

Summary of STARNet: Seamless Transitions and (Re)admissions Network

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abstract



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The Seamless Transitions and (Re)admissions Network (STARNet) met in December 2012 to synthesize ongoing hospital-to-home transition work, discuss goals, and develop a plan to centralize transition information in the future. STARNet participants consisted of experts in the field of pediatric hospital medicine quality improvement and research, and included physicians and key stakeholders from hospital groups, private payers, as well as representatives from current transition collaboratives. In this report, we (1) review the current knowledge regarding hospital-to-home transitions; (2) outline the challenges of measuring and reducing readmissions; and (3) highlight research gaps and list potential measures for transition quality. STARNet met with the support of the American Academy of Pediatrics' Quality Improvement Innovation Networks and the Section on Hospital Medicine.

Current research and quality improvement efforts to optimize transitions of care for children to and from the hospital are fragmented in part because of a lack of evidence base and standardization of outcomes. Despite national attention to the subject and a large number of quality improvement activities in pediatric transitions, clear evidence for specific drivers of pediatric readmissions is limited. Although researchers continue to define the "who" and "why" of preventable pediatric admissions, several large collaboratives have embarked on efforts to improve care transitions and reduce readmissions (Table 1). With a goal of improving inpatient to outpatient transitions, many individual institutions have established pediatric readmission teams by using a value proposition derived from adult populations.¹⁻³ Whether these initiatives will be successful in improving hospital

transition and reducing readmissions remains unclear in the absence of a well-defined pediatric research model.

Quality improvement leaders working on hospital to home transitions of care within the American Academy of Pediatrics' (AAP) Quality Improvement Innovation Networks identified the need to address many of these issues based on the current state of research. With the support of the Quality Improvement Innovation Networks and the Section on Hospital Medicine, they convened this expert panel to begin synthesizing existing work and coordinating future work. The Seamless Transitions and (Re)admissions Network (STARNet) met in December 2012. STARNet participants consisted of experts in the field of pediatric hospital medicine quality improvement and research, and included physicians and key

stakeholders from the Children's Hospital Association, private payers, representatives from the current transition collaboratives, and key national groups. The goal of this meeting was to synthesize ongoing hospital-to-home transition work, discuss goals of the STARNet organization, and develop a plan to centralize transition information for the use of clinicians, researchers, and quality improvement projects in the future. This report summarizes the discussions of the STARNet meeting. The objectives of this report are to (1) review the current knowledge regarding hospital-to-home transitions; (2) outline the challenges of measuring and reducing readmissions; and (3) highlight research gaps and potential measures for transition quality.

CURRENT KNOWLEDGE REGARDING PEDIATRIC HOSPITAL-TO-HOME TRANSITIONS

Care transitions are "a set of actions designed to ensure the coordination and continuity of health care as patients transfer between different locations or different levels of care within the same location."⁴ Examples of pediatric transitions include the following: home to primary care provider (PCP), PCP to subspecialist, PCP to emergency department (ED), ED to hospital, and hospital to home. The transition between the hospital and the outpatient setting can be complex given the shared responsibility between inpatient providers, outpatient providers, the child, and their caregiver(s). Effective communication, care coordination, contingency planning, and family engagement are all key components of care transition quality. Certain populations of children require additional transitional support because of medial complexity.

Communication

Written communication between care providers at hospital discharge is often inconsistent, untimely, lacking

in essential information, and includes excessive nonessential information for both pediatric and adult patients.⁵⁻⁷ These breakdowns can introduce the risk of adverse outcomes.⁸ Researchers have identified essential informational elements for written discharge communication for both PCPs and hospitalists.^{6,9} In particular, Quality Improvement researchers from the Value in Inpatient Pediatrics network found that PCPs identify changes in medical management, follow-up appointments, and pending laboratory results as important components of discharge communication.¹⁰ Inpatient to outpatient verbal hand off may decrease readmission-related resource utilization in certain adult populations,¹¹ but this remains an understudied component of hospital to home transitions. Other frameworks and recommendations for the transition process improvement include shared care plans for complex children, condition-specific discharge bundles, and defining discharge timing, but more implementation work is needed.¹²⁻¹⁴

Care Coordination/Contingency Planning

Care coordination is the "deliberate organization of patient care activities between two or more participants... to facilitate the appropriate delivery of health care services."¹⁵ Care coordination is a fundamental tenet of successful transition. Assigning an individual or team responsibility for the inpatient to home transition can decrease pediatric readmission or ED use after discharge.¹⁶

