in high-quality evidence [9]. Even when strong evidence supports a CPG recommendation, the underlying data may have a surprisingly short half-life since updates are required every 3 years [10].

Nonetheless, payers and regulatory agencies often convert guidelines into rigid decision-support tools, and in some instances, measure adherence to assess provider quality. Since real patients are diverse and have unique circumstances and comorbidities, rigid adherence to guidelines may result in unintended harm. Orthopaedic surgeons and other stakeholders must recognize that guidelines are not generalizable to every patient – they are developed for the typical patient and routine clinical presentation. Strict implementation of guidelines can also hinder appropriate consideration of patients' cultural norms and personal preferences. Patients may perceive strict adherence as an attempt to ration care and reduce cost. Moreover, when medical decision-making is driven by guidelines, physicians may perceive loss of autonomy, which is increasingly recognized as a source of provider disengagement [11].

While CPGs have improved healthcare quality and diminished variation in some cases [5], physician resistance suggests that these guidelines may not sufficiently accommodate differences across patient populations, adequately account for provider clinical acumen, or keep pace with information and technology changes [2, 6, 10]. Standardized Clinical Assessment and Management Plans (SCAMPs) represent a promising adjunct to CPGs [3, 8]. A SCAMP is a flexible care guideline designed to narrow practice variability while still permitting providers the opportunity to exercise clinical judgment and offer treatment specific to a patient's clinical scenario or personal needs. Each SCAMP is a focused prospective collection of relevant clinical data based on "targeted data statements" that attempt to predict how the SCAMP will affect an episode of care.

A SCAMP is created by a multidisciplinary team during a period of 3 to 6 months, and is primarily based on available high-quality evidence. When evidence is unavailable, a SCAMP incorporates expert opinion based on sound practices. The team responsible for each SCAMP should include clinicians with sufficient content expertise and nonclinician analysts to manage data collection, organization, and synthesis. Each SCAMP establishes a "common pathway for a diverse patient population with a particular condition" [3, 8] – such as distal radius fracture in the pediatric patient. The pathways are designed as decision trees, providing guidance based on the specific clinical scenario such that management is individualized. For example, in a SCAMP for pediatric distal radius fracture, treatment varies based on fracture pattern: A buckle fracture could be treated with splinting and would not require radiographic followup, while a physeal fracture could be treated with closed reduction, close monitoring for loss of reduction, and repeat radiographs 6 to 9 months after injury to assess for premature physeal closure.

In contrast to CPGs, SCAMPs collect targeted data regarding patients, specific clinical circumstances, testing and treatment choices, and outcomes (Table 1). Downstream analysis following SCAMP implementation can provide data regarding resource utilization and outcomes, and can be systematically used to improve future care pathways. It is important to understand that clinicians are permitted to deviate from the care pathway established by a SCAMP anytime the clinician believes that a specific patient is not best managed by the default pathway. In this way, medical decision-making is driven by a provider's assessment of the clinical scenario and offers an opportunity for preservation of physician engagement. When a provider deviates from a SCAMP, the rationale for the deviation must be provided. For example, when treating a

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Table 1 CPGs versus SCAMPs

Clinical Practice Guidelines (CPGs)	Standardized Clinical Assessment and Management Plans (SCAMPs)
Recommendations strictly based on available evidence	Decision trees are primarily based on available evidence, but incorporate sound practices when evidence is limited
Static	Dynamic – Evolves based on iterative analysis of internally collected data
Lower design cost	Higher design and implementation costs
Deviations discouraged, adherence measured	Productive deviations encouraged and incorporated into evolving SCAMPs decision trees
Infrequently updated	Rapidly updated

physeal distal radius fracture, a clinician could deviate from the SCAMP by declining radiographs 6 to 9 months after injury to assess for premature physeal closure. The physician would need to explain the underlying rationale, which could be that the patient was within 2 years of skeletal maturity and that no deformity or functional limitation was expected from physeal arrest. In this manner, unlike CPGs, SCAMPs actively invite and record physician deviations, which are then analyzed as a source of information and potential innovation. When a productive pattern of deviations emerges, the SCAMP is modified and improved. By encouraging and incorporating productive clinician deviations, SCAMPs inherently avoid rigid decision support tools by regulatory agencies. Iterative change based on relevant data collection and analysis is an essential feature of SCAMPs.

The initial SCAMPs were developed and implemented at Boston Children's Hospital in 2009 [3, 8]. Since then, the Boston Children's program has grown to 48 internal, multidepartment SCAMPs. In addition, there are 13 SCAMPs at seven external centers with more than 50,000 patients enrolled. The process of developing and implementing a SCAMP, along with emphasis on utilizing emerging evidence for continuous process improvement, can rapidly improve healthcare delivery. Many features of SCAMPs are similar to the evidence-based care process models developed at the Intermountain Healthcare System in Utah [1]. A series of six SCAMPs launched in the Cardiovascular Program at Boston Children's Hospital have convincingly demonstrated three principal, interconnected benefits: Reduction in practice pattern variation, optimization of resource utilization, and improvement in patient health and function [3].

This initial series of SCAMPs demonstrated an 80% adherence rate despite permitting clinicians to exercise judgment and deviate as desired [3]. This high rate of adherence demonstrates that SCAMPs can reduce variation without compromising physician autonomy and while permitting individualized patient management. When review of a SCAMP detects low provider adherence, an in-depth analysis has to be performed and modification of the SCAMP needs to occur. As a SCAMP evolves to incorporate emerging evidence, practice pattern variations can be reduced and adherence can be further improved. If provider deviations from the SCAMP are not justified, the SCAMP can highlight opportunities for targeted clinician reeducation.

SCAMPs also appear to improve resource utilization and reduce costs. The six SCAMPs launched by the Boston Children's Cardiovascular Program demonstrated an 11% to 51% reduction in medical costs, with an average reduction of 27.5% [3]. A substantial portion of the cost savings was due to

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reduction in unnecessary testing and treatment. Most interestingly, some of the SCAMPs also demonstrated improvement in patient outcomes, suggesting that cost reduction and improved patient health can be simultaneously achieved. For example, following implementation of a SCAMP for management of congenital aortic stenosis, the frequency of "ideal" results increased from 40% to 69% and the frequency of "inadequate" results decreased from 30% to 9%, which markedly prolongs event-free survival in children [3]. To our knowledge, no SCAMP has been associated with a reduction in healthcare quality or an increase in adverse events.

Early evidence suggests that physicians who use SCAMPs tend to find the experience satisfactory. A survey of six different institutions found that SCAMPs are preferred by 72% of providers while CPGs are preferred by 12% [3]. Given the limited utilization of SCAMPs across the country, the usefulness and validity of this tool needs to be confirmed by independent provider organizations, across diverse clinical settings. Further information on the impact of SCAMPs on outcomes is crucial to establish the overall value of this process improvement tool. Data regarding the cost of designing, implementing, and analyzing a SCAMP must also be made available.

Orthopaedic providers that have already incorporated CPGs into patient care should make efforts to analyze downstream impact on practice-pattern variations and patient health and function. Scrutiny of results obtained through implementation of CPGs will better position these organizations to gauge the value of adopting flexible care guidelines such as SCAMPs, which may be more costly and labor-intensive. SCAMPs offer a promising paradigm-shifting approach to drive value improvement in health care. By reducing variation and optimizing resource utilization, SCAMPs have the potential to facilitate reductions in cost and improvement in patient outcomes.

The Institute for Relevant Clinical Data Analytics, the nonprofit organization overseeing SCAMPs, currently assists several dozen institutions to use the SCAMP framework to gather and analyze data in over 60 conditions, sharing relevant and useful information throughout the network. In concept, validated SCAMPs could be seamlessly shared across provider organizations, resulting in rapid dissemination of actionable information. The transferability of a validated SCAMP would permit provider organizations not initially involved in the design or implementation to rapidly reduce variation and optimize resource utilization. In this regard, SCAMPs appear offer a flexible, reliable, and scalable approach to improve value in healthcare. SCAMPs in orthopaedic surgery have been developed for distal radius fractures at Boston Children's Hospital and Brigham and Women's Hospital. The emergence of data from these trials will be highly informative and could drive improvements in the value of care we deliver to our patients.

References

1. Byington CL, Reynolds CC, Korgenski K, Sheng X, Valentine KJ, Nelson RE, Daly JA, Osguthorpe RJ, James B, Savitz L, Pavia AT, Clark EB. Costs and infant outcomes after implementation of a care process model for febrile infants. *Pediatrics*. 2012;130:e16–24.
2. Cabana MD, Rand CS, Powe NR, Wu AW, Wilson MH, Abboud PA, Rubin HR. Why don't physicians follow clinical practice guidelines? A framework for improvement. *JAMA*. 1999;282: 1458–1465.
3. Farias M, Jenkins K, Lock J, Rathod R, Newburger J, Bates DW, Safran DG, Friedman K, Greenberg J. Standardized Clinical Assessment And Management Plans (SCAMPs) provide a better alternative to clinical practice guidelines. *Health Aff (Millwood)*. 2013;32:911–920.
4. Fisher ES, Bynum JP, Skinner JS. Slowing the growth of health care costs—lessons from regional variation. *N Engl J Med*. 2009;360:849–852.

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5. Grimshaw JM, Russell IT. Effect of clinical guidelines on medical practice: a systematic review of rigorous evaluations. *Lancet*. 1993;342:1317–1322.
6. Lane LB, Starecki M, Olson A, Kohn N. Carpal tunnel syndrome diagnosis and treatment: A survey of members of the American Society for Surgery of the Hand. [Published online ahead of print September 13, 2014]. *J Hand Surg Am*. DOI: 10.1016/j.jhsa.2014.07.019.
7. Lewis CG, Inneh IA, Schutzer SF, Grady-Benson J. Evaluation of the first-generation AAOS clinical guidelines on the prophylaxis of venous thromboembolic events in patients undergoing total joint arthroplasty: Experience with 3289 patients from a single institution. *J Bone Joint Surg Am*. 2014;96:1327–1332.
8. Rathod RH, Farias M, Friedman KG, Graham D, Fulton DR, Newburger JW, Colan S, Jenkins K, Lock JE. A novel approach to gathering and acting on relevant clinical information: SCAMPs. *Congenit Heart Dis*. 2010;5:343–353.
9. Sanders JO, Bozic KJ, Glassman SD, Jevsevar DS, Weber KL. Clinical practice guidelines: their use, misuse, and future directions. *J Am Acad Orthop Surg*. 2014;22:135–144.
10. Shekelle PG, Ortiz E, Rhodes S, Morton SC, Eccles MP, Grimshaw JM, Woolf SH. Validity of the Agency for Healthcare Research and Quality clinical practice guidelines: how quickly do guidelines become outdated? *JAMA*. 2001;286:1461–1467.
11. Timmermans S. From autonomy to accountability: the role of clinical practice guidelines in professional power. *Perspect Biol Med*. 2005;48:490–501.