

Article

Initial Steps for Quality Improvement of Obesity Care Across Divisions at a Tertiary Care Pediatric Hospital

Sheila Z. Chang ^{1,2}, Daniel R. Beacher ^{2,3}, Soyang Kwon ^{2,4}, Megan A. McCarville ^{2,4,6,†}, Helen J. Binns ^{2,4,5,6} and Adolfo J. Ariza ^{2,4,6,*}

¹ University of Illinois College of Medicine at Chicago, Chicago, IL 60612, USA;
E-Mail: schang39@uic.edu

² Mary Ann and J. Milburn Smith Child Health Research Program, Stanley Manne Children's Research Institute, Chicago, IL 60611, USA; E-Mails: beach046@umn.edu (D.R.B.); skwon@luriechildrens.org (S.K.); megan.mccarville@gmail.com (M.A.M.); hbinns@luriechildrens.org (H.J.B.)

³ University of Minnesota Medical School, Minneapolis, MN 55455, USA

⁴ Pediatrics, Feinberg School of Medicine, Northwestern University, Chicago, IL 60611, USA

⁵ Preventive Medicine, Feinberg School of Medicine, Northwestern University, Chicago, IL 60611, USA

⁶ Pediatrics, Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, IL 60611, USA

† Current address: Center for Clinical Effectiveness at the Blue Cross and Blue Shield Association, Chicago, IL 60601, USA.

* Author to whom correspondence should be addressed; E-Mail: aariza@luriechildrens.org; Tel.: +1-312-227-7023; Fax: +1-312-227-9523.

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Abstract: *Background:* Pediatric subspecialists can participate in the care of obese children. *Objective:* To describe steps to help subspecialty providers initiate quality improvement efforts in obesity care. *Methods:* An anonymous patient data download, provider surveys and interviews assessed subspecialty providers' identification and perspectives of childhood obesity and gathered information on perceived roles and care strategies. Participating divisions received summary analyses of quantitative and qualitative data and met with study leaders to develop visions for division/service-specific care improvement. *Results:* Among 13 divisions/services, subspecialists' perceived role

varied by specialty; many expressed the need for cross-collaboration. All survey informants agreed that identification was the first step, and expressed interest in obtaining additional resources to improve care. *Conclusions:* Subspecialists were interested in improving the quality and coordination of obesity care for patients across our tertiary care setting. Developing quality improvement projects to achieve greater pediatric obesity care goals starts with engagement of providers toward better identifying and managing childhood obesity.

Keywords: pediatric subspecialty; obesity identification; obesity management

1. Introduction

Pediatric obesity has medical consequences across a broad spectrum of body systems, including lipid disorders, hypertension, sleep disordered breathing, diabetes, metabolic syndrome, non-alcoholic fatty liver disease, and orthopedic disorders [1]. Addressing obesity and its related comorbidities in children begins with timely recognition in the medical care setting [1–3]. In the primary care setting, identification of obesity has been associated with increased delivery of obesity-focused care [3]. The Expert Committee provided guidelines for pediatric obesity care [1]. It recommended that medical providers routinely measure and document BMI. Providers are to establish procedures to routinely deliver obesity preventive/management counseling messages to their patients. In addition, providers are encouraged to develop interdisciplinary obesity management teams. These teams may include nurses, physical therapists, physicians, psychologists, and/or administrative staff members [1]. However, research suggests that successful obesity management will require moderate- to high-intensity comprehensive behavioral intervention programs, including many hours of patient- provider interaction [4].

Given that obesity management in the primary care setting is challenging [5–7], pediatric subspecialty visits may represent an opportunity for such recognition and counseling about overweight and obesity [8–13]. Due to comorbidities, patients with obesity are likely to present for multiple types of pediatric subspecialty visits. For children who have received counseling about overweight and obesity in the primary care setting, healthy lifestyle counseling promoted by a subspecialist may underscore and add credibility to the primary care provider's advice [9,14]. Identification by pediatric subspecialists has the capacity to benefit obese and overweight children by the provision of additional services and counseling in the coordinated spectrum of care [12,13]. However, pediatric subspecialists often fail to document occurrences of obesity among children in their care [9,10,13,15]. Thus, opportunities for obesity-related counseling might be missed.