Family Engagement

Although the transfer of health care information at hospital discharge is critical for pediatric patients, it is only 1 small part of the transition process. The family also plays a key role in the transition. During a hospital stay, a team of nurses, physicians, pharmacists, respiratory therapists, and parents/caregivers provide care. However, at

discharge the burden of daily care as well as assessment of clinical status becomes the sole responsibility of the parent/caregiver under the guidance of their outpatient medical providers. The transition to home with a child with complex medical needs is often a very stressful change for parents.^{17,18} Involving parents in the transition process increases their ability and confidence to care for their child.¹⁹ Identification of parents who are uncomfortable with discharge could allow for mitigation before hospital discharge.^{20,21} Finally, family discharge preparation should be tailored to level of English language proficiency (with appropriate translation when appropriate) and health literacy.^{22,23}

Family-centered care (FCC) promotes partnership with families by using the principles of information sharing, respect and honoring differences, partnership and collaboration, negotiation, and care in the context of the family and community.²⁴ FCC in both the inpatient and outpatient setting may aid the hospital to home transition. The principles of FCC have been adopted readily in the pediatric inpatient setting through family-centered rounds allowing for family input on discharge goals, timing, and outpatient arrangements.²⁵ Additionally, FCC in the PCP office decreases unmet health care needs related to transitions and offers families opportunity for shared decision-making.²⁴ One uninvestigated yet potential use of FCC is the inclusion of the patient/caregiver in the discharge communication from the inpatient to outpatient care team. This approach would allow for shared decision-making between health care providers and the family; shared decision-making can help families feel less conflicted about treatment options.²⁶ Family engagement in discharge processes may also lead to innovations around utilization of technology for after discharge care such as texting check-ins or telehealth.

TABLE 1 Examples of Efforts in Pediatric Transitions

Collaborative Effort	Organizers/Drivers	Participants	Aim	Methods	Outcome
Solutions for Patient Safety	Children's Hospitals Solutions for Patient Safety National Children's Network	88 children's hospitals	20% reduction in readmissions by December 31, 2013, phase 1 hospitals 10% reduction in readmissions by December 31, 2013, phase 2 hospitals	"All teach all learn" hospitals receive monthly reports for comparison with the network as a whole. National webinars on teaching quality improvement methodology and webinars which are specific to readmissions.	7-d inpatient and observation readmissions
IMPACT: Improving Pediatric Patient-Centered Care Transitions	AAP Section on Hospital Medicine Subcommittee on Quality and Safety	Interested member hospitalists and their hospitals	Improve accurate caregiver teach-back of essential self-management information during a postdischarge telephone call to 90% within 12 mo Improve hospitalist-PCP timely communication of essential content to 90% within 12 mo Reduce readmission rates for technology-supported patients by 20% within 24 mo Reduce return-to-ED posthospital discharge for technology-dependent patients by 20% within 24 mo Improve PCP perception of medical provider handoff by 33% within 12 mo	Multifactorial designed planned experimentation. Rapid cycle improvement Local and Multisite Collaborative Plan-Do-Study-Act cycles to share keys to success, lessons learned, and strategies to overcome barriers among and between participating sites	Readmission rates and return to ED rates
Pedi-Boost	University of California Medical Centers with Society of Hospital Medicine	3 pilot hospitals to be followed by interested hospitalists nationally	Pedi-Boost tools implemented for the site-specific target population for at least 75% of eligible patients Decrease 72-h return to ED by 10% within 6 mo Greater than 75% of participating patients and families will rate their understanding of postdischarge plans on a Likert scale at "good" or better within 6 mo Greater than 75% of participating patients and families will rate their satisfaction with the discharge process on a Likert scale at good or better within 6 mo	Pedi-Boost tools	Return to ED, family and medical provider satisfaction

