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## Systematic Identification of Coordination Gaps in Pediatric Care

### Abstract

In the United States, the status of coordination among pediatric care services is not well understood. Through the use of quality improvement (QI) techniques, coordination gaps were systematically identified in the interagency network of pediatric services in Kalamazoo MI. Gaps were found in transportation resources, follow-up procedures, awareness of services, interagency communication, insurance limitations, population behaviors, and resource utilization. This preliminary study reveals the need for (1) protocols for intra- and inter-agency communication, (2) mechanisms for easy and fast retrieval of pediatric resources, and (3) health information exchange.

### Keywords

pediatric care coordination, quality improvement

### Cover Page Footnote

The authors would like to thank the following institutions for their participation in the study: Bronson Methodist Hospital, Family Health Center, Kalamazoo County Health and Community Services, Kalamazoo Regional Educational Service Agency, and Western Michigan University Homer Stryker M.D. School of Medicine (WMed). Drs. Prieto, Kothari, and Dickson report grants from the Kellogg Foundation during the conduct of the study. No competing financial or editorial interests were reported by the authors of this paper.

## INTRODUCTION

In the United States, infant mortality rates are among the highest in the developing world.<sup>1</sup> For children with special needs, it is known that medical, social, and educational services are often fragmented, duplicative, scattered, and uncoordinated.<sup>2,3</sup> However, for service networks assisting groups of children with diverse racial or socioeconomic backgrounds, the status of care coordination, that is, the organization of patient's care activities, is not well understood.

In Kalamazoo Michigan, poor pediatric health outcomes<sup>4,5</sup> evidence the need for specific courses of action in local service administration and integration. In 2014, The Kellogg Foundation launched the Racial Healing planning grant, an initiative aimed at identifying and developing courses of action to reduce health and educational disparities in the Kalamazoo area. Our research group responded to the call by means of a quantitative and qualitative analysis of data and services to identify and document healthcare coordination gaps. The gaps would inform stakeholders on the key issues to address when planning the courses of action.

In this article, the qualitative portion of the study is introduced, in which deficiencies and risks of the pediatric care coordination process were systematically assessed using process maps and failure mode and effects analysis (FMEA), which are both quality improvement (QI) tools.<sup>6,7</sup> Through the use of the QI tools, clear evidence of gaps and associated risks was found in all agencies responsible for pediatric care coordination.

## METHODS

Educational and hospital organizations that serve the entire county population of children aged 0–5 were recruited: Bronson Methodist Hospital, Family Health Center, Kalamazoo County Health and Community Services, Kalamazoo Regional Educational Service Agency, and Western Michigan University Homer Stryker MD School of Medicine (WMed). From these organizations, the pediatric healthcare agencies serve 80% of the low-income population.

A naturalistic method was applied, which utilized semi-structured group interviews for knowledge elicitation. Interviewees were identified by each participating agency. The Western Michigan University Human Subjects Institutional Review Board exempted the study from IRB approval, since the analysis was at the process level and not at the individual level.

The project was executed in three phases:

**Phase 1. Conducting interviews to understand the process flow.** An initial round of interviews was conducted with principal stakeholders in each of the agencies to create flowcharts for the main service processes. The intent of the meetings was to understand the processes and the players involved in the care coordination services for children aged 0–5 years. The interviews were between 1.5 and 2.5 hours and scheduled at the WMed administrative building. The interviews were recorded for subsequent review, and the names of the stakeholders were removed from the audio recordings.

**Phase 2. Follow-up interviews to revise process flow maps.** The recordings from Phase 1 were reviewed, and the care coordination process mapped using standard flow charting symbols. A second round of 0.5-to-1.0-hour interviews was conducted with the stakeholders involved in Phase 1. In some cases, interviews were also scheduled with operational staff at various stages of

care coordination planning and execution. Stakeholder buy-in was solicited for the process maps developed by the researchers. Information about potential concerns from the operational staff was also solicited. Figure 1 shows an example of a flowchart developed for a neonatal intensive care unit.