Quality improvement processes are those actions which have been developed to systematically evaluate care and implement changes to improve health. Various models of quality improvement have been applied to pediatric obesity care in the primary care setting [7,16–18], but none have included quality improvement aims involving collaboration with subspecialty providers.

Initiating quality improvement can be challenging. Enhanced teamwork and improved communication are important components of strategies to improve ambulatory care quality [19]. For practice-based quality improvement, Crabtree *et al.* [20], described the steps necessary to change

clinical care as understanding and working according to organizational characteristics, having leadership buy-in, engaging providers, providing performance feedback, and moving providers to identify and implement key solutions and strategies that could be developed through Plan-Do-Study-Act cycles. A few recent articles have delved into utilizing electronic health technology to improve delivery of pediatric obesity care [21,22] but we are not aware of any information on outpatient obesity care delivery at a tertiary care hospital.

Our urban tertiary care hospital has taken steps to help subspecialty providers initiate quality improvement efforts in obesity care. The process was initiated by a team of very motivated providers from general pediatrics, cardiology, and kidney diseases divisions. These individuals were interested in improving the quality and coordination of obesity care for outpatients among hospital divisions/services. The aim of this paper is to present a model to foster coordinated quality improvement initiatives to address childhood obesity across diverse groups of subspecialty clinicians at tertiary care hospitals. We present a thoughtful, staged approach previously used in primary care settings [20] to initiate a hospital-wide, division-specific dialogue on an important child health issue.

2. Experimental Section

2.1. Overview

This study describes the steps taken to mobilize and motivate clinicians in an outpatient, tertiary care, subspecialty environment toward improved obesity care. In preparing this hospital-wide quality improvement effort we were guided by previous primary care work on changing care delivery practices [20,23,24]. We adapted principles of quality improvement which include identification of a key motivated leader, involving support staff (e.g., such as nurses, nurse aides, clerical, nutritionists, etc.), performance review and feedback, and academic detailing (*i.e.*, when disease management and quality improvement experts meet with site quality improvement and provider teams to provide education to foster development of site-specific steps to improve care). The sections below describe the processes used:

- Forming a leadership group
- Engaging leaders across the hospital divisions/services
- Engaging providers across the institution
- Encourage quality improvement by providing performance review and feedback on the identification of overweight/obesity by divisions/services
- Brainstorm strategies for creating practical solutions to improve quality and coordination of obesity care at individual divisions/services

This study was approved by the Ann & Robert H. Lurie Children's Hospital of Chicago Institutional Review Board.

2.2. Forming a Leadership Group

A group of very motivated providers from general pediatrics, cardiology, and kidney diseases divisions formed a team interested in improving the quality and coordination of obesity care for outpatients among divisions/services at an urban tertiary care hospital. All team members recognize

that the hospital serves a high risk population. They are interested in obesity as they frequently provide care to patients with obesity comorbidities. In particular, members from the division of cardiology are interested in improving obesity care because of obesity impact on cardiovascular health. The team developed strategies aimed at initiating a hospital-wide quality improvement effort on obesity identification and care.

2.3. Engaging Leaders across the Hospital Divisions/Services

All medical divisions and primary care services were recruited by contacting and informing a division/service member about the proposed effort. Seven subspecialty medical divisions (Allergy & Immunology, Cardiology, Endocrinology, Hematology/Oncology & Stem Cell Transplant, Kidney Diseases, Pulmonology, Rheumatology) agreed to participate and Otolaryngology/Head & Neck Surgery learned of the effort and also requested to participate. The division of Gastroenterology, Hepatology and Nutrition volunteered participation of its Hepatology service. Additionally, the subspecialty services of Sports Medicine (a service within Orthopedics) and four primary care services (two primary care sites, Adolescent Medicine, and the Wellness & Weight Management Clinic) agreed to participate.