TABLE 1 Continued

Collaborative Effort	Organizers/Drivers	Participants	Aim	Methods	Outcome
			Greater than 75% of participating trainees, nurses, and attending physicians self-reported efficacy in applying quality improvement methodology to patient care is rated at good or higher within 6 mo		
Children's Hospital Association	Children's Hospital Association	Interested member hospitals	Reduce discharge-related care failures by 50% Improve compliance with key discharge processes by 95%	Rapid cycle improvement with the Institute for Healthcare Improvement model of improvement	Discharge-related care failures and patient/family readiness for discharge
Hospital Transition Clinic	University of North Carolina, Duke Endowment, North Carolina Medicaid, Children's Health Accountable Care Collaborative	University of North Carolina inpatient physicians, local Medicaid network, Outpatient Complex Care physicians, Legal Aid of North Carolina	Reduce 30-d readmissions for patients discharged from the general pediatric services by 30% Reduce ED visits within 30 d for patients discharged from the general pediatrics services by 30% Decrease hospital length of stay by 1/4 of a day Decrease medication errors in patients through the use of teach back after discharge Improve barriers to care through discharge planning screening process Improve transition back to patient's primary care through improved communication	In-hospital visit screening for medical fragility and social needs with referral as appropriate to resolve and improve ongoing issues Transitions clinic visit within 2 d of discharge	Primary outcomes: Readmission, ED visit post hospitalization Secondary outcomes: Length of stay; Number of medication related questions addressed after discharge; Number of families screened for unmet social needs; Number of patients who have an appointment with the PCP within 30 d of discharge
Packard Foundation		Multistakeholder expertise across the care continuum	To develop national standards for pediatric hospital discharge care	National survey of ongoing discharge practices	

Children With Medical Complexity

Finally, children with chronic conditions may be most vulnerable to suboptimal hospital to home transitions because they use the health care system more frequently and require more complex care coordination.²⁷ Miscommunication between caregivers in the home has led to medication errors in children

with chronic conditions.²⁸ The AAP Council on Children With Disabilities published a report on children with complex needs and home care that outlines the areas that need to be addressed when coordinating discharge planning from hospital to home. These include the stability of the child's medical condition, family, home, community, medical home,

training for caregivers, home care nursing, supplies, and insurance coverage. After discharge, continued review of these areas is needed to ensure the best outcome for the child.¹² Care coordination for children with special health care needs continues to be problematic and requires timely, effective communication to be successful.²⁹

OTHER PEDIATRIC CARE TRANSITIONS

Although STARNet was originally convened to address the inpatient to outpatient transition, the group acknowledged the importance and potential applicability of evidence from various pediatric transitions. For example, a significant body of literature focused on the transitions between PCP and specialists exists. The majority of PCPs and specialists prefer a comanagement approach, especially for children with serious illness or complex medication management.^{30,31} In the outpatient setting, communication has been improved with the use of electronic medical records.³¹ It is plausible that shared electronic medical records from the inpatient and outpatient settings would assist inpatient to home transitions.³² Several templates with essential communication elements have been established, including a shared care plan referral form with designated sections to divide responsibility of documentation between parents, PCPs, and specialists.^{33,34} Such shared templates may serve as a model for hospital discharge improvement efforts.

Checklists and standardized handover for within the hospital transition have shown improvement in communication and accuracy of information shared between providers.^{35,36} The I-PASS study^{37–39} seeks to optimize transitions to develop safe, reliable, and efficient hand-offs within the inpatient setting. These concepts could be applied and investigated in hospital to home transition.

CHALLENGES OF MEASURING AND REDUCING READMISSIONS

Readmission is a key measure in current Centers for Medicare and Medicaid Services Medicare reimbursement policy. Attention was given to this metric because of high readmission rates for adults with certain conditions, such as congestive

heart failure, pneumonia, and after acute myocardial infarction.^{40–44} Pediatric readmission rates for a variety of conditions have only recently become widely available.^{45–47} Overall these rates tend to be lower than those seen in adults. Furthermore, the conditions leading to frequent adult readmission are different than those that result in pediatric readmissions.⁴⁶

The relationship between pediatric readmission and quality of care is unclear. For example, in 1 study of pediatric readmission, higher readmission rates were observed in states with higher overall care quality scores.⁴⁸ Another study revealed the documentation of a PCP follow-up plan at discharge was associated with an increase in 30-day readmission rates for pediatric patients.⁴⁹ Despite the unclear relationship between pediatric readmission and hospital quality, pediatric readmissions have recently been added to Medicaid reimbursement policies in several states, including Texas, Illinois, and New York.^{50–54}

Superficially, readmission rates seem to be a straightforward quality metric that is easy to measure. However, several methods exist to calculate pediatric readmission rates. “All cause” readmission rates include both planned and unplanned readmissions. A more specific focus on unplanned readmissions requires either excluding readmissions based on certain diagnosis and procedure codes^{46,55} or utilizing individual hospital designations of planned versus unplanned. State Medicaid offices have chosen “potentially preventable readmissions” as the metric upon which reimbursement is determined. The potentially preventable readmissions are defined by using proprietary software developed by 3M-Health Information Systems.⁵⁶ Unfortunately, the current methods to identify unplanned and potentially preventable readmissions rely on expert opinion and have not

been formally validated. Therefore, researchers, improvement scientists, and policy makers must weigh the pros and cons of each method to measure pediatric readmission.