**Phase 3. Interviews to obtain data for FMEA and refinement of process flow maps, if required.** The concerns voiced by the stakeholders and the analysis of the voice recordings were used to develop the FMEAs. A final round of interviews was conducted with the operational staff to evaluate the following components: (1) the severity of the effects of identified causes, (2) likelihood of occurrence, and (3) likelihood of detection of the causes. The three components were used to create risk priority numbers (RPNs) that were useful in understanding the most serious gaps and relevant risk factors in child care coordination. Table 1 shows an example of an FMEA developed for a neonatal intensive care unit.

## RESULTS

Certain factors appear to be common concerns that inhibit successful care coordination:

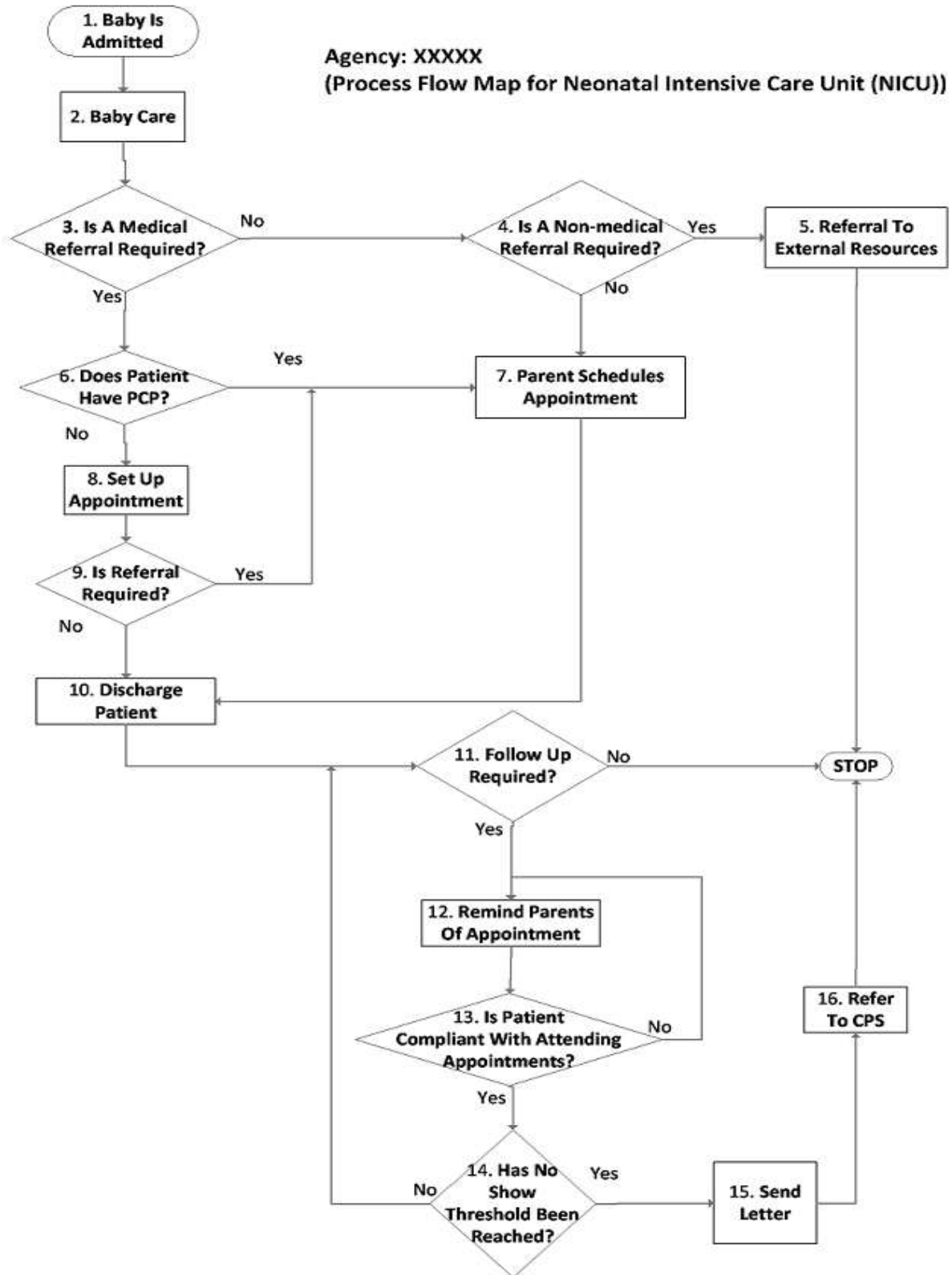
**Transportation resources.** It was mentioned that patients missed appointments due to insurance policies for transportation that are unsupportive of financial hardship (e.g., Medicaid's reimbursed transportation) or medical urgency (e.g., pre-scheduled transportation with 3 days in advanced for Medicaid patients). In addition, public transportation accessibility is limited in special cases, including night or weekend emergencies, or for families with more than three riding children per parent. The potential effect is missing appointments, difficulty in rescheduling appointments, and potential inefficiency in utilization of personnel.

