

REVIEWS

Pediatric Hospitalist Comanagement of Surgical Patients: Structural, Quality, and Financial Considerations

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Comanagement of surgical patients is occurring more commonly among adult and pediatric patients. These systems of care can vary according to institution type, comanagement structure, and type of patient. Comanagement can

impact quality, safety, and costs of care. We review these implications for pediatric surgical patients. *Journal of Hospital Medicine* 2014;9:737–742. © 2014 Society of Hospital Medicine

According to the 2012 Society of Hospital Medicine (SHM) survey, 94% of adult hospitalists and 74% of pediatric hospitalists provide inpatient care to surgical patients.¹ Many of these programs involve comanagement, which the SHM Comanagement Advisory Panel has described as a system of care featuring “shared responsibility, authority, and accountability” for hospitalized patients with medical and surgical needs.² Collaboration between medical and surgical teams for these patients has occurred commonly at some community institutions for decades, but may only be emerging at some tertiary care hospitals. The trend of comanagement appears to be increasing in popularity in adult medicine.³ As in adult patients, comanagement for children undergoing surgical procedures, particularly those children with special healthcare needs (CSHCNs), has been proposed as a strategy for improving quality and costs. In this review, we will describe structural, quality, and financial implications of pediatric hospitalist comanagement programs, each of which include both potential benefits and drawbacks, as well as discuss a future research agenda for these programs.

ORGANIZATIONAL NEEDS AND STRUCTURE OF COMANAGEMENT PROGRAMS

Patterns of comanagement likely depend on hospital size and structure, both in adult patients³ and in pediatrics. Children hospitalized for surgical procedures generally fall into 1 of 2 groups: those who are

typically healthy and at low risk for complications, and those who are medically complex and at high risk. Healthy children often undergo high-prevalence, low-complexity surgical procedures such as tonsillectomy and hernia repairs;⁴ these patients are commonly cared for at community hospitals by adult and pediatric surgeons. Whereas medically complex children also undergo these common procedures, they are more likely to be cared for at tertiary care centers and are also more likely to undergo higher-complexity surgeries such as spinal fusions, hip osteotomies, and ventriculoperitoneal shunt placements.⁴ Hospitalist comanagement programs at community hospitals and tertiary care centers may therefore have evolved differently in response to different needs of patients, providers, and organizations,⁵ though some institutions may not fall neatly into 1 of these 2 categories.

Comanagement in Community Hospitals

A significant number of pediatric patients are hospitalized each year in community hospitals.⁶ As noted above, children undergoing surgery in these settings are generally healthy, and may be cared for by surgeons with varying amounts of pediatric expertise. In this model, the surgeon may frequently be offsite when not in the operating room, necessitating some type of onsite postoperative coverage. In pediatrics, following adult models, this coverage need may be relatively straightforward: surgeons perform the procedure, followed by a medical team assuming postoperative care with surgical consultation. Because of general surgeons' varying experience with children, the American Academy of Pediatrics suggests that patients younger than 14 years or weighing less than 40 kg cared for by providers without routine pediatric experience should have a pediatric-trained provider involved in their care,⁷ though this suggestion does not mandate comanagement.

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TABLE 1. Common Models of Comanagement*

Model	Attending Service	Consulting Service	Automatic Consultation	Who Writes Orders?	Notes
I	Surgery	Pediatrics	No	Surgery	Similar to “traditional” consultation
II	Surgery	Pediatrics	Yes	Usually surgery	Basic comanagement, consultant may sign off
III	Pediatrics	Surgery	Yes	Usually pediatrics	Basic comanagement, consultant may sign off
IV	Combined	N/A	N/A	Each service writes own	True comanagement, no sign-off from either service permitted

NOTE: Abbreviations: N/A, not applicable.

*Adapted from Mendelson and Friedman.²⁰

For children cared for by adult providers who have little experience with areas of pediatric-specific care such as medication dosing and assessment of deterioration, we believe that involvement of a pediatric provider may impact care in a number of ways. A pediatric hospitalist’s availability on the inpatient unit may allow him or her to better manage routine issues such as pain control and intravenous fluids without surgeon input, improving the efficiency of care. A pediatric hospitalist’s general pediatric training may allow him or her to more quickly recognize when a child is medically deteriorating, or when transfer to a tertiary care center may be necessary, making care safer. However, no studies have specifically examined these variables. Future research should measure outcomes such as transfers to higher levels of care, medication errors, length of stay (LOS), and complication rates, especially in community hospital settings.