Due to the lower overall pediatric readmission rates compared with adults, researchers and improvement scientists must be aware of the challenges of studying broad interventions applied to all hospitalized patients. In addition to the challenge of identifying the most appropriate measure of readmission, sample size considerations are important for each environment. As a consequence many existing discharge studies are underpowered to detect a change in readmission.¹⁶ For readmission reduction quality improvement projects, the challenge is having enough readmission events across each subgroup or substrata to learn rapidly if improvement interventions are having their desired effect.⁵⁷ For institutions with limited resources, interventions might best be targeted to those children who are at highest risk of readmission.

Certain populations of children have been identified as having higher risk of readmission. At 1 hospital, children with neurologic and oncologic diagnoses comprised the largest groups of patients with short-term readmissions.⁴⁷ Nationally, the highest rates of 30-day readmission occurred in children with neoplasms.⁴⁶ When looking over a longer span of time, the highest 365-day rehospitalization rates take place among a small percentage of children with neuromuscular conditions and technology dependence.⁵⁸ This group accounts for 3% of patients seen at children’s hospitals but 20% of all admissions and 25% of all hospital charges.⁵⁸ Although the preventability of these hospitalizations is not completely known, readmissions in children with episodic chronic, single lifelong chronic, or multiple and complex clinical risk groups were deemed

“more likely preventable” 25% of the time.⁵⁹ Thus, greatest impact on pediatric readmissions may be achieved through a focus on developing interventions to reduce readmissions for children with specific complex conditions.

Inpatient factors, outpatient factors, and previous health care utilization may be important for determining who is at risk for pediatric readmission. We present a conceptual model of factors contributing to pediatric readmission based on the STARNet discussions and existing literature (Fig 1). In the outpatient arena, a child’s underlying disease process may be a key factor in readmission risk given higher readmission rates for certain conditions and in children with multiple chronic conditions.^{46,58,60} The patient/families’ ability to care for disease is dependent on outpatient supports, including financial resources.^{61,62} Ability to care for disease is also related to medical complexity, knowledge, and access to outpatient care.^{63,64} In the inpatient realm, discharge processes and clinical status likely play a role in readmission.^{16,65} In particular, a caregiver report of lack of discharge readiness has been associated with readmission risk.²¹ Additionally, in adults impaired functional status at discharge is associated with readmission.⁶⁶ Finally, markers of previous health care utilization, although not direct risk factors, may be useful in trying to identify which children are at risk for readmission.^{58,60,67}

The evidence base for the link between care transition redesign and readmission is drawn primarily from the adult medical literature. In a systematic review of studies of adult readmission interventions, no single intervention was found to be effective in reducing 30-day readmission rates.⁶⁸ However, some intervention bundles have shown to be effective in reducing readmissions

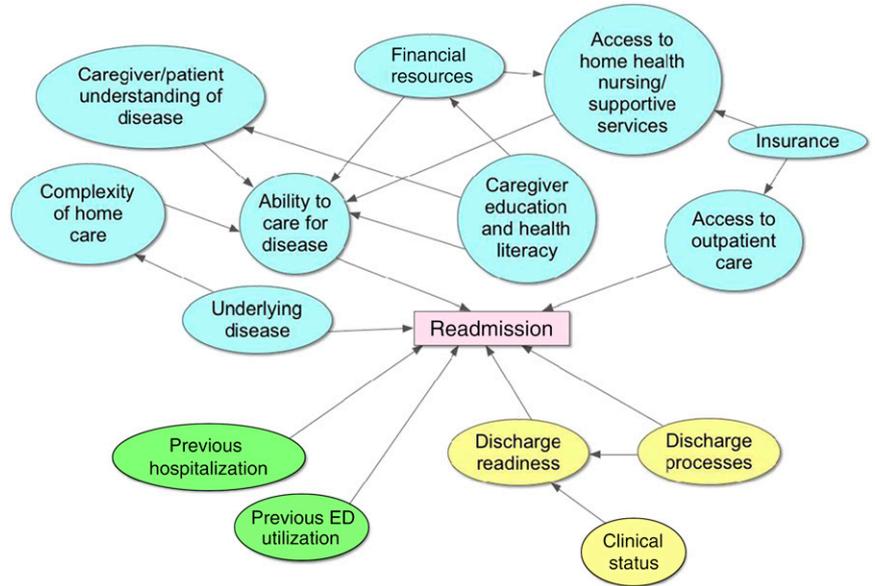


FIGURE 1 Factors influencing readmission risk of a pediatric patient. Blue circles represent outpatient factors and underlying disease processes. Green circles represent previous health care utilization. Yellow circles represent factors during the hospitalization.