**Follow-up procedure on appointment scheduling and attendance.** Agencies had protocols or procedures to track patients within their system but in many instances they did not have an effective protocol to follow up after the patient is discharged or referred. This leads to coordination gaps at critical times like after hours or weekends. Also, due to lack of formal mechanisms for tracking attendance to appointments or referrals, care coordinators track information at their discretion (e.g., from patient's electronic or paper-based health records).

**Awareness of services.** There exists limited knowledge about community resources within the Kalamazoo area. The predominant cause is non-availability of a centralized information source. Care coordinators generally accrue and manage information about community resources independently, and often in reaction to patient needs. Consequently, care coordination delays or suboptimal services may be encountered by patients. The periodic need to update personal resource databases also leads to additional burden on the care coordinators since it involves time away from actual duties.

**Interagency communication.** The concern of interagency communication is apparent in all agencies. For example, home visitation programs provide notification only to the referring agencies about the enrollment of a patient. A consequence of this procedure is the exclusion of other agencies or entities that may benefit from the notification, such as primary care practitioners (PCPs). In other instances, PCPs and Child Protection Services do not provide feedback to other supporting agencies, which makes case management difficult. The lack of awareness of services coupled with the ineffective interagency communication often leads to duplication of services and ineffective use of resources.

**Figure 1.** Example of a flowchart developed for a neonatal ICU



Step	Process	Failure mode	Failure effects	Severity (1–10)	Failure causes	Likelihood of occurrence (1–10)	Current process detection	Likelihood of detection (1–10)	Risk priority number (RPN)	Severity X likelihood of failure	Actions to reduce occurrence of failure
3	Is a medical referral required?	System	Potential delay in patient healthcare	5	Difficulty in obtaining information from medical records	7	Transitional care specialist	3	105	35	Provide a single EHR portal to access information
4	Is a non-medical referral required?	System	Delayed or inadequate care	7	Open loop system for communication with external community resources	7	Transitional care specialist	8	392	49	Improve interagency communication
		System	Delayed, inadequate, or no care	7	Negative perception about home visitation and social worker role	5	Transitional care specialist	9	315	35	Educate parents on the benefits from services
8	Set up appointment	System	Delayed or inadequate care	8	a. Lack of available appointment slots	6	Transitional care specialist	4	192	48	Increase availability
		System	Inefficient use of personnel time	3	b. Time to schedule appointment ( <i>put on hold when scheduling</i> )	7	Transitional care specialist	1	21	21	Improve interagency communication
13	Is patient compliant with attending appointments?	Personnel	Delayed or no care	10	a. Personal choice to miss appointments	5	Transitional care specialist	8	400	50	Educate parents on risks of non-compliance
		System	Delayed or no care	8	b. Insurance policies related to transportation scheduling	9	Transitional care specialist	9	648	72	Expand internal programs and/or identify community resources
		System	Delayed or no care	8	c. Lack of available appointment slots	6	Transitional care specialist	4	192	48	Reduce no shows

Scale used:

1. Likelihood of Occurrence: 1–10; 10 = very likely to occur
  2. Likelihood of Detection: 1–10; 10 = very unlikely to detect
  3. Severity: 1–10; 10 = most severe effect
- Risk Priority Number (RPN) = 1 x 2 x 3

**Table 1. Failure modes and effects analysis for a neonatal intensive care unit**

**Interagency communication.** The concern of interagency communication is apparent in all agencies. For example, home visitation programs provide notification only to the referring agencies about the enrollment of a patient. A consequence of this procedure is the exclusion of other agencies or entities that may benefit from the notification, such as primary care practitioners (PCPs). In other instances, PCPs and Child Protection Services do not provide feedback to other supporting agencies, which makes case management difficult. The lack of awareness of services coupled with the ineffective interagency communication often leads to duplication of services and ineffective use of resources.