We conducted semi-structured interviews with a representative from each of the participating divisions/services. Representatives included six division heads, five service leaders, a division nurse practitioner leader, and an attending physician division member. The content areas of the interview included questions addressing division resources, methods, and protocols as well as attitudes and roles in the identification and management of obesity and obesity-related comorbidities (see Supplementary Materials). The purpose of the interviews was not only to understand current practices and perceptions of obesity care but also to identify obesity care issues and to understand how best to engage entire divisions in the quality improvement process. Representatives were asked about resources available within each clinic such as educational materials, electronic medical record (EMR)-based materials, the availability of dietitians within their division, and their awareness of any special clinics or appropriate programs for obesity treatment. Interviews allowed for open discussion of perceived barriers to identify and care for obese patients. Finally, representatives were asked about their thoughts on how to address perceived barriers to better identify and manage obese patients.

Detailed note-taking during interviews was used to record responses, which were then reviewed and uploaded for analysis using a “word cloud” program (ToCloud [Software] available from <http://www.tocloud.com/>). Due to time limitations and budgetary constraints we were unable to use more rigorous qualitative research methods. The word cloud creates a visual representation of text data in which commonly used words and phrases are displayed more prominently. This representation is more visually appealing than counts or lists and we found it to be a useful way to capture and convey themes. The frequent key words and phrases that were emphasized by word cloud’s visual representation of the qualitative data were then used to guide identification of common themes across divisions. The word cloud summaries can be requested from the corresponding author.

2.4. Engaging Division/Service Providers

In order to improve our understanding of provider's perceived role and clinical practices related to the identification and management of obesity we applied knowledge gained from the interviews of division representatives to design a provider survey. The 23 question survey assessed provider training and perceived roles in identification and management of obesity care. Survey questions targeting demographics, training, beliefs, and practices were created through an adaptation of a previous survey utilized by Rhodes, *et al.* [9]. Invitation to participate and a link to an online survey was sent via email to 193 providers, including physicians, fellows, and advanced practice nurses in the participating division/services. Data from the 74 respondents (38%) are presented below.

Questions assessing providers' perceived role in obesity care used a 5-point Likert scale (strongly agree, agree, neutral, disagree, strongly disagree). Respondents were asked about the following perceived barriers: time; personnel; equipment; EMR; reimbursements; referral options; coordinated care; and educational opportunities. Space was available for additional comments regarding coordination and improvement of obesity care across our institution.

2.5. Assessing Performance and Providing Feedback

To increase interest in addressing issues related to care of overweight/obese patients and to identify opportunities for quality improvement we assessed and reported to participant divisions/services their baseline performance of obesity-related documentation. Reports presented patient data by individual divisions/services and for all participant divisions/services as a whole. Data were gathered through an anonymous EMR data download of outpatient visits made by children ages 2–17 years between November 2010–October 2011 to each of the participating divisions and services. Data elements included patient demographics, anthropometrics, visit diagnosis using the International Classification of Disease, 9th Revision (ICD-9) codes, and problem list ICD-9 codes. Reports presented patient demographics, prevalence of overweight/obesity based on body mass index (BMI) analysis, and percentage of overweight/obese patients identified in the visit diagnosis or problem list as overweight or obese based on ICD-9 coding (Table 1).

The data download contained 65,326 visits. Duplicate visits, incomplete visits, and visits that did not involve a physician or advanced practice nurse were excluded ($n = 2842$). Other visits excluded from the study ($n = 8655$) included those that had: missing anthropometric data; issues with height or weight measurement technique noted in the EMR (e.g., patient has ankle/foot orthosis); height z-score ≥ 4 or ≤ -4 ; or weight z-score ≤ -4 . The final dataset had 53,829 qualifying visits made by exactly 29,000 patients.

Anthropometric measures were interpreted using Epi Info 3.5.3 (National Center for Health Statistics, CDC: Atlanta, GA, USA, 2011). We assigned patients to one of the participating division or service groups based on where the subject's highest BMI percentile value was obtained during the study year. This ensured that patients that were ever obese during the study year were categorized as such. Preliminary analyses were conducted using IBM SPSS Statistics (Version 20.0.0, IBM Corp., Armonk, NY, USA) and final analyses using SAS (Version 9.3, SAS Institute, Cary, NC, USA).

Frequencies and descriptive analyses were applied. We also used chi square tests, as appropriate. Significance was set at $\alpha < 0.05$.

Patients were grouped based on age, sex, race/ethnicity, and insurance (Table 2). We also grouped patients by BMI percentile: <5th; 5–49th; 50–84th; 85–94th (overweight) and ≥ 95 th (obese). Clinician recognition of overweight or obesity was defined as the notation of specific weight-related (ICD-9) codes in the visit diagnosis or problem list (Table 1). Presence of at least one of these codes during the study period was considered proper identification of overweight or obesity.

Table 1. ICD-9 Code Categorization of Qualification for Obesity Identification.

ICD-9 Codes	
Code	Name
278	OBESITY, UNSPECIFIED
278.00AE	OBESITY (BMI 30.0–39.9)
278.00J	OBESITY
278.00M	OBESITY
278.00Z	CHILDHOOD OBESITY
278.01	MORBID OBESITY
278.01C	OBESITY, MORBID
278.02	OVERWEIGHT
278.02B	OVER WEIGHT
278.02J	OVERWEIGHT, PEDIATRIC, BMI (BODY MASS INDEX) > 99% FOR AGE
278.02K	OVERWEIGHT, PEDIATRIC, BMI (BODY MASS INDEX) 95–99% FOR AGE
278.02L	OVERWEIGHT (BMI 25.0–29.9)
278.02N	OVERWEIGHT CHILD
783.1	ABNORMAL WEIGHT GAIN
783.1A	EXCESSIVE BODY WEIGHT GAIN
783.1F	EXCESSIVE WEIGHT GAIN
783.1L	WEIGHT GAIN
V85.53	BMI, PEDIATRIC 85%–<95%
V85.53A	BMI (BODY MASS INDEX), PEDIATRIC, 85% TO LESS THAN 95% FOR AGE
V85.54	BMI, PEDIATRIC $\geq 95\%$
V85.54B	BMI (BODY MASS INDEX), PEDIATRIC, 95–99% FOR AGE
V85.54C	BMI (BODY MASS INDEX), PEDIATRIC, > 99% FOR AGE
V85.54F	BMI, PEDIATRIC > 99% FOR AGE
V85.54J	BMI, PEDIATRIC > 99% FOR AGE

Table 2. Demographics of all patients seen in the participating divisions/services.

Variable		All Patients (N = 29,000)	
Age	2–5 yr	9027	(31.1%)
	6–12 yr	12,230	(42.2%)
	13–17 yr	7743	(26.7%)
Sex	Male	15,074	(52.0%)
	Female	13,926	(48.0%)
Race	White	13,880	(47.9%)
	Black	4024	(13.9%)

Table 2. *Cont.*

Variable		All Patients (N = 29,000)	
	Hispanic	8153	(28.1%)
	Asian	1301	(4.5%)
	Other	1134	(3.9%)
	Missing	508	(1.7%)
Insurance	Medicaid	13,067	(45.1%)
	Private	15,854	(54.7%)
	Other	2	(<0.1%)
	Missing	77	(0.3%)

A report summarizing the findings from the interviews, clinician survey, and describing prevalence and identification of obese patients at each participating division/service and for the participating divisions/services as a whole was prepared. A version of this report was presented during a seminar where all clinicians in the participating divisions/services were invited to attend. In addition, a copy of the report was submitted to the representative of each division/service. They were offered a meeting with the project leaders to discuss the report and brainstorm ideas to address the issues identified.

3. Results and Discussion

3.1. Engaging Leaders

Among division/services representatives interviewed, nine of 13 reported having informal policies or directives in place for the identification of overweight/obese patients. These primarily involved including patient BMI and BMI percentile in the EMR visit documentation.

While representatives from primary care services indicated that they have a key role in identifying obese/overweight patients, those from subspecialty divisions had varying opinions. Most (8/10) subspecialty representatives emphasized that if the patient's weight or BMI was related to the disorder they were seeing the patient for, they felt responsible for identification and would continue with further counseling. They uniformly perceived that another provider (*i.e.*, primary care provider) was primarily responsible for weight management care coordination.

Less than half (6/13) reported using handouts on healthy diet and physical activity as part of their counseling strategy. Six subspecialty divisions have a nutritionist to counsel and/or provide written educational materials. However, subspecialists agreed that their role was to either refer back to the patient's primary care provider or to other care providers within the institution for appropriate management once the patient's obesity was identified. Subspecialty providers from endocrinology and rheumatology reported that since obesity may often be a consequence of an endocrine-related disorder (e.g., hypothyroid, Cushing) and it is a side effect of drugs commonly used in their clinics (*i.e.*, steroids) they frequently see obese patients, and thus may provide primary care services on obesity and other health issues.

The most commonly mentioned barriers to appropriate identification and management of obesity were lack of time, inadequate numbers of support personnel, lack of knowledge of referral options, problems related to obtaining educational materials, and difficulty utilizing the EMR. One subspecialty

representative mentioned lack of care coordination across the institution as a barrier to providing optimal care, emphasizing that communication between management teams across different specialties was critical for the management of childhood obesity.

Three representatives suggested that improvement of the EMR system such as color-coding/flagging patients by BMI percentile group would aid in identification of obese and overweight patients. They also suggested including readily available information such as listings of community referral programs and specific handouts for patients within the EMR to aid in patient management. Other suggestions included training staff to provide nutrition counseling/guidance, and facilitate communication with families between visits. In addition, representatives suggested a shift in approach so that it would become the subspecialist's responsibility to connect patients to appropriate management resources. Representatives also emphasized that a change in subspecialty provider counseling was necessary so that families would hear a coordinated message regarding concerns for obesity/overweight issues from multiple providers in addition to their primary care provider.

3.2. Engaging Division/Service Providers

There were 74/193 (38%) invited providers who responded to the survey. Most responders (69%) were attending physicians, 14% were fellows, and 18% were pediatric nurse practitioners. The majority (76%) of responders spend at least 2 days per week providing outpatient care to patients. About half (44%) reported never having received at least 8 hours of formal obesity care training. A majority of clinicians (62%) felt they were competent to counsel on obesity/weight management; 69% felt that families were willing to discuss obesity issues with them, and 57% perceived that families were receptive to such counseling.

Overall, responses from the provider survey reflect the perceptions reported by the representatives on the identification and management of obesity in their patients. Most respondents (96%) believed that their role is to identify overweight/obesity and (85%) agreed/strongly agreed that their role is to both appropriately counsel on healthy habits and to refer for additional management. All respondents agreed/strongly agreed that their role is to identify and manage obesity-associated comorbidities related to their area of expertise. Only 37% of respondents agreed/strongly agreed that their role is to identify obesity-associated comorbidities not related to their area of expertise. Sixty four percent agreed/strongly agreed that they play a role in helping to coordinate obesity-related care.

Most frequently reported barriers to the proper identification and management of childhood obesity in the provider survey were: lack of time (75%), awareness of referral options (70%), and coordinated care (58%); insufficient number of personnel (31%), and educational opportunities (26%); they also mentioned issues with EMR features (19%) and reimbursement (26%). Most respondents (83%) agreed that coordination of care could be improved across the institution.