in adults.^{69–71} In particular, the complex discharges that involve multiple interventions to support patient self-care are most effective.⁷² For pediatric populations, a systematic review of discharge interventions suggests inpatient tailoring and education with teach-back with postdischarge support may prevent subsequent utilization.¹⁶

Preventability of pediatric readmissions is a topic of uncertainty and debate. At a single tertiary care center, 20% of readmissions were rated as preventable on a 5-point Likert preventability scale.⁵⁹ Readmissions after surgical procedures were more likely preventable than readmissions after medical hospitalizations. Readmissions for central venous catheter infections or ventriculoperitoneal shunt malfunctions (8.5% of the total sample) were considered more likely to be preventable, both of which occurred in patients with underlying serious chronic illnesses. In a second study, readmission after and related to care on a pediatric hospital medicine service was examined. A 14-point classification system was

used to classify readmissions into 1 of 3 groups: physician-related, caregiver-related, or disease-related. Preventable readmissions, defined as admissions with at least 1 physician or caregiver-related reason for readmission, comprised 25% of all readmissions.⁷³

The relative importance of the parent/child/health care provider relationships, the role of the discharging hospital, and the outpatient environment on readmission risk remains unclear. Although between-hospital variation in readmissions exists for certain conditions,⁴⁶ the variability for common pediatric conditions is less (ie, for certain conditions discharging hospitals have very similar readmission rates).⁴⁵ There is much still to be learned about how the discharge process should be reconstructed to improve outcomes such as medication adherence, trust in providers, and patient-centered disease management. Further assessment is also needed to identify if and how avoidance of a return to ED or hospital setting results in resource savings versus resource reallocation.

TABLE 2 Potential Hospital-to-Home Transition Measures

Type of Measure	Institute of Medicine Quality Domain ⁷⁴	Measure	Description/Comments	Data Routinely Exists in Administrative Hospital Database? (Yes/No)
Health care utilization	Safe, Efficient	365-d rehospitalization	The use of long-term rehospitalization rates may help focus efforts on patients with multiple hospitalizations within a 1-year period. The utilization by this population has great cost to our health care system. Access to a claims database may be needed to assess visits to other facilities.	Y
Health care utilization	Safe, Efficient	ED visits after hospitalizations	This measure has the potential for easy measurement when assessing return to the same institution. The rates of posthospitalization emergency utilization are not well described. Like readmissions, the preventability of these visits has not been widely assessed. Access to a claims database may be needed to assess visits to other facilities.	Y
Health care utilization	Effective, Efficient	PCP visits after hospitalization	Posthospital follow-up with a PCP ensures the PCP's awareness of a hospitalization. However, not all children may be instructed to follow-up with the PCP after discharge and evidence that PCP visits reduce readmissions is contradictory.	N
Health care utilization	Effective, Efficient	Specialty appointment visits hospitalization	This measure only applies to children with ongoing issues requiring subspecialist management, likely including children with higher acuity illness during hospitalization and/or children with complex care conditions.	N
Medication	Safe	Prescriptions filled after discharge	Because the majority of hospitalized children are discharged from the hospital on medications, this measure is broadly applicable.	N
Medication	Safe	Medication reconciliation	This measure is applicable to all hospitalized children and should be performed routinely. It can be used as a transition measure both on admission and discharge to the hospital. When provided to outpatient providers after discharge, this tool provides the opportunity to assess for discrepancies in medications administered with those prescribed.	N
Medication	Safe	Post hospital adverse drug events	This measure is applicable to all hospitalized children as all children are at risk for unintended medication or harm from a prescribed medication. However, measurement of harm is challenging.	N

