Perceived Barriers to Anthropometric Measurements in Critically Ill Children

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Background Anthropometric measurements are vital for safe care in pediatric intensive care units.
Objective To identify barriers to anthropometric measurements and determine if perceptions of barriers differ between ordering providers and nurses.
Methods A 21-item survey to elicit perceptions of barriers to obtaining anthropometric measurements was distributed via e-mail to societies with members who provide care in pediatric intensive care units.
Results Most of the 258 eligible respondents (46% ordering providers) were from North America (90%). Although 84% agreed that anthropometric measurements are important, only 3% knew if these measurements were obtained upon admission to their unit. Estimates of patients' measurements by parents or caregivers were commonly used (72%) when actual measurements were not obtained. Leading barriers were presence of medical devices (57%), use of extracorporeal life support (54%), and unstable hemodynamic status (52%). More ordering providers than nurses considered osteopenia/fragile bones as a barrier to weight measurement (46% vs 29%; $P=.007$) and traumatic brain injury a barrier to measurement of head circumference (42% vs 24%; $P=.002$). More nurses than ordering providers perceived dialysis (21% vs 9%; $P=.01$) and obesity (26% vs 15%; $P=.04$) as barriers to measurement of stature. Ordering providers more than nurses perceived nurses' workload (51% vs 33%; $P<.001$) and lack of importance (43% vs 20%; $P<.001$) as barriers.
Conclusions Barriers to obtaining anthropometric measurements exist in pediatric intensive care units; ordering providers and nurses have different perceptions of what constitutes a barrier. (*American Journal of Critical Care.* 2015;24:e99-e107)

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Weight, stature, and head circumference are the most commonly obtained anthropometric measurements in infants and children.[1] Anthropometric measurements are vital for the safe and effective care of critically ill children in the pediatric intensive care unit (PICU). Accurate measurements of weight and stature are required to calculate the correct dosage of medications and blood products, assess nutritional status, prescribe appropriate nutrient intake, and determine treatments and therapies.[2,3] Additionally, these measurements are crucial for determining appropriate size of equipment, doses of emergency medications, and amount of energy for electrical defibrillation for treatment in cardiac arrests and similar emergencies.[4]

Subsequent measurements of weight during a PICU admission are essential to identify and understand changes in fluid status.[2] The accuracy of a patient's weight before the current illness should be considered but should be interpreted with caution, particularly in children with altered fluid balance, malnutrition, or an underlying chronic illness.[2,5] Serial measurements of weight during an acute illness are helpful to assess a patient's status. A return to the amount a patient weighed before illness can signify recovery from the illness.[2] Measurement of stature (standing height or recumbent length) is necessary to calculate body mass index, ideal body weight, and body surface area, values that are often used for prescribing particular classes of medications and calculating various therapies in critically ill patients.[2] Head circumference is the commonly used indicator of brain growth and volume in infants and young children.[6] A substantial change in head circumference over a short time may be an early indicator of an intracranial process such as hemorrhage, meningitis, or the presence of a space-occupying lesion.[7,8]

Anthropometric measurements are vital for safe care in pediatric intensive care units (PICUs).

Anthropometric measurements have even greater importance in neonates, infants, and young children when assessing changes in body mass as these patients recover from critical illness.[9] It is important to note that anthropometric measurements are but one of several dimensions used to assess nutritional status and monitor fluid balance during critical illness. When combined with cautious interpretation of specific biomarkers and findings of physical assessment, anthropometric measurements can help optimize and tailor prescriptions for optimal delivery of care.[10] Accurate anthropometric measurements obtained at the time of admission to the PICU and at specific intervals during the PICU stay are an essential first step to individualized care that might favorably affect patient outcomes.

There are many challenges in obtaining anthropometric measurements in critically ill children. Collectively, ordering providers and bedside nurses may not fully appreciate the importance of these measurements and their impact on patient care. Consequently, anthropometric measurements may be inconsistently and/or incorrectly obtained, completely avoided, or estimated as a matter of routine practice. Weight that is not measured is often determined, with various degrees of accuracy, on the basis of estimates made by the clinical care team or a patient's parents.[4,11-13] Stature and head circumference are often not measured, perhaps because of a perceived lack of importance in the list of priorities during care of a critically ill infant or child. The lack of accurate and consistent anthropometric data can thus pose marked risks to the safe management and recovery of a critically ill child and, in some instances, result in harm. Ultimately, lack of or erroneous anthropometric measurements can lead to inaccurate or inadequate therapies, which can adversely affect clinical outcomes such as duration

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of mechanical ventilation, length of PICU stay, and patient survival.[2,9]

We are unaware of any study of perceptions and barriers to obtaining anthropometric measurements in critically ill children. The objective of this study was to identify barriers perceived by ordering providers and nurses to obtaining anthropometric measurements in critically ill children. We hypothesized that specific barriers to obtaining anthropometric measurements exist in the PICU and that these perceived barriers differ between ordering providers and nurses.