3.3. Performance and Feedback on the Identification of Overweight and Obesity

Overall, 16% (4521/29,000) of patients were overweight and 18% (5283/29,000) were obese. Division-specific rates of overweight and obesity are shown in Figure 1. In total, 33% (1750/5283) of obese children and 9% (402/4521) of overweight children were identified by ICD-9 code. Rates of overweight and obesity identification by ICD-9 code in each subspecialty division are shown in

Figure 2. Excluding primary care divisions, obesity identification varied from 2% to 40% across subspecialties. Additionally, 79% of obese patients who were not identified throughout the study year were seen at outpatient visits in more than one division or service.

Figure 1. Distribution of BMI Percentile Categories across Participating Divisions/Services.

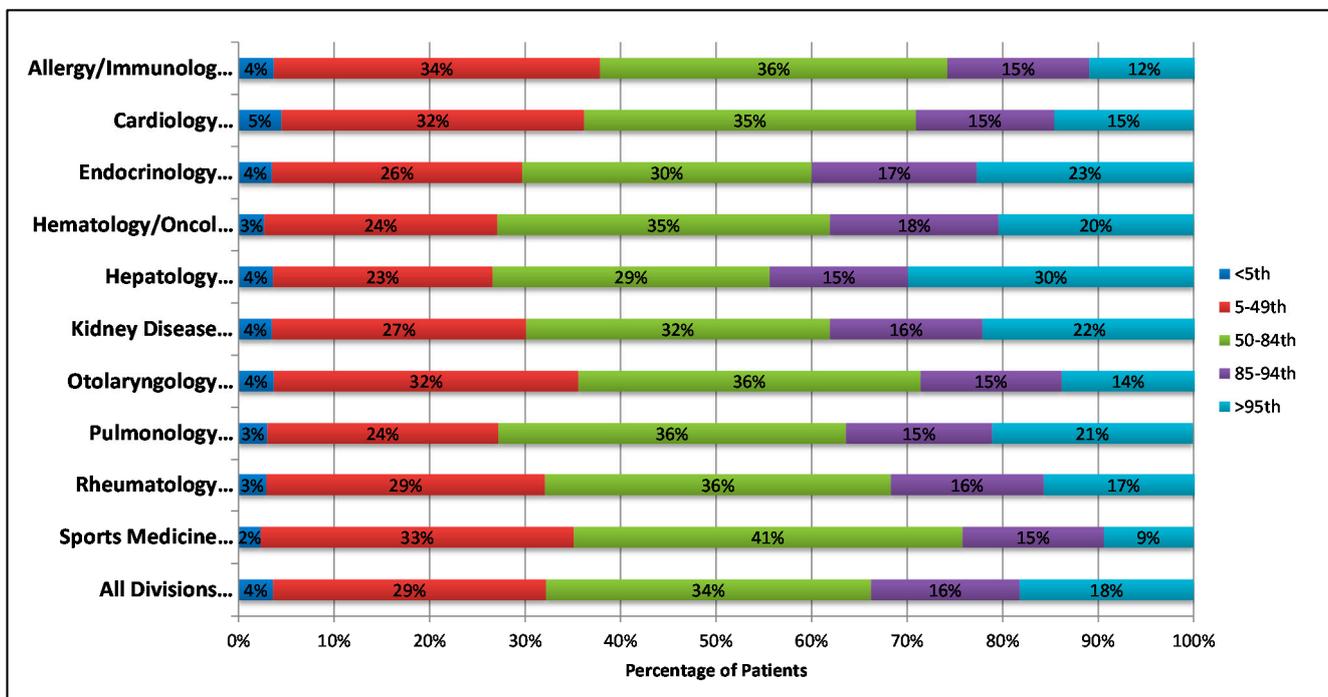
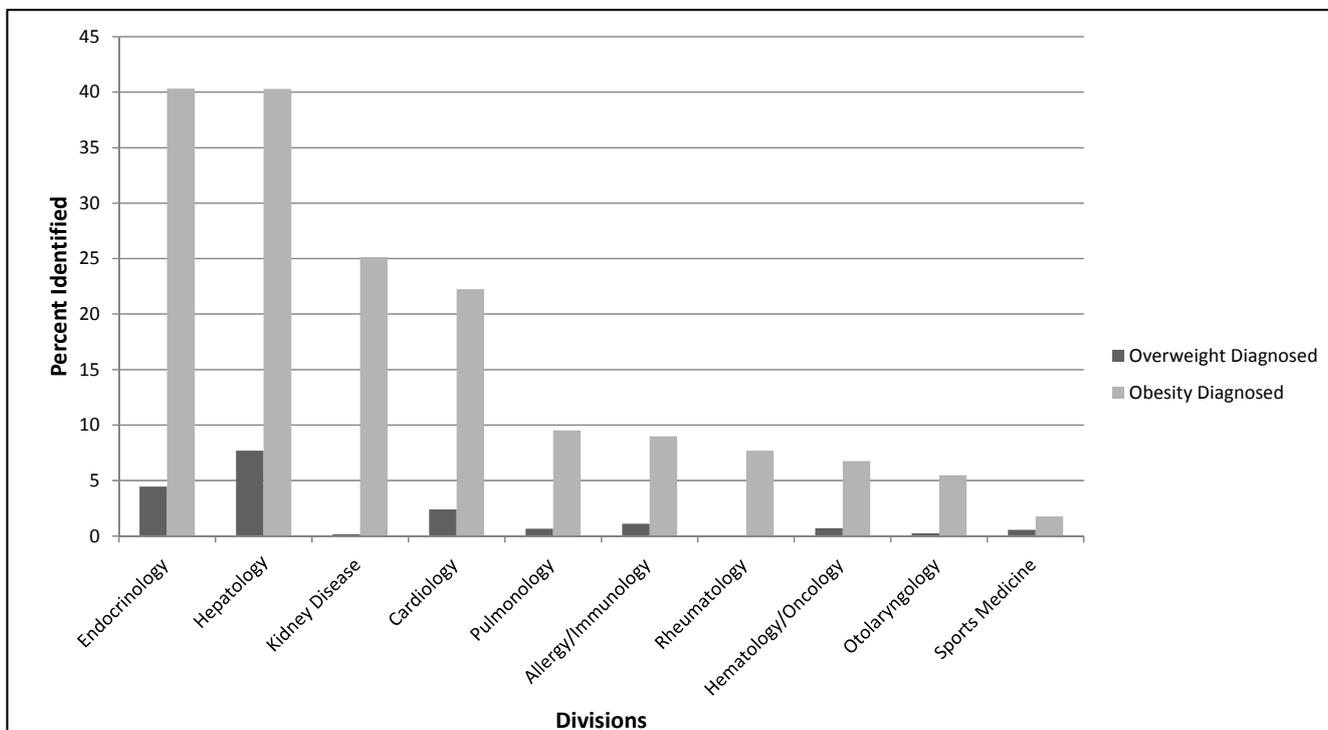


Figure 2. ICD-9 Code Identification of Overweight and Obesity by Subspecialty Division.



3.4. Brainstorm on Strategies for Creating Practical Solutions

After receiving the report, one primary care service and 4 division representatives (cardiology, hematology/oncology, rheumatology, and kidney diseases) called the project leader to further discuss the report and/or to strategize on presentation to the entire division. Hospital-wide and division-specific reports were presented at meetings of the cardiology, rheumatology and hematology/oncology divisions. These discussions were focused on understanding the need for division-specific solutions. It was concluded during all meetings that there is a need for a multi-pronged approach to address the issues unveiled by the project. One aspect would be an EMR-related solution (*i.e.*, modifications to the prompts, inclusion of smart text), while a second approach would rely on increasing awareness and educating providers. As targets for education, two types of providers were identified, doctors and/or nurse practitioners, and medical assistance-level or nurse aide providers. Even though there are commonalities in the issues and suggested solutions, most providers indicated that a hospital-wide strategy would not be an appropriate way to improve the quality of obesity care for their specific division.

3.5. Discussion

This paper reports on the implementation of an approach previously used in primary care settings [20] to initiate a hospital-wide, division-specific dialogue on an important child health issue. This is the first report on the implementation of this approach in the pediatric tertiary care setting. We successfully used the development of project leadership team and focused interviews of key division/service representatives to gain understanding of organizational characteristics and work strategies. Throughout the process we have fostered division/service leadership buy-in through the interviews, survey, and reports which help them better understand their current performance and identify strategies for improvement. We engaged all providers in the participating divisions/services through survey and feedback methods to help them better understand their division/service performance. The process has increased interest among subspecialty divisions to improve coordination of obesity care across divisions/specialties at our tertiary care hospital. Individual meetings with division/service groups helped providers identify and plan key solutions and strategies that could be developed through Plan-Do-Study-Act cycles.

We recognize that this paper reports on the very first step of a long process that would be needed to improve patient health and outcomes. Further, this project reports on efforts at one urban hospital; organizational structure and care delivery will vary by institution. However, the steps we applied for building concern and response to childhood obesity care can be adapted and applied widely. The response rate to our provider survey was low and therefore may not be generalizable to all clinicians in this institution. Additionally, application of rigorous qualitative research methods may have identified additional themes meriting further exploration through the provider survey. However, others may find themselves with time and budgetary constraints similar to those we faced, and could use our same methods.

Obese pediatric patients present for care within multidisciplinary obesity care clinics and many also present for management of obesity-related conditions in the tertiary care setting. A comprehensive care strategy would include improved coordinated care by primary care providers, across pediatric

subspecialists and between specialist and with multidisciplinary obesity care clinics. Beginning the process of moving towards this comprehensive care strategy requires initiating quality improvements within and across each of these groups. As indicated by providers during the summary report meetings, adoption of changes in obesity care would need to be facilitated by a multi-faceted intervention that is tailored to the specific needs and roles of each division/service. However, such changes also need to include a broader hospital-wide perspective and collaborative effort. Providers in most divisions proposed having quality improvement interventions that include changes to the EMR along with education and training to clinicians and to support staff members. Next steps to improve obesity care in our hospital will focus on identifying and implementing division specific obesity management approaches. Further work will be needed to evaluate subsequent actions of divisions/services.

4. Conclusions

Subspecialists were interested in improving the quality and coordination of obesity care for patients across our tertiary care setting. Developing quality improvement projects to achieve greater pediatric obesity care goals starts with engagement of providers toward better identifying and managing childhood obesity. The steps we have taken can be replicated by other tertiary care hospitals.

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Author Contributions

Sheila Z. Chang, MPH: (1) substantial contributions to the conception, design of analysis, and interpretation of data; (2) writing the first draft of the article and revised it critically for important intellectual content; and (3) final approval of the version to be published.

Daniel R. Beacher, MD: (1) substantial contributions to the conception and design, acquisition of data, and analysis and interpretation of data; (2) revising the article critically for important intellectual content; and (3) final approval of the version to be published.

Soyang Kwon, PhD: (1) substantial contributions to the analysis and interpretation of data; (2) revising the article critically for important intellectual content; and (3) final approval of the version to be published.

Megan A. McCarville, MD: (1) substantial contributions to the conception and design and acquisition of data; and (2) final approval of the version to be published.

Helen J. Binns, MD, MPH: (1) substantial contributions to the conception and design, and analysis and interpretation of data; (2) revising the article critically for important intellectual content; and (3) final approval of the version to be published.

Adolfo J. Ariza, MD: (1) substantial contributions to the conception and design, and analysis and interpretation of data; (2) revising the article critically for important intellectual content; and (3) final approval of the version to be published.

Conflicts of Interest

All authors report no current or foreseeable financial and personal relationships that might inappropriately create a conflict of interest.

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