TABLE 2 Continued

Type of Measure	Institute of Medicine Quality Domain ⁷⁴	Measure	Description/Comments	Data Routinely Exists in Administrative Hospital Database? (Yes/No)
Caregiver	Patient-Centered	Readiness for discharge	Caregivers are perhaps in the best position to assess transition successes and failures. Not only must they be knowledgeable regarding the outpatient plan, they must also feel prepared for discharge and comfortable with managing the patient care issues. The caregiver's ability to teach-back care plan/medications at discharge may be an objective way to assess readiness for transition. Tools exist to evaluate caregiver readiness for discharge and abilities to problem solve after discharge. ^{21,75} Readiness for discharge has been linked to important health outcomes including readmission. ^{21,75,76}	N
Caregiver	Patient-Centered	Caregiver assessment of health care provider knowledge	Caregivers also have the unique opportunity to assess health care providers' comfort with the entire transition. Caregivers may provide subjective insight into how well the inpatient care teams understand their child's chronic health issues. Additionally, caregivers could rate how well outpatient providers understand a hospitalization event.	N
Caregiver	Patient-Centered	Caregiver experience with coordination of care	Multiple validated measures to assess caregiver experience with coordination of care are published. ^{77–80}	N
Other	Safe, Effective	Response to outstanding laboratory and radiology tests	This transition measure is applicable to a subset of hospitalized children. Studies regarding pending laboratories at discharge among adults reveal 32% to 41% patients had results pending at hospital discharge of which 43% were abnormal. Importantly, 62% of physicians were unaware that these results were pending because discharge summaries did not contain the information on pending laboratories 89% of the time. ^{81,82} Further the ownership for post discharge laboratories in pediatric patients is contested. ⁸³	N
Other	Safe, Timely, Efficient	Home health plan implemented correctly with proper equipment received	Given current understandings that children who require medical supplies are at higher risk for readmission, this may be an important metric to target children at high risk. This concept may best be measured through caregiver report.	N
Other	Safe, Effective	Discharge information received by PCP	Providers can assess timely communication of essential information transmission and receipt. PCPs can also assess overall satisfaction with transition.	N

TABLE 2 Continued

Type of Measure	Institute of Medicine Quality Domain ⁷⁴	Measure	Description/Comments	Data Routinely Exists in Administrative Hospital Database? (Yes/No)
Other	Safe	Death	Death after transition is an objective measurable event; fortunately the rates of pediatric deaths are low enough that this is not a viable measure of pediatric transition success.	N

READMISSION RESEARCH GAPS

Transitions are an important aspect of care for all hospitalized children. Using readmission as a metric of successful transition has inherent challenges. Future research in the pediatric readmission realm should focus on the following:

- Reasons for readmissions, factors that contributed to the readmission, attribution of these causal factors, and potential to mitigate these factors to reduce preventable readmission.
- The variability in readmission rates attributable to the discharging hospital and further understanding how much the quality of hospital care affects readmission in pediatric populations.
- Understanding which patients are at high risk for readmission, and recognizing that the relative infrequency of readmission requires enrollment of large numbers of children in interventional studies of readmission prevention.

MEASURES OF HOSPITAL-TO-HOME TRANSITION

The ultimate goal of transition research must be to ensure the

highest quality patient care and prevent harm that can result from poor transitions of care. Given the gaps in understanding pediatric readmission, we propose several other potential measures of hospital-to-home transition (Table 2). These hospital-to-home outcome measures require further study for feasibility, measurement reliability and validity, and effectiveness in preventing harm. Once transition outcome measures are established, interventions to optimize transitions should be further evaluated with a rigorous approach by using quality improvement research methods. Measures may reflect health care utilization, medication adherence/safety, caregiver perspectives, and other aspects of transitions.

NEXT STEPS FOR STARNET

This first STARNet meeting offered an opportunity to analyze and synthesize much of the latest, ongoing research and quality improvement work relevant to transitions in care from hospital-to-home. STARNet was envisioned to serve as the nexus for pediatric hospital-to-home transitions work. Many other overlapping domains in health care are relevant to discussions about pediatric

transition-related work, including but not limited to care coordination with the primary care medical home, patient-centered outcomes, and national payment reform interests. We have therefore begun to engage primary care pediatricians, family members, payers, and pediatric-to-adult transition experts in an effort to build a broader multistakeholder group that will create a more expansive strategy for improving all pediatric transitions of care, between any 2 points in the health care system. Once convened, this steering committee would work to coordinate a shared national agenda, potentially serving to develop a clearinghouse for transition resources, integrate front-line clinical, research, and quality improvement work, and/or secure funding for sustainability. In the same manner that patient care fragmented across settings is inadequate, an uncoordinated change agenda for pediatric transitions falls short of our potential to transform the system. STARNet aspires to break down barriers between transition-related work with the goal of seamless transitions for our children and high value care. Clear and mutually agreed upon transition agendas are paramount to this effort.

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