Methods

A multidisciplinary team of PICU-specific registered dieticians, critical care advanced practice nurses, a pediatric gastroenterologist board certified in nutrition, and a pediatric intensivist at Children's Hospital of Philadelphia (CHOP) used Survey Monkey (http://www.surveymonkey.com) to create a 21-item survey (see Appendix). Survey items were constructed to identify perceived and actual challenges to obtaining anthropometric measurements in PICU patients. The survey covered the broad themes of the PICU environment and provider characteristics, initial and subsequent times of obtaining anthropometric measurements, sources of anthropometric data (if actual measurements were not obtained), and patient- and provider-specific barriers perceived by respondents. The survey was tested locally for feedback on the clarity of the questions and for construct validity. After approval from the CHOP institutional review board, the survey was distributed via electronic mail link to 6 professional organizations with members who care for critically ill children in a variety of international PICU settings: Advanced Nursing Practice in Acute and Critical Care, American Society of Parenteral and Enteral Nutrition–Pediatrics, Pediatric ICU Advanced Practice Nursing, PICU Nursing Science, Society for Critical Care Medicine, and World Federation of Pediatric Intensive and Critical Care Societies. Participation was voluntary, and consent was implied once respondents began the survey. Eligible respondents included ordering providers and nurses. Ordering providers included physicians and advanced practice providers (nurse practitioners and physician assistants). For the purpose of this study, the term PICU health care providers included both ordering providers and nurses. The survey was active for 14 weeks, from June through September 2012; periodic reminders were sent to the listserv of each organization throughout the study period.

Characteristics of the respondents and PICUs are summarized as counts and percentages. Summary data are presented as categorical variables. Differences between ordering providers and nurses

1. Do you practice in pediatrics?
2. How pertinent are accurate growth parameters in the care of the patient in the ICU?
3. Are growth parameters (weight, length/height, head circumference) collected on each patient on admission to the ICU?
4. How soon after admission to the ICU are you expected to obtain growth measurements?
5. If an actual weight or length/height is not measured on admission, how do you obtain an estimate?
6. How frequently should weight measurements be obtained in children <1 year of age in the ICU?
7. How frequently should weight measurements be obtained in children >1 year old in the ICU?
8. How frequently should length measurements be obtained in children <1 year old in the ICU?
9. How frequently should height/length measurements be obtained in children >1 year old in the ICU?
10. How frequently should head circumference be obtained in children <2 years old in the ICU?
11. In subsequent measurements, when are growth measurements usually obtained?
12. Who reviews growth parameters in the ICU?
13. How often are growth parameters reviewed by the ICU care team?
14. Which of the following would you consider barriers to obtaining growth measurements on patients in the ICU?

Possible barrier	Weight	Length/ height	Head circumference
Mechanical ventilation	____	____	____
Hemodynamically unstable	____	____	____
Critical airway	____	____	____
Traumatic brain injury	____	____	____
Too heavy	____	____	____
Fragile bones	____	____	____
Extracorporeal membrane oxygenation	____	____	____
Dialysis	____	____	____
Nursing too busy	____	____	____
Parents and/or patient do not want to be disturbed	____	____	____
Infection/isolation	____	____	____
Lack of appropriate equipment	____	____	____
Unsure of correct technique to obtain measurement	____	____	____
Medical device in place (electroencephalography, drains, ventriculostomy, halo, distractors, traction equipment, etc)	____	____	____

15. Do you routinely place weight, height, and head circumference orders for each patient in the ICU on admission and during the ICU stay to ensure growth measurements are obtained?
16. How are the growth (weight, height/length, head circumference) data shared with the care team?
17. What unit do you primarily work in?
18. What is your role in the ICU?
19. How many years have you been in this position?
20. How many beds does the unit where you primarily work have?
21. Where is your hospital located?

Appendix Questions in the survey.

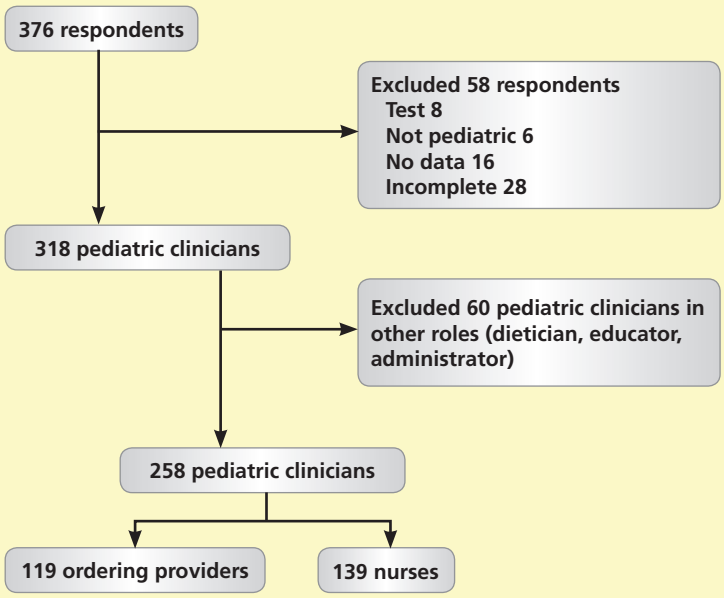

Figure 1 Flow chart of participants.

Table 1
Demographic characteristics of health care providers and pediatric intensive care units[a]

Characteristic	Ordering provider (n = 119)	Nurse (n = 139)	*P*
Experience, y			.005
0-5	47 (40)	78 (56)	
6-10	19 (16)	27 (19)	
11-15	20 (17)	16 (12)	
16-20	17 (14)	5 (4)	
>20	16 (13)	13 (9)	
Type of unit			.07
Medical-surgical	63 (53)	63 (45)	
Cardiac	9 (8)	18 (13)	
Mixed	45 (38)	48 (35)	
Other	2 (2)	10 (7)	
Number of beds			.001
<6	3 (3)	1 (1)	
6-11	13 (11)	14 (10)	
12-19	22 (18)	41 (29)	
20-40	45 (38)	23 (17)	
>40	36 (30)	60 (43)	
Location			.09
North America	110 (92)	121 (87)	
Australia	3 (3)	14 (10)	
Europe	5 (4)	3 (2)	
South America	1 (1)	1 (1)	

[a] Values in second and third columns are number (percentage) of care providers. Because of rounding, not all percentages total 100.

were analyzed by using χ^2 analysis or the Fisher exact test. All *P* values are 2-sided and were considered significant if $P < .05$. The STATA 11.0 statistical package (StataCorp LP) was used for analysis.

Results

Characteristics of Respondents and PICUs

A total of 376 respondents participated in the survey; among these, complete data were available for 318 respondents. After data from respondents who were not ordering providers or nurses (eg, registered dieticians, administrators, clinical educators, and clinical nurse specialists) were excluded, data from 258 pediatric clinicians were included for final analysis (Figure 1). Of the 258 eligible PICU care providers, 119 were ordering providers: 77 attending physicians (30%), 27 advanced practice providers (10%), and 15 fellow trainees (6%). Demographic characteristics of clinicians and PICU settings are described in Table 1. The majority of ordering providers (60%) had more than 5 years of experience caring for critically ill children. In contrast to ordering providers, 56% of nurse respondents had 5 years or less of PICU experience. Almost half (49%) of the 258 respondents worked in medical-surgical PICUs; the majority (64%) worked in PICUs with 20 or more beds. More respondents were from North America (90%) than any other continent.

Perceptions and Beliefs of Health Care Providers of Anthropometric Measurements in the PICU

Although 84% of the 258 respondents agreed that anthropometric measurements were important, only 3% indicated that such measurements were "always" obtained upon admission to the PICU (Table 2). The majority of the 258 respondents (66%) stated that initial anthropometric measurements should be obtained within 12 hours of admission to the PICU. Most (71%) thought that subsequent anthropometric measurements were obtained during the night shift. More ordering providers than nurses thought that orders were consistently placed to obtain anthropometric measurements both at admission (76% vs 49%; $P < .001$) and at prescribed intervals during the PICU stay (41% vs 30%; $P = .002$). Parents' or caregivers' estimates of anthropometric measurements were most commonly used (72%) when actual measurements were not obtained (Figure 2).

