Journal of Pediatric Surgery 50 (2015) 819–824

Contents lists available at ScienceDirect

Journal of Pediatric Surgery

journal homepage: www.elsevier.com/locate/jpedsurg

Targeted needs assessment for a transitional "boot camp" curriculum for pediatric surgery residents

Christopher Blackmore [a], Steve Lopushinsky [a,b], Jocelyn Lockyer [c], Elizabeth Oddone Paolucci [a,c,*]

[a] Department of Surgery, University of Calgary, Calgary, Alberta, Canada
[b] Section of Pediatric Surgery, University of Calgary, Calgary, Alberta, Canada
[c] Department of Community Health Sciences, University of Calgary, Calgary, Alberta, Canada

ARTICLE INFO

Article history:
Received 31 January 2015
Accepted 13 February 2015

Key words:
Boot camp
Competency-based
Medical education
Career transitions pediatric surgery

ABSTRACT

Introduction: Transition periods in medical education are associated with increased risk for learners and patients. For pediatric surgery residents, the transition to training is especially difficult as learners must adjust to new patient populations. In this study we perform a targeted needs assessment to determine the ideal content and format of a pediatric surgery boot camp to facilitate the transition to residency.
Methods: A needs assessment survey was developed and distributed to pediatric surgery residents and staff across North America. The survey asked participants to rank 30 pediatric surgical diagnoses, 20 skills, and 11 physiological topics on "frequency" and "importance". Items were then ranked using empirical methods. The survey also evaluated the preferred boot camp format.
Results: In total, 12 residents and 23 staff completed the survey. No significant differences were identified between staff and residents in survey responses. The top 5 topics identified for inclusion in a boot camp were: (1) fluid and electrolyte management, (2) appendicitis, (3) pediatric hernias, (4) nutrition and (5) pain management. The preferred format for a boot camp was 3–4 days in duration applying a blend of educational methods.
Conclusions: Based on the results of the needs assessment survey, a novel pediatric surgery boot camp curriculum can be developed.

Medical education in North America consists of well-defined stages connected by critical transition periods as one progresses from medical school to clinical practice. Focusing on Post-Graduate Medical Education (PGME), multiple studies have cited the transition from medical school to surgical residency as being stressful because of the variability in surgical skills exposure during clerkship as well as the increased number of clinical responsibilities [1–4]. These transition periods have also been associated with higher rates of psychiatric morbidity and burnout among trainees [5].

Of concern to medical educators and the community at large, transition periods may introduce potential risk for patients. The "July Phenomenon" is a well-studied effect predicting increased patient morbidity and mortality at teaching hospitals at the start of the academic year; a time that parallels most major transitions in medical training. In support of this, recent studies have shown that there is an increased risk of errors accounting for preventable complications during July [6,7].

From a pediatric surgery perspective, the Canadian Pediatric Adverse Events Study has identified that more children experience adverse events in academic centers compared to community centers [8]. This discrepancy was most pronounced in surgical patients, where those treated at academic centers experienced higher rates of adverse events (37.2% of patients) compared to community centers (21.5% of patients) [8].

Given the above concerns, there has been a strong push toward new methods of teaching and evaluation in PGME [9]. Programs are beginning to adopt competency-based frameworks to ensure that individual learner's skills match their progress through the continuum of medical education. In Canada, this is exemplified by the Royal College of Physicians and Surgeons of Canada (RCPSC) Competence by Design initiative [10]. In the United States, the Accreditation Council for Graduate Medical Education (ACGME) is implementing the Next Accreditation System (NAS) based on competency milestones [11]. In addition, many surgical programs have adopted "boot camps" to train residents during the critical transition to residency [12–15].

Pediatric surgery is unique in that trainees obtain their initial specialization in adult general surgery before transitioning to pediatrics. At the start, trainees have varying degrees of exposure to pediatrics and varying comfort levels in addressing pediatric issues. During informal discussions with pediatric surgery residents and staff, the transition into pediatric surgery has been described as particularly difficult. As a result, it was timely to investigate the perceptions of residents and staff regarding the need to develop an educational intervention for new pediatric surgery residents.

The purpose of this study was to conduct a targeted needs assessment of key stakeholders (i.e., residents and staff) in order to: (1) identify differences in the perceived needs for a pediatric surgery boot camp among stakeholders; (2) assess empirical ranking methods to inform the development of the future curriculum; (3) identify which pediatric

* Corresponding author at: #1026 North Tower, 1403-29 Street NW, Calgary, AB T2N 2T9, Canada. Tel.: +1 403 944 3151.
E-mail address: eoddone@ucalgary.ca (E.O. Paolucci).

http://dx.doi.org/10.1016/j.jpedsurg.2015.02.044
0022-3468/

surgical diagnoses, skills, and physiological topics should be included as curricular content in a pediatric surgery boot camp for new residents; and (4) determine the preferred boot camp duration, structure and educational methods to be employed. To the best of our knowledge, this study was the first of its kind to gather the information necessary to inform the development of a pediatric surgery boot camp curriculum.

1. Methods

1.1. Participants

Participants comprised the entire population of the Canadian Association of Pediatric Surgeons (CAPS; $n = 172$). Additionally, Canadian and American trainees were targeted via their program directors who were asked to forward the needs assessment survey to their current residents. Although exact numbers could not be determined, the survey was estimated to have been distributed to approximately 200 participants.

1.2. Targeted needs assessment: survey development

In consultation with pediatric surgery staff, residents and a curricular design expert (J.L.) at the University of Calgary, a targeted needs assessment survey was developed. The survey consisted of two parts: (1) boot camp content, and (2) boot camp format. For the content section, three overarching domains were identified: (1) pediatric surgical diagnoses; (2) pediatric surgical skills; and (3) pediatric physiology. To ensure content validity, each of the pediatric surgical diagnoses ($n = 30$), skills ($n = 20$), and physiology topics ($n = 11$) included in the was were derived directly from the Royal College of Physicians and Surgeons of Canada Objectives in Training for Pediatric Surgery Medical Expert competencies [16]. These objectives closely mirror those outlined by the Accreditation Council for Graduate Medical Education Pediatric Surgery Milestone Project [17].

Participants were asked to rate each of the pediatric surgical diagnoses, skills, and physiology topics on the level of "importance" to new pediatric surgery residents during their transition to training, and the "frequency" with which these items were encountered by pediatric surgeons or residents. This was done using a 5-point Likert scale. For importance, the scale ranged from "1" referring to "Not at all Important" to a score of "5" referring to "Very Important." For frequency, the scale ranged from "1" referring to "Less than Once per Year" to "5" referring to "More than Once per Week."

Our rating system was adapted from a similar study designed to create a rank order list of topics for inclusion in an internal medicine examination blueprint [18]. The "importance" score was designed to incorporate topics deemed critical for new trainees based on their level of urgency and room for error. The "frequency" score aimed to capture topics encountered most often by a new trainee. By combining these factors as described below, we aimed to create a rank order list of topics deemed most critical for a pediatric surgical boot camp. This list would be used to develop goals, objectives and ultimately a pediatric surgery transitional "boot camp" curricular outline.

The boot camp format section of the survey involved multiple choice, short answer, and open-ended questions to determine the preferred format of the boot camp. Specifically, questions regarding the perceived ideal duration, instructional methods, and structure were posed. Participants were also asked to describe other competencies and content areas they felt should be included in a pediatric surgery boot camp. The survey was created using SurveyMonkey (SurveyMonkey Inc., Palo Alto, CA) and distributed via an emailed electronic link. Data were collected anonymously.

1.3. Data analysis

All statistical analyses were performed using SPSS version 22 (SPSS Inc., Chicago, IL). For the content part of the survey, the mean scores and standard deviations were calculated for importance and frequency ratings for all staff and resident respondents. For each domain (pediatric surgical diagnoses, skills and physiology), multivariate analysis of variance (MANOVA) was applied comparing staff and residents to identify any differences in how the key stakeholders perceived topics on the level of importance or frequency.

To determine which content should be included in a boot camp curriculum, we applied methodology described by Smith and Beran [19] for the development of rank order lists for clinical presentations. Given our smaller sample size, we were able to test four of the five methods for combining ratings of frequency and importance. The Rasch model was excluded from analysis given its requirement for large sample sizes [19]. The first method involved ranking based solely on "frequency" which determines how often the topic is encountered in practice. The second method involved ranking on "importance" ratings. The third method, the multiplicative model, involved multiplying the "frequency" and "importance" ratings to obtain a composite score, which provided equal weighting to both ratings. Lastly, the three-step model is a form of assigning weights on both frequency and severity. In this model, items ranked highly on both scales received higher weighting than items ranked highly on a single scale [19].

For the boot camp format section of the survey, answers were tabulated using frequencies. Open-ended questions were transcribed and themed. The University of Calgary Conjoint Health Research Ethics Board approved this study.

2. Results

2.1. Participants

In total, 12 residents and 23 pediatric surgery staff completed our survey, representing an estimated response rate of 18% ($n \approx 200$). Overall, 57% ($n = 20$) of survey respondents were male, and 57% ($n = 20$) had completed or were registered in training programs in Canada, 40% ($n = 14$) had completed or were registered in programs within the United States, and 3% ($n = 1$) had completed training outside North America.

2.2. Targeted needs assessment survey: boot camp content

Mean ratings of each topic were tabulated for frequency and importance for residents and staff under each domain: pediatric surgical diagnoses (Table 1), pediatric surgical skills (Table 2), and pediatric physiology (Table 3). The MANOVAs comparing resident and staff ratings for importance, as well as frequency, revealed no significant differences between stakeholders (Tables 1–3).

2.3. Rank order method comparison

For the topