

Published in final edited form as:

Pediatr Clin North Am. 2014 August ; 61(4): 653–661. doi:10.1016/j.pcl.2014.04.002.

Pediatric hospital medicine role in the comanagement of the hospitalized surgical patient

Joshua K. Schaffzin, MD, PhD¹ and Tamara D. Simon, MD, MSPH²

¹Division of Hospital Medicine, Cincinnati Children's Hospital Medical Center, Cincinnati, Ohio

²Division of Hospital Medicine, Department of Pediatrics, University of Washington and Seattle Children's Hospital, Seattle, Washington

synopsis

Medical comanagement of surgical patients by pediatric hospital medicine providers has become increasingly common. Subjectively, the comanagement model is superior to more traditional consultative models because of the anticipatory preventive care and coordination hospitalists provide to patients and hospital colleagues. While some studies have demonstrated the value of the comanagement model in adults and children, others failed to do so. The coming years are both exciting and challenging for this emerging field as it attempts to sustain its early progress and define its future in pediatric hospital medicine.

Keywords

Pediatric; hospitalist; surgery; comanagement; pediatric hospital medicine; consultant; service

Introduction

In the past decade, the field of pediatric hospital medicine has grown dramatically in breadth and in numbers. Simultaneously, as pediatric care has advanced, children who would not have survived infancy are growing into young adults with complex chronic diseases and are frequently hospitalized to address exacerbation of underlying disease processes and procedures to improve their quality of life. This section will focus on issues that arise in comanagement of medically complex patients pre- and post-operatively with surgical colleagues.

In recent years, the comanagement of surgical patients has become prevalent among pediatric hospital medicine (PHM) programs. This is likely due to a number of factors. First,

© 2014 Elsevier Inc. All rights reserved.

Author Contact information: Corresponding author: Joshua K. Schaffzin, MD, PhD; 3333 Burnet Avenue, MLC 9016, Cincinnati, OH 45229-3033; Joshua.schaffzin@cchmc.org; 513-803-3232 fax 513-803-4299 Tamara D. Simon, MD, MSPH; Room 946, MS C-9S-9, 1900 Ninth Avenue, Seattle, WA 98101; Tamara.Simon@seattlechildrens.org; 206-884-1136 .

Publisher's Disclaimer: This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

HM is becoming accepted as a subspecialty of pediatrics, and comanagement is one of several specialized niches in the practice of PHM. Second, hospitalized children are more complex medically.^{1,2} As pediatrics has become more specialized, so too have surgical specialties, such that training does not include as in-depth pediatric patient management as it may once have. Finally, comanagement in PHM is a natural evolution of comanagement in adult hospital medicine settings, which is a widespread practice model.

This relatively new role for PHM providers is an ideal fit within existing hospitalist practice models. PHM providers are typically involved directly in hospital safety and systems integration. They provide value to institutions in patient care coordination, excelling in the management of medically complex patients. These patients typically have multiple subspecialists involved in their care, as well as a battery of hospital-based ancillary staff. PHM providers communicate well with families, nurses, surgical, and medical providers, integrating all of the input into patient management plans that focus on the needs of the patient and family. In addition, in hospitals where sentinel events have occurred among surgical patients, PHM providers and comanagement have been identified as the solution.

As a relatively recent addition to the PHM provider repertoire, surgical comanagement suffers from a paucity of literature describing its benefits and limits. In this review, we provide a summary of both our experiences and published data to outline the current state of surgical comanagement and create a framework for presenting challenges and issues within the field.

What is comanagement and why is it increasingly common?

Traditional models of medical care for surgical patients involve consultation of medical providers if and when a need arises. While this model may work in some situations, it is not optimal, because it can lead to missed diagnoses and poor quality care.³ In essence, by waiting for something to happen, an opportunity may have been missed to prevent patient harm. The solution to this issue is to bring medical providers into the care team early in the process, before any harm occurs. For example, in a child with a seizure disorder, it would be better for a medical provider to manage anti-epileptic medications to prevent a seizure rather than consulting someone after a seizure has occurred. The model that has emerged to provide medical care for surgical patients is one of comanagement between surgical and PHM providers.

According to the Society of Hospital Medicine (SHM), surgical comanagement is the “shared responsibility, authority, and accountability for the care of a hospitalized patient... [where] the patient’s surgeon manages the surgery related treatments and a hospitalist manages the patient’s medical conditions.”⁴ In theory, co-managing pediatricians promote valuable assets to institutions. These may include safety, by anticipating complications and preventing poor patient outcomes, availability for families and nurses by being present on the medical units, and resource allocation by allowing surgical colleagues to spend more time operating than managing admitted patients.⁵⁻⁷

In reality, the benefit provided by pediatric hospitalist comanagement likely differs between targeted populations and routine use.^{5,6} Among pediatric patients receiving comanagement

prior to and following surgery for neuromuscular scoliosis, length of stay was decreased in one study and unchanged in another.^{8,9} Among adult populations receiving comanagement prior to and following knee or hip replacement surgery, results also varied, with some studies showing decreased length of stay, complications rates, and mortality among co-managed patients, but others showing no such benefit.^{7,10-15} One study reported a subjective benefit to hospitalist comanagement of surgical patients, where nurses and surgeons both reported preferring the comanagement model for its delivery of prompt coordinated care.⁷ However, the same study failed to show a decrease in cost or mortality for co-managed patients. Finally, there is no evidence that surgeons' time in the operating room increased in the context of comanagement.⁵

Current state of comanagement in PHM

According to a recent informal survey of PHM providers conducted on the American Academy of Pediatrics Section on Hospital Medicine listserv[©], surgical comanagement represents a portion and not the whole of time spent in care of hospitalized patients. (J. Schaffzin, unpublished data) Approximately one-third of respondents reported spending between 20-39%, and nearly half reported spending <20% of their clinical time in post-operative care. (Figure 1) PHM providers who care for surgical patients do so mostly through consultation, with 92% of respondents reporting working in a consultative model, while 65% reported working in a comanagement model. (Figure 2) Additionally, PHM providers do not work alone in providing medical care to surgical patients. At free-standing hospitals and hospitals-within-hospitals, PHM providers most often collaborate with surgical residents and mid-level providers (e.g., nurse practitioners) in addition to the attending surgeons, to provide care to surgical patients.

Establishing a surgical comanagement program

While comanagement models provide what is believed to be quality medical care to surgical patients, comanagement may not be appropriate in all clinical settings. PHM providers may believe they mediate well between different providers, but it is possible that in the instance of disagreement between medical and surgical providers, the family is left in the middle. Additionally, when attending physicians take over care and work directly with each other, there is a potential for education of residents, particularly surgical residents, to suffer.⁵ It may be detrimental to withhold the experience of providing basic medical care to post-operative pediatric patients to future surgery attendings, as comanagement models may not be available in their future practices. On the other hand, exposure to hospitalists may enhance surgical residents' learning, given the prominent role hospitalists play in resident education.¹⁶

The American Medical Association, SHM, and the literature provide guidance for aspects desirable to include in comanagement models.^{5,8,17,18} There are five aspects to consider. The first is equity, where all stakeholders have a similar investment in and accountability for patient outcomes, and all share the responsibility of patient management. Second, each stakeholder has clearly defined and mutually agreed-upon roles, ideally in the form of a comanagement agreement. Third, an equal exchange of information, education, and ideas

amongst all providers is critical. Fourth, adequate staffing of PHM providers is necessary to ensure adequate coverage is provided for the patient volume seen. Finally, constant and open communication is required to develop and maintain the relationship between co-managing providers (Table 1).

To establish a viable comanagement program, initial investment is required.⁸ The number of full-time equivalent positions and a schedule framework (e.g., shifts, day versus night in-house coverage) must be determined. Consideration must be given to the skill set and level of experience needed for physician providers. Many pediatric hospitalists have engaged in surgical comanagement, but new residency graduates are unlikely to have been exposed to care of surgical patients outside of an intensive care unit. Mid-level providers are becoming a more permanent fixture of PHM programs, as well as surgical programs. An advantage to including mid-level providers in comanagement models is the ability to have engaged, present providers who coordinate care and give continuity to care. However mid-levels may provide most benefit when the patient populations and post-operative course are mostly homogeneous, with a potential opportunity to target physician involvement to the more complex patients. Additionally, optimizing care of surgical patients may start in the pre-operative period, and some programs have explored the extension of hospitalist comanagement to the preoperative time period.^{8,9}

The context of practice must also be considered. The surgical services in need of medical support should be identified, and a case made to these services of the value comanagement can bring to care of their patients. An institution must be engaged and supportive, to provide overhead and infrastructure to a comanagement program. Protected time is needed for administrative activities, such as committee service and administering the comanagement arrangements. Additionally, education is essential, and time must be set aside to train experienced providers as well as trainees and new graduates. There are likely to be significant knowledge gaps in the care of surgical patients at all levels of experience. If teaching is an expected part of the job, expectations of teaching activities and time to perform teaching must also be provided.

Current challenges and issues for surgical comanagement in the field of pediatric hospital medicine

Clinical Practice/ Practice Management

From a clinical perspective, surgical comanagement must be recognized as within the scope of general pediatric hospital practice. A recent American Academy of Pediatrics statement recognizes “perioperative surgical and medical subspecialty care” as one of the guiding principles for a PHM program.¹⁹ However, billing and payment for services is not yet straightforward for comanagement models, and are greatly influenced by local factors. Possibilities for payment for comanagement services include having the time of co-managing PHM providers being covered by institutions.²⁰ Alternatively, co-managing providers may bill for their time as consultants, provided there is a specific question or issue to be addressed. Routine post-operative conditions, such as constipation and pain, for which PHM providers are often responsible, are covered by the global billing fee that the surgical

services collect. Thus, billing for such services is less likely to be reimbursed. PHM providers may seek to take advantage of this situation when developing comanagement agreements by allocating a portion of the global billing fee to support of the comanagement program.

Following initial establishment of a comanagement service, sustainability of the surgical comanagement role is critical. In order to sustain this practice, PHM providers providing care to surgical patients must develop a professional pride in their role. It is important to avoid a situation in which PHM providers may feel as though they work for the surgeons, rather than for the patient and family. Interpersonal engagement is also crucial to sustain a surgical comanagement program. Medical providers must learn to work with surgical colleagues to avoid personality conflicts. Differences in training and experience, as well as potentially underlying personality types, exist between surgeons and pediatricians, and at times approaches and personalities can clash. Finally, co-managing partners must remain acutely aware of the value of comanagement over traditional models. Traditional models of care, where medical providers are consulted after a problem is identified, are not ideal, and both surgical and PHM providers must stay vigilant to avoid reverting to such situations.

Quality

Quality care is difficult to measure, but is essential to the sustainability of surgical comanagement. PHM and surgical providers need to work to optimize post-operative outcomes, manage available personnel resources, and reduce costs to the patient and to the hospital. Surgical care lends itself to standardization, given a frequently predictable post-operative course and the need to prevent complications. One recent example of a successful quality initiative focused on efforts to recognize compartment syndrome.²¹ Other areas ripe for standardization of post-operative management are those where evidence suggests best practice but implementation is variable. These areas include but are not limited to: reduction of wound infection,^{22,23} antibiotic stewardship,²⁴ deep venous thrombosis prevention,²⁵ pain management,²⁶ and lung recruitment.²⁷

In addition, PHM providers, particularly those who care for surgical patients, have an opportunity to play a significant role as the Affordable Care Act is implemented. In the new Affordable Care Act model, payment is linked to patient outcomes, and institutions will be challenged to utilize resources judiciously for surgical patients. PHM providers can help by standardizing the processes, shortening length of stay, decreasing costs, and preventing readmission of the most complex patients.

Education

Sustainability will also rely upon educating future PHM providers capable of co-managing surgical patients. Internal medicine trainees have reported training during residency of certain peri-operative conditions to be lacking.²⁸ While peri-operative care is an important aspect of hospitalist care,¹⁹ it does not necessarily generalize to all areas of pediatrics. Thus, it is unclear how to train whom during residency to utilize time and effort maximally. Currently, hospital medicine fellowships offer an opportunity for such training. While not yet accredited by the ACGME, fellowships are becoming more common and stronger in the

training in research and clinical management they provide.²⁹ The new model of specialty tracking during residency also provides an opportunity for trainees interested in hospital medicine to obtain sub-specialized training, including peri-operative care.²⁹ Finally, with the increased prevalence of children with complex chronic conditions,^{1,2} there is greater need for specific training to care for these children. Peri-operative management is an essential component of care of the complex child, since these children tend to have more technology than non-complex children.¹ Training of surgical colleagues in the care of pediatric patients is also important in this new paradigm. PHM providers are potentially a source for surgical trainees to learn such care, as well to advocate for formalized training in surgical programs.

Research

Finally, perhaps the greatest challenge facing PHM providers who co-manage surgical patients is the creation and execution of a research agenda. Once a clinical service is established, and providers trained, there arises a need to generate individualized to a particular practice. As a result, there is also a need to share knowledge about specific practices and systems. In order to standardize practice, models of care and their outcomes need to be better understood.³⁰ This way, national benchmarks can be developed to guide optimal care for all patients.

While some literature exists linking comanagement to outcomes, few studies were conducted in pediatrics and results have been variable. Carefully designed and analyzed studies of resource utilization (e.g., length of stay and costs), safety (e.g., serious safety events avoided), and patient and family-centered outcomes (e.g., satisfaction, quality of life)³¹ are needed. Furthermore, PHM providers are natural partners for the study of surgical procedures in children, to evaluate short and long term outcomes, such as the epidemiology of neurosurgical shunt infections^{32,33} and the use of fibrinolytics in spinal surgery.³⁴ Particularly important questions to ask are about the true long term benefit of major surgeries such as spinal fusion provide for medically complex children, and identifying time points at which benefits outweigh the short term risks.

Conclusions

Surgical comanagement is one of several specialized niches emerging in the field of pediatric hospital medicine. This model of care seems superior to the more traditional consult model because in comanagement PHM and surgical providers share responsibility and accountability for patient management and outcomes. The establishment of such programs requires both financial and personnel investment. Once established, pediatric hospitalist programs providing care to surgical patients are poised to make contributions in the areas of quality, education, and research.

References

1. Simon TD, Berry J, Feudtner C, et al. Children with complex chronic conditions in inpatient hospital settings in the United States. *Pediatrics*. Oct; 2010 126(4):647–655. [PubMed: 20855394]
2. Burns KH, Casey PH, Lyle RE, Bird TM, Fussell JJ, Robbins JM. Increasing prevalence of medically complex children in US hospitals. *Pediatrics*. Oct; 2010 126(4):638–646. [PubMed: 20855383]

3. Robie PW. The service and educational contributions of a general medicine consultation service. *Journal of general internal medicine*. Jul-Aug;1986 1(4):225–227. [PubMed: 3772595]
4. Medicine SoH. [Accessed January 6, 2014] Hospitalist Co-Management with Surgeons and Specialists. <http://www.hospitalmedicine.org/AM/Template.cfm?Section=Home&Template=/CM/HTMLDisplay.cfm&ContentID=25894>
5. Siegal EM. Just because you can, doesn't mean that you should: A call for the rational application of hospitalist comanagement. *Journal of hospital medicine : an official publication of the Society of Hospital Medicine*. Sep; 2008 3(5):398–402. [PubMed: 18951402]
6. Whinney C, Michota F. Surgical comanagement: a natural evolution of hospitalist practice. *Journal of hospital medicine : an official publication of the Society of Hospital Medicine*. Sep; 2008 3(5): 394–397. [PubMed: 18951400]
7. Huddleston JM, Long KH, Naessens JM, et al. Medical and surgical comanagement after elective hip and knee arthroplasty: a randomized, controlled trial. *Ann Intern Med*. Jul 6; 2004 141(1):28–38. [PubMed: 15238368]
8. Rappaport DI, Adelizzi-Delany J, Rogers KJ, et al. Outcomes and Costs Associated with Hospitalist Comanagement of Medically Complex Children Undergoing Spinal Fusion Surgery. *Hospital Pediatrics*. 2013; 3(4)
9. Simon TD, Eilert R, Dickinson LM, Kempe A, Benefield E, Berman S. Pediatric hospitalist comanagement of spinal fusion surgery patients. *Journal of hospital medicine : an official publication of the Society of Hospital Medicine*. Jan; 2007 2(1):23–30. [PubMed: 17274045]
10. Fisher AA, Davis MW, Rubenach SE, Sivakumaran S, Smith PN, Budge MM. Outcomes for older patients with hip fractures: the impact of orthopedic and geriatric medicine cocare. *J Orthop Trauma*. Mar; 2006 20(3):172–178. discussion 179-180. [PubMed: 16648698]
11. Macpherson DS, Parenti C, Nee J, Petzel RA, Ward H. An internist joins the surgery service: does comanagement make a difference? *J Gen Intern Med*. Aug; 1994 9(8):440–444. [PubMed: 7965238]
12. Phy MP, Vanness DJ, Melton LJ 3rd, et al. Effects of a hospitalist model on elderly patients with hip fracture. *Arch Intern Med*. Apr 11; 2005 165(7):796–801. [PubMed: 15824300]
13. Zuckerman JD, Sakales SR, Fabian DR, Frankel VH. Hip fractures in geriatric patients. Results of an interdisciplinary hospital care program. *Clin Orthop Relat Res*. Jan.1992 (274):213–225. [PubMed: 1729006]
14. Marcantonio ER, Flacker JM, Wright RJ, Resnick NM. Reducing delirium after hip fracture: a randomized trial. *J Am Geriatr Soc*. May; 2001 49(5):516–522. [PubMed: 11380742]
15. Southern WN, Berger MA, Bellin EY, Hailpern SM, Arnsten JH. Hospitalist care and length of stay in patients requiring complex discharge planning and close clinical monitoring. *Arch Intern Med*. Sep 24; 2007 167(17):1869–1874. [PubMed: 17893308]
16. Heydarian C, Maniscalco J. Pediatric hospitalists in medical education: current roles and future directions. *Current problems in pediatric and adolescent health care*. May; 2012 42(5):120–126. [PubMed: 22483082]
17. Panel TSoHMsSC-MA. A White Paper on A Guide to Hospitalist/Orthopedic Surgery Co-Management.
18. Affairs CoEaJ. [Accessed January 27, 2014] Ethical Implications of Surgical Co-Management. 1999. Report 5-I-99:<http://www.ama-assn.org/resources/doc/code-medical-ethics/8043a.pdf>
19. Guiding principles for pediatric hospital medicine programs. *Pediatrics*. Oct; 2013 132(4):782–786. [PubMed: 24081997]
20. Freed GL, Dunham KM, Switalski KE. Research Advisory Committee of the American Board of P. Assessing the value of pediatric hospitalist programs: the perspective of hospital leaders. *Acad Pediatr*. May-Jun;2009 9(3):192–196. [PubMed: 19450780]
21. Schaffzin JK, Prichard H, Bisig J, et al. A collaborative system to improve compartment syndrome recognition. *Pediatrics*. Dec; 2013 132(6):e1672–1679. [PubMed: 24218466]
22. Glotzbecker MP, Riedel MD, Vitale MG, et al. What's the evidence? Systematic literature review of risk factors and preventive strategies for surgical site infection following pediatric spine surgery. *Journal of pediatric orthopedics*. Jul-Aug;2013 33(5):479–487. [PubMed: 23752143]

23. Vitale MG, Riedel MD, Glotzbecker MP, et al. Building consensus: development of a Best Practice Guideline (BPG) for surgical site infection (SSI) prevention in high-risk pediatric spine surgery. *Journal of pediatric orthopedics*. Jul-Aug;2013 33(5):471–478. [PubMed: 23752142]
24. McLeod LM, Keren R, Gerber J, et al. Perioperative antibiotic use for spinal surgery procedures in US children's hospitals. *Spine*. Apr 1; 2013 38(7):609–616. [PubMed: 23370689]
25. Raffini L, Trimarchi T, Beliveau J, Davis D. Thromboprophylaxis in a pediatric hospital: a patient-safety and quality-improvement initiative. *Pediatrics*. May; 2011 127(5):e1326–1332. [PubMed: 21464186]
26. Greco C, Berde C. Pain management for the hospitalized pediatric patient. *Pediatric clinics of North America*. Aug; 2005 52(4):995–1027. vii–viii. [PubMed: 16009254]
27. Cassidy MR, Rosenkranz P, McCabe K, Rosen JE, McAneny D. I COUGH: reducing postoperative pulmonary complications with a multidisciplinary patient care program. *JAMA surgery*. Aug; 2013 148(8):740–745. [PubMed: 23740240]
28. Plauth WH 3rd, Pantilat SZ, Wachter RM, Fenton CL. Hospitalists' perceptions of their residency training needs: results of a national survey. *The American journal of medicine*. Aug 15; 2001 111(3):247–254. [PubMed: 11530039]
29. Maloney CG, Mendez SS, Quinonez RA, et al. The Strategic Planning Committee report: the first step in a journey to recognize pediatric hospital medicine as a distinct discipline. *Hosp Pediatr*. Oct; 2012 2(4):187–190. [PubMed: 24313023]
30. Wiese J, Jaffer AK. A new home awaits the hospitalist. *Journal of hospital medicine : an official publication of the Society of Hospital Medicine*. Jan; 2007 2(1):3–4. [PubMed: 17274041]
31. Cohen E, Kuo DZ, Agrawal R, et al. Children with medical complexity: an emerging population for clinical and research initiatives. *Pediatrics*. Mar; 2011 127(3):529–538. [PubMed: 21339266]
32. Tuan TJ, Thorell EA, Hamblett NM, Kestle JR, Rosenfeld M, Simon TD. Treatment and microbiology of repeated cerebrospinal fluid shunt infections in children. *Pediatr Infect Dis J*. Sep; 2011 30(9):731–735. [PubMed: 21852762]
33. Simon TD, Whitlock KB, Riva-Cambrin J, et al. Revision surgeries are associated with significant increased risk of subsequent cerebrospinal fluid shunt infection. *Pediatr Infect Dis J*. Jun; 2012 31(6):551–556. [PubMed: 22333701]
34. McLeod LM, French B, Flynn JM, Dormans JP, Keren R. Antifibrinolytic Use and Blood Transfusions in Pediatric Scoliosis Surgeries Performed at US Children's Hospitals. *Journal of spinal disorders & techniques*. Oct 30.2013

Key points

- Surgical comanagement is one of several specialized niches emerging in the field of pediatric hospital medicine
- In a comanagement model, pediatric hospitalists and surgeons share responsibility and accountability for patient management and outcomes
- Particular considerations are required in the establishment of surgical comanagement programs
- Surgical hospitalists are poised to make contributions in the areas of clinical care, practice management, quality, education, and research