Comanagement in Tertiary Care Referral Centers

At tertiary care referral centers, surgeries in children are most often performed by pediatric surgeons. In these settings, providing routine hospitalist comanagement to all patients may be neither cost-effective nor feasible. Adult studies have suggested that population-targeted models can significantly improve several clinical outcomes. For example, in several studies of patients 65 years and older hospitalized with hip fractures, comanagement with a geriatric hospitalist was associated with improved clinical outcomes and shortened LOS.^{8–12}

An analogous group of pediatric patients to the geriatric population may be CSHCNs or children who are “medically complex.” Several frameworks have been proposed to identify these patients.¹³ Many institutions classify medically complex patients as those with complex chronic medical conditions (CCCs).^{13–15} One framework to identify CSHCNs suggested including not only children with CCCs, but also those with (1) substantial service needs and/or family burden; (2) severe functional limitations; and/or (3) high rates of healthcare system utilization, often requiring the care of several subspecialty providers.¹⁶ As the needs of these patients may be quite diverse, pediatric hospitalists may be involved in many aspects of their care, from preoperative evaluation,¹⁷ to establishing proto-

cols for best practices, to communicating with primary care providers, and even seeing patients in postoperative follow-up clinics. These patients are known to be at high risk for surgical complications, readmissions,¹⁴ medical errors,¹⁸ lapses in communication, and high care costs. In 1 study, comanagement for children with neuromuscular scoliosis hospitalized for spinal fusion surgery has been associated with shorter LOS and less variability in LOS.¹⁹ However, drawbacks of comanagement programs involving CSHCNs may include difficulty with consistent identification of the population who will most benefit from comanagement and higher initial costs of care.¹⁸

Models of Comanagement and Comanagement Agreements

A comanagement agreement should address 5 major questions: (1) Who is the primary service? (2) Who is the consulting/comanaging service? (3) Are consults as-needed or automatic? (4) Who writes orders for the patient? (5) Which staffing model will be used for patient care?²⁰ Although each question above may be answered differently in different systems, the “correct” comanagement program is a program that aligns most closely with the patient population and care setting.^{11,20}

Several different models exist for hospitalist–surgeon comanagement programs^{20,21} (Table 1). Under the consultation model (model I), hospitalists become involved in the care of surgical patients only when requested to do so by the surgical team. Criteria for requesting this kind of consultation and the extent of responsibility afforded to the medical team are often not clearly defined, and may differ from hospital to hospital or even surgeon to surgeon.²² Hospitalist involvement with adult patients with postoperative medical complications, which presumably employed this as-needed model, has been associated with lower mortality and LOS²³; whether this involvement provides similar benefits in children with postoperative complications has not been explicitly studied.

The remaining models involve compulsory participation by both surgical and medical services. In models II and III, patients may be evaluated preoperatively; those felt to meet specific criteria for high medical complexity are either admitted to a medical

service with automatic surgical consultation or admitted to a surgical service with automatic medical consultation. In both cases, writing of orders is handled in the same manner as any consultation model; depending on the service agreement, consulting services may sign off or may be required to be involved until discharge. In model IV, care is fully comanaged by medical and surgical services, with each service having ownership over orders pertaining to their discipline. Ethical concerns about such agreements outlined by the American Medical Association include whether all patients cared for under agreements II to IV will truly benefit from the cost of multispecialty care, and whether informed consent from patients themselves should be required given the cost implications.²⁴

Comanagement models also vary with respect to frontline provider staffing. Models may incorporate nurse practitioners, hospitalists, physician assistants, or a combination thereof. These providers may assume a variety of roles, including preoperative patient evaluation, direct care of patients while hospitalized, and/or coordination of inpatient and outpatient postoperative care. Staffing requirements for hospitalists and/or mid-level providers will differ significantly at different institutions based on surgical volume, patient complexity, and other local factors.

COMANAGEMENT AND QUALITY

Comanagement as a Family-Centered Initiative

Development of a family-centered culture of care, including care coordination, lies at the core of pediatric hospital medicine, particularly for CSHCNs.^{25,26} In the outpatient setting, family-centered care has been associated with improved quality of care for CSHCNs.^{27,28} For families of hospitalized children, issues such as involvement in care and timely information transfer have been identified as high priorities.²⁹ An important tool for addressing these needs is family-centered rounds (FCRs), which represent multidisciplinary rounds at the bedside involving families and patients as active shared decision makers in conjunction with the medical team.^{30,31} Although FCRs have not been studied in comanagement arrangements specifically, evidence suggests that this tool improves family centeredness and patient safety in nonsurgical patients,³² and FCRs can likely have a similar impact on postoperative care.

A pediatric hospitalist comanagement program may impact quality and safety of care in a number of other ways. Hospitalists may offer improved access to clinical information for nurses and families, making care safer. One study of comanagement in adult neurosurgical patients found that access to hospitalists led to improved quality and safety of care as perceived by nurses and other members of the care team.³³ A study in pediatric patients found that nurses overwhelmingly supported having hospitalist involvement in complex

children undergoing surgery; the same study found that pediatric hospitalists were particularly noted for their communication skills.³⁴

Assessing Clinical Outcomes in Pediatric Hospitalist Comanagement Programs

Most studies evaluating the impact of surgical comanagement programs have focused on global metrics such as LOS, overall complication rates, and resource utilization. In adults, results of these studies have been mixed, suggesting that patient selection may be an important factor.³⁵ In pediatrics, 2 US studies have assessed these metrics at single centers. Simon et al. found that involvement of a pediatric hospitalist in comanagement of patients undergoing spinal fusion surgery significantly decreased LOS.¹⁹ Rappaport et al. found that patients comanaged by hospitalists had lower utilization of laboratory tests and parenteral nutrition, though initial program costs significantly increased.³⁶ Studies outside the United States, including a study from Sweden,³⁷ have suggested that a multidisciplinary approach to children's surgical care, including the presence of pediatric specialists, reduced infection rate and other complications. These studies provide general support for the role of hospitalists in comanagement, although determining which aspects of care are most impacted may be difficult.

Comanagement programs might impact safety and quality negatively as well. Care may be fragmented, leading to provider and family dissatisfaction. Poor communication and multiple handoffs among multidisciplinary team members might interfere with the central role of the nurse in patient care.³⁸ Comanagement programs might lead to provider disengagement if providers feel that others will assume roles with which they may be unfamiliar or poorly trained.³⁵ This lack of knowledge may also affect communication with families, leading to conflicting messages among the care team and family frustration. In addition, the impact of comanagement programs on trainees such as residents, both surgical and pediatric, has received limited study.³⁹ Assessing pediatric comanagement programs' impact on communication, family-centeredness, and trainees deserves further study.

FINANCIAL IMPLICATIONS OF PEDIATRIC COMANAGEMENT PROGRAMS

Children undergoing surgery require significant financial resources for their care. A study of 38 major US children's hospitals found that 3 of the top 10 conditions with the highest annual expenditures were surgical procedures.⁴ The most costly procedure was spinal fusion for scoliosis, accounting for an average of \$45,000 per admission and \$610 million annually. Although a significant portion of these costs represented surgical devices and operating room time, these totals also included the cost of hospital services and

in-hospital complications. CSHCNs more often undergo high-complexity procedures such as spinal fusions³⁶ and face greater risk for costly postoperative complications. The financial benefits that come from reductions in outcomes such as LOS and readmissions in this population are potentially large, but may depend on the payment model as described below.

Billing Models in Comanagement Programs

Several billing constructs exist in comanagement models. At many institutions, comanagement billing may resemble that for “traditional” consultation: the pediatric hospitalist bills for his/her services using standard initial and subsequent consultation billing coding for the child’s medical conditions, and may sign off when the hospitalist feels recommendations are complete. Other models may also exist. Model IV comanagement may involve a prearranged financial agreement, in which billing modifiers are used to differentiate surgical care only (modifier 54) and postoperative medical care only (modifier 55). These modifiers, typically used for Medicare patients, indicate a split in a global surgical fee.⁴⁰

The SHM has outlined financial considerations that should be addressed at the time of program inception and updated periodically, including identifying how each party will bill, who bills for which service, and monitoring collection rates and rejected claims.² Regardless of billing model, the main focus of comanagement must be quality of care, not financial considerations; situations in which the latter are emphasized at the expense of patient care may be unethical or illegal.²⁴ Regardless, surgical comanagement programs should seek maximal reimbursement in order to remain viable.