**Insurance limitations.** Certain insurance policies dictate eligibility for programs, network of providers, and transportation during treatment. These policies may manifest as limitations while providing service to patients.

**Demographics, behaviors, and perceptions of population served.** Socioeconomic status and education level of the served population could be potential barriers. For example, out-of-pocket costs for transportation and medicine might deter parents from attending an appointment. Transient residential status also imposes challenges if contacting parents is required.

**Non-optimal operation or resource utilization within agency.** The lack of standard operating procedures, insufficient resources, and the inefficient use of personnel time may lead to excessive delay in processing referrals, lack of referral processes for nonmedical conditions, and limited time for coordination of activities.

A summary of the agencies that mentioned a concern, together with the calculated RPNs are presented in Table 2 (agencies have been de-identified); each agency may have different RPNs for the same concern, since representatives from different operating units were interviewed, and one FMEA was created for each operating unit.

**Table 2. Agency concerns and calculated RPNs**

Concerns voiced by stakeholders	Agency mentioning each concern and calculated RPNs
Transportation resources	A1 (648/360/320), A3 (192/45)
Follow up procedure	A1 (700), A2 (392), A5 (250)
Awareness of services	A1 (168), A2 (236), A3 (72)
Interagency communication	A1 (392), A2 (378), A3 (450/400/216/100/100), A4 (432), A5 (720)
Insurance limitations	A1 (648), A3 (96)
Demographics, behaviors, and perceptions of population served.	A1 (400), A2 (288), A5 (720)
Non-optimal operation and/or resource utilization within agency	A1(243), 2(336), 3(224), 4(500/448)

RPNs, risk priority numbers

## IMPLICATIONS

From the information presented in Table 2, interagency communication seems to be the most frequent concern followed by non-optimal operation or resource utilization within agency. However, the RPNs indicate that each concern creates a different risk depending on the agency. To illustrate, A5 provides services mainly to socioeconomically disadvantaged populations, and hence lack of interagency communication highly increases the chances that services are not provided at the network level (e.g., babies not supported by the programs and services for children in the community health department).

With the previous findings, our study provided evidence to the utility of QI techniques to identify care coordination gaps between medical and socio-educational resources.

The methods proposed can be used to analyze neighborhood, state, and national networks. Since the Kalamazoo network serves most of the population aged 0 to 5, these results can provide some useful insights into other networks that include diverse racial and socioeconomic backgrounds, as well as children with special needs. This study did not specifically target special care children, thus the results may not properly describe the issues of that population.

As a limitation, FMEA calculations were based on the opinions of key informants that, while experts identified by agency leadership, may have been inaccurate in degree or nature.

### SUMMARY BOX

**What is already known about this topic?** In the U.S., infant mortality rates are high, and there is evidence of inefficiencies in the care coordination networks for children with special needs.

**What is added by this report?** A systematic qualitative analysis to determine coordination gaps in a comprehensive inter-agency network for children aged 0–5 years. The analysis shows that there exist several challenges to overcome in the present organization of the programs/services. These challenges concern the system (transportation resources, agency protocols, community service awareness, and interagency communication) and the population served (demographics, behaviors, and perceptions).

**What are the implications for public health practice, policy, and research?** Working jointly with local stakeholders on establishing standard interagency referral processes is the next step in reducing racial and socioeconomic disparities in pediatric care coordination. Such referral process must be accompanied by a mechanism for easy and fast retrieval of existing health and education resources, as well as with mechanisms for care coordinator to safely and systematically retrieve patients' information throughout the coordination network.



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