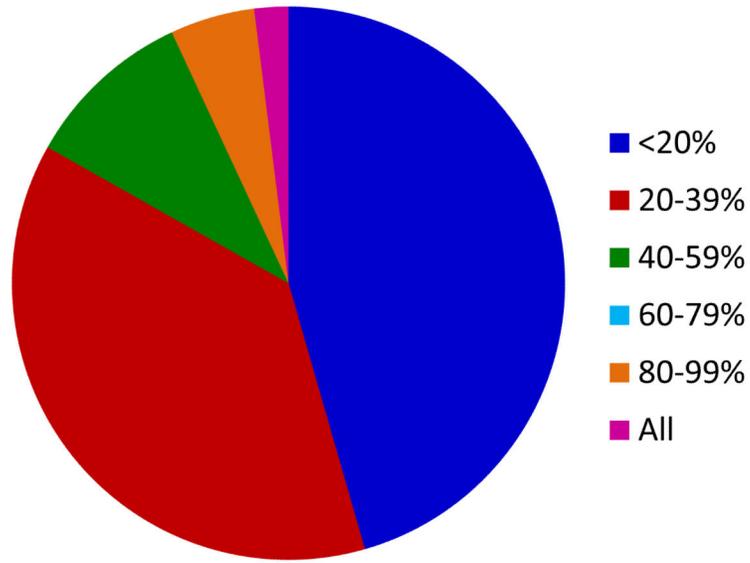


Figure 1. Proportion of time spent in post-operative care of surgical patients by responding pediatric hospitalists
Number of respondents - 61. Data from: Informal SOHM survey, 2013.

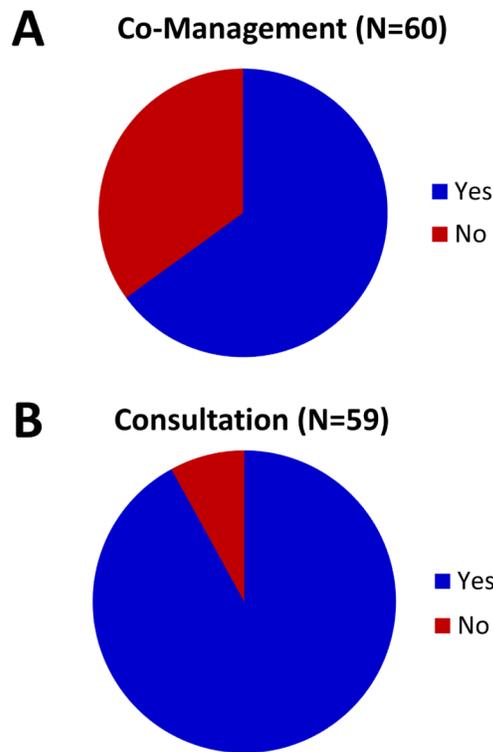


Figure 2. Practice arrangements of responding pediatric hospitalists caring for surgical patients. A – Proportion practicing in a co-management model; B – Proportion practicing in a consultative model

Number of respondents is noted for each arrangement, and responses are not mutually exclusive. Data from Informal SOHM survey, 2013.

Table 1

Basic components of a co-management agreement.

Component	Example Questions
Patient Selection	Which patients are eligible for co management? How will they be selected?
Attending of Record	Who will serve as attending of record? Who as consultant?
Nursing First Call	Whom should bedside staff call with what concerns?
Communication With Patients and Families	How will a unified message be conveyed to patients and families? How will disagreements in management be addressed?
Communication Between Providers	How frequent should communication happen? How should one provider contact another?
Admission and Discharge Procedures	Who is responsible for medication reconciliation? For discharge planning? For transition of care to primary provider?
Financial and Billing Considerations	How will co-managed cases be billed?

Data from Society of Hospital Medicine A *White Paper on A Guide to Hospitalist/Orthopedic Surgery Co-Management*. Available at: http://www.hospitalmedicine.org/AM/Template.cfm?Section=White_Papers&Template=/CM/ContentDisplay.cfm&ContentID=25864