Value of Comanagement for a Healthcare Organization Under Fee-for-Service Payment

The value of any comanagement program is highly dependent on both the institution’s payor mix and the healthcare organization’s overarching goals. From a business perspective, a multidisciplinary approach may be perceived as resource intensive, but formal cost-effectiveness analyses over time are limited. Theoretically, a traditional payment model involving hospitalist comanagement would be financially beneficial for a healthcare institution by allowing surgeons and surgical trainees more time to operate. However, these savings are difficult to quantify. Despite the fact that most hospitalist programs have no direct financial benefit to the institution, many hospital leaders seem willing to subsidize hospitalist programs based on measures such as patient and referring physician satisfaction with hospitalist care.⁴¹ Postoperative complications, although unfortunate, may be a source of revenue under this model if paid by insurance companies in the usual manner, leading to a misalignment of quality and financial goals. Regardless, whether these

programs are considered worthy investments to healthcare organizations will ultimately depend on evolving billing and reimbursement structures; to date, no formal survey of how comanagement programs bill and are reimbursed has been performed.

Value for an Organization in an Accountable Care Organization Model

Although a detailed discussion of accountable care organizations (ACOs) is beyond the scope of this article, stronger incentives in these structures for reducing resource utilization and complication rates may make hospitalist comanagement attractive in an ACO model.⁴² ACO program evaluation is expected to be based on such data as patient surveys, documentation of care coordination, and several disease-specific metrics.^{43,44} Several children’s hospital-based systems and mixed health systems have dedicated significant resources to establishing networks of providers that bridge inpatient and outpatient episodes of surgical care.^{27,28} One adult study has suggested lower costs associated with hospitalist comanagement for geriatric patients with hip fractures.¹² Comanagement programs may help meet quality and value goals, including enhancing care coordination between inpatient and outpatient care, and therefore may prove to be a beneficial investment for institutions. As the healthcare landscape evolves, formal study of the costs and benefits of pediatric comanagement models in ACO-type care structures will be important.

SETTING A RESEARCH AGENDA

Pediatric hospitalist comanagement programs require vigorous study to evaluate their impact. Potential research targets include not only clinical data such as LOS, perioperative complication rates, readmission rates, and resource utilization, but also data regarding surgeon, nursing, and family satisfaction. These programs should also be evaluated in terms of how they impact trainees, both surgical and pediatric. Because of comanagement programs’ complexities, we anticipate that they will impart both positive and negative effects on some of these factors. These programs will also require evaluation over time as they require significant education on the part of staff and families.³⁶

In addition to affecting global metrics, pediatric hospitalists may also have a positive impact on surgical care by demonstrating leadership to improve systems of care relevant to surgical patients, including the use of guidelines. The American College of Surgeons’ National Surgical Quality Improvement Program has identified 2 priorities that hospitalists may impact: surgical site infection (SSI) and pulmonary complications, which combined comprise greater than half of all 30-day postoperative complications.⁴⁵ Regarding SSI prevention, hospitalist researchers are making valuable contributions to literature surrounding adherence to Centers for Disease Control and

Prevention and Pediatric Orthopedic Society of North America guidelines.^{46–48} Research is ongoing regarding how human and systems factors may impact the effectiveness of these guidelines, but also how reliably these guidelines are implemented.⁴⁹ In the area of pulmonary complications, pediatric hospitalists have followed the example of successful initiatives in adult surgery patients by developing and implementing postoperative protocols to prevent pulmonary complications such as postoperative pneumonia.⁵⁰ At 1 center, pediatric hospitalists have led efforts to implement a standardized respiratory care pathway for high-risk orthopedic patients.⁵¹ Evaluation of the effectiveness of such programs is currently ongoing, but early data show similar benefits to those demonstrated in adults.

CONCLUSIONS

Pediatric hospitalist comanagement programs for surgical patients have largely followed the path of adult programs. Limited data suggest that certain clinical outcomes may be improved under comanagement, but patient selection may be important. Although there is significant variety between programs, there exist several common themes, including the importance of clear delineation of roles and a central goal of improved care coordination. Ongoing research will hopefully shed more light on the impact of these programs, especially with regard to patient safety, hospitalist-led quality-improvement programs, and financial implications, particularly in different structures of care and reimbursement models.

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