The majority of respondents (50%) favored obtaining daily weights in infants (<1 year old), whereas 41% of clinicians favored weekly weight measurements for children 1 year old or older (Table 3). Although the 258 respondents were evenly divided between obtaining stature measurements at weekly and monthly intervals in infants (40% each), the majority (55%) preferred to obtain monthly measurements of stature in children. Most respondents thought that anthropometric measurements were reviewed by attending physicians (77%) and the nutrition support team

(79%); medical records (93%) were identified as the main source used to retrieve this information. Fewer than half (43%) thought that the measurements were reviewed daily in the PICU.

Patient-Specific Barriers to Anthropometric Measurements

For all anthropometric measurements combined, the most commonly perceived patient-specific barriers were presence of medical devices (57%), need for extracorporeal life support (54%), and unstable hemodynamic status (52%). Figure 3 depicts commonly perceived barriers to individual anthropometric measurements by weight, stature, and head circumference. Perceived differences in patient-specific barriers to individual anthropometric measurements between ordering providers and nurses are presented in Table 4. Significant differences between ordering providers and nurses in perception of barriers to obtaining anthropometric measurements for patient-specific clinical variables were detected for osteopenia or fragile bones (for weight), dialysis and obesity (for stature), and traumatic brain injury and existing medical devices (for head circumference).

Care Provider–Specific Barriers to Anthropometric Measurements

More ordering clinicians than nurses thought that nurse workload was a barrier to obtaining anthropometric measurements (51% vs 33%, $P<.001$). Other common care provider–specific barriers to anthropometric measurements include patient/parent request not to be disturbed (38%) and lack of importance (31%). Table 5 depicts differences in perception of barriers between ordering providers and nurses. Perceptions significantly differed between the groups for nurses' workload, lack of importance, and correct measurement techniques.

Discussion

Our study is the first international survey to characterize barriers to anthropometric measurements in critically ill children. In addition to identifying barriers to obtaining anthropometric measurements in the PICU, we also determined differences in these perceived barriers between ordering providers and nurses. Our findings have important implications for education, clinical care, and patient safety. Most of the respondents in our survey agreed that obtaining anthropometric measurements in the PICU is important. However, few thought that such measurements are obtained on admission to the PICU; instead parental and/or staff estimates are often used to derive this information. This finding most likely reflects the lower priority accorded to anthropometric

Table 2
Perceptions and beliefs of health care providers about anthropometric measurements in pediatric intensive care units[a]

Perceptions and beliefs	Ordering provider (n = 119)	Nurse (n = 139)	*P*
Importance of anthropometry			.009
Important	109 (92)	107 (77)	
Neutral	10 (8)	26 (19)	
Unimportant	0 (0)	2 (1)	
Unknown	0 (0)	4 (3)	
Measurements obtained at admission			.42
Always	6 (5)	2 (1)	
Sometimes	106 (89)	129 (93)	
Never	6 (5)	7 (5)	
Unknown	1 (1)	1 (1)	
Timing of initial measurements			.42
0-12 hours	79 (66)	91 (65)	
13-24 hours	13 (11)	18 (13)	
25-48 hours	4 (3)	1 (1)	
No specific time	17 (14)	17 (12)	
Unknown	6 (5)	12 (9)	
Timing of subsequent measurements[b]			
Day shift	22 (18)	34 (24)	.29
Evening shift	7 (6)	5 (4)	.56
Night shift	83 (70)	101 (73)	.68
Weekend	0 (0)	13 (9)	.003
Random	1 (1)	6 (4)	.13
Unknown	15 (13)	7 (5)	.04
Orders placed to obtain weight[b]			
Admission	110 (92)	99 (71)	.001
Subsequent	83 (70)	50 (36)	.001
Orders placed to obtain stature[b]			
Admission	85 (71)	53 (38)	.001
Subsequent	26 (22)	37 (27)	.39
Orders placed to obtain head circumference[b]			
Admission	75 (63)	51 (37)	.001
Subsequent	36 (30)	37 (27)	.58

[a] Values in second and third columns are number (percentage) of care providers. Because of rounding, not all percentages total 100.
[b] Respondents could pick multiple responses in this category.

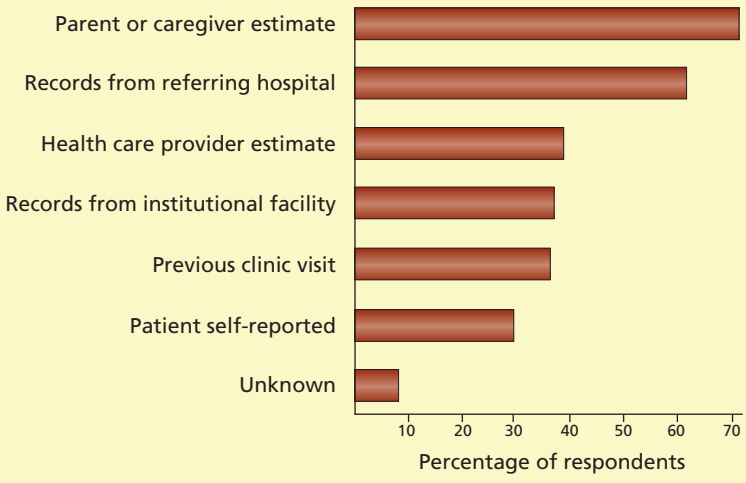

Figure 2 Sources of anthropometric measurements when the measurements could not be obtained at the time of admission to the pediatric intensive care unit.

Table 3
Health care providers' beliefs about frequency of anthropometric measurements in infants and children in pediatric intensive care units[a]

Frequency	In infants (age < 1 year)	In children (age ≥ 1 year)	*P*
Weight measurement			.001
Daily	128 (50)	45 (17)	
3 times a week	41 (16)	26 (10)	
2 times a week	45 (17)	45 (17)	
Weekly	22 (9)	107 (41)	
Other frequency	16 (6)	25 (10)	
Unknown	6 (2)	10 (4)	
Stature measurement			.001
Weekly	102 (40)	31 (12)	
Monthly	102 (40)	141 (55)	
Other frequency	7 (3)	20 (8)	
Unknown	47 (18)	66 (26)	

[a] Values in second and third columns are number (percentage) of 258 respondents. Because of rounding, not all percentages total 100.

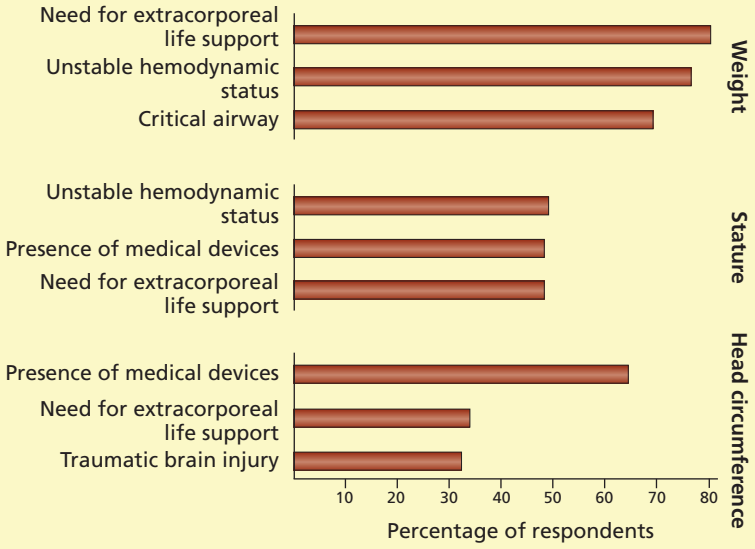

Figure 3 Barriers to obtaining measurements of weight, stature, and head circumference in the pediatric intensive care unit.

measurements compared with other time-sensitive and effort-intensive critical interventions necessary to stabilize a child upon admission to the PICU. Reports[4,11-13] indicate that estimates of anthropometric measurements by a patient's parent or caregiver or by PICU staff are erroneous, often by wide margins. Although records from referring hospitals or outpatient clinic visits are an additional source of information, the weight, stature, and head circumference listed in those records may also have been estimates made by a patient's parent or caregiver or by health care providers. In addition, variability in clinical standards, wide inconsistencies in staff training, and lack of equipment accuracy make the reliability of anthropometric measurements questionable.

A striking finding from our data is the discordance of perceptions between ordering providers and nurses for orders placed to obtain anthropometric measurements upon PICU admission and at prescribed intervals during the PICU stay. This discrepancy presents an opportunity to improve concordance between ordering providers to prescribe and nurses to obtain anthropometric measurements. Although our data indicate that ordering providers thought anthropometric measurements are important for providing patient care, placing orders to obtain measurements of weight, stature, and head circumference at admission and during the PICU stay is not routine practice. Use of "forcing functions" such as prechecked orders within a standard order set in the electronic medical record and establishing (if not already usual practice) nursing standards specific to obtaining these measurements will improve the likelihood that the prescribing behavior of the ordering providers will align with the delivery of nursing care.[14] The combination of prechecked orders in an order set, ready availability of appropriate tools and equipment, and well-trained staff will greatly enhance the ability to obtain anthropometric measurements in critically ill children.[14]

However, simply obtaining measurements of weight, stature, and head circumference without thoughtful discussion among the clinical team and use in patient care can lead to diminished perception of the importance of the measurements. This can result in inconsistency in obtaining anthropometric measurements or in not obtaining them at all. Giving performance feedback to ordering providers and nursing staff on prescribing and obtaining anthropometric measurements is important to dissuade estimation of these measurements, aid clinical care, and enhance patient safety.

The respondents in our study also perceived the need to obtain daily weights in infants and weekly weights in older children. This finding appears to acknowledge providers' concerns about growth in infants, but the concern may be misplaced because weights obtained at less frequent intervals will establish trends in weight change and may be equally effective for tracking adequate growth. The purpose of monitoring growth, particularly weight, is often detection of abnormalities of growth in healthy children so appropriate interventions can be made.[15] Obtaining daily weight in critically ill children, a common practice, may be useful to evaluate fluid balance, address changes in medication dosing, and prescribe therapies, but the measurements may not reflect sustainable changes in body mass.[16] Moreover, during an average PICU admission, with median length of stay less than 3 days,[17] the focus should not be on growth or weight gain.

Rather, care should be directed toward stabilization of weight and resolution of the acute illness with minimal decrease in muscle mass.

We found key differences between ordering providers and nurses in their perception of patient-specific and provider-specific barriers. Compared with ordering providers, nurses thought that anthropometric measurements were less important (Table 2). This finding is surprising because the essence of nursing practice is to optimize delivery of care while balancing the risks and benefits of specific assessments and interventions.[18] Frequently regarded as a standard of practice for nursing care in the PICU, weight is often measured as soon as possible upon admission to the unit for use as baseline information for care delivery.[19,20] Further, we found that ordering providers consistently overestimated the frequency with which orders were placed to obtain anthropometric measurements. These demonstrated gaps in perceptions between the 2 groups suggest that differences exist in workplace roles and expectations.

Many of these perceived barriers could be overcome by establishing standardized guidelines for ordering providers and nurses. For example, the availability of newer technologies such as patient beds with the capability of measuring weight and the use of overhead lifts enable members of the clinical team to work together to order and obtain weights in a timely manner at PICU admission. Education on the importance of stature in clinical care and the use of appropriate tools and techniques to measure stature should be encouraged. Critically ill children with contractures of long bones pose special challenges for measurements of stature. In such circumstances, skilled providers such as registered dieticians should be consulted to obtain limb-length measurements as an alternative method to determine stature.[21,22] Last, specific criteria and guidelines for measuring head circumference should be clarified.

Our data also indicate that most anthropometric measurements occurred on the night shift. This practice may be an important barrier (or potential barrier) to consider in achieving higher compliance with obtaining measurements; patients or patients' families may be sleeping and more likely to refuse measurements at night. Partnering with patients and their families to determine an optimal time of day for obtaining measurements, while aligning with unit practice, may help reduce yet another barrier to obtaining anthropometric measurements in the PICU.

Our study has limitations. First, the respondents may not be representative of the worldwide community of PICU clinicians; we had only 258 eligible respondents and most were in North America. Data on the composition and practice setting (academic center vs community hospital) of the respondents were not obtained. We were unable to determine duplicate responses or to determine if several respondents worked in the same PICU setting and were similarly biased in perceptions and beliefs. In addition, we did not specifically survey registered dieticians or ask if respondents worked in PICU settings with unit-specific registered dieticians, whose presence and involvement in patient care is likely to strongly influence perceptions of anthropometric measurements.[22] Our limited sample size precluded the ability to perform more detailed analysis to evaluate perceived differences by level of training and scope of practice within each group.

Table 4
Health care providers' perceptions of patient-specific barriers to anthropometry in pediatric intensive care units[a]

Patient-specific barriers	Ordering provider (n = 119)	Nurse (n = 139)	*P*
Critical airway			
Weight	88 (74)	89 (64)	.11
Stature	45 (38)	57 (41)	.61
Head circumference	45 (38)	38 (27)	.08
Mechanical ventilation			
Weight	49 (41)	60 (43)	.80
Stature	29 (24)	46 (33)	.13
Head circumference	14 (12)	15 (11)	.85
Unstable hemodynamic status			
Weight	95 (80)	101 (73)	.19
Stature	54 (45)	74 (53)	.21
Head circumference	35 (29)	45 (32)	.69
Extracorporeal life support equipment			
Weight	93 (78)	113 (81)	.54
Stature	53 (45)	69 (50)	.45
Head circumference	38 (32)	49 (35)	.60
Dialysis			
Weight	31 (26)	42 (30)	.49
Stature	11 (9)	29 (21)	.01
Head circumference	6 (5)	11 (8)	.45
Traumatic brain injury			
Weight	63 (53)	64 (46)	.32
Stature	30 (25)	42 (30)	.41
Head circumference	50 (42)	33 (24)	.002
Medical devices			
Weight	77 (65)	75 (54)	.10
Stature	60 (50)	63 (45)	.45
Head circumference	86 (72)	79 (57)	.01
Fragile bones/osteopenia			
Weight	55 (46)	41 (29)	.007
Stature	27 (23)	28 (20)	.65
Head circumference	16 (13)	11 (8)	.16
Obesity			
Weight	56 (47)	69 (50)	.71
Stature	18 (15)	36 (26)	.04
Head circumference	2 (2)	5 (4)	.46

[a] Values in second and third columns are number (percentage) of care providers.

Table 5
Health care providers' perceptions of clinician-specific barriers to anthropometry in pediatric intensive care units[a]

Clinician-specific barrier	Ordering provider (n = 119)	Nurse (n = 139)	*P*
Nurses' workload			
Weight	62 (52)	47 (34)	.004
Stature	62 (52)	51 (37)	.02
Head circumference	59 (50)	40 (29)	.001
Patient does not want to be disturbed			
Weight	52 (44)	60 (43)	>.99
Stature	43 (36)	52 (37)	.90
Head circumference	41 (34)	46 (33)	.90
Isolation			
Weight	16 (13)	10 (7)	.10
Stature	12 (10)	9 (6)	.36
Head circumference	10 (8)	2 (1)	.01
Not considered important			
Weight	39 (33)	17 (12)	.001
Stature	59 (50)	41 (30)	.001
Head circumference	57 (48)	24 (17)	.001
Lack of correct equipment			
Weight	35 (29)	34 (24)	.40
Stature	32 (27)	44 (32)	.41
Head circumference	14 (12)	6 (4)	.03
Unsure of correct technique			
Weight	23 (19)	7 (5)	.001
Stature	40 (34)	24 (17)	.004
Head circumference	32 (27)	7 (5)	.001

[a] Values in second and third columns are number (percentage) of health care providers.

Of note, perceptions and beliefs stated by respondents may differ from the respondents' actual practice, resulting in disparity between what is perceived and what is actually carried out in the PICU.[11] We did not attempt to ascertain specific examples of medical or nursing errors or harm to patients related to lack of obtaining accurate anthropometric measurements in PICU patients. This aspect should be further explored in future surveys and quality-improvement projects. Nevertheless, we think our study is the first in which barriers to anthropometric measurements in PICU patients and differences in perception of these barriers between ordering providers and nurses were determined.

Clinical Implications

Our findings have major implications for educating clinicians about the importance of obtaining timely anthropometric measurements in PICU patients. Targeted strategies with evidence-based guidelines and practice standards are necessary to dispel myths about common barriers to obtaining anthropometric measurements. Specific unit and organizational support with documented policies and procedures is necessary to establish and test quality improvement initiatives that will enhance obtaining anthropometric measurements in the PICU.

Conclusions

Specific barriers to obtaining anthropometric measurements exist in the PICU and have major implications for clinical care and patient safety. Perceptions of these barriers differ between ordering providers and nurses, suggesting the need for targeted education and development of solutions to overcome the barriers. Obtaining timely and serial anthropometric measurements during critical illness in children can markedly influence therapies and interventions that in turn affect clinical outcomes and prevent harm.

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FINANCIAL DISCLOSURES
None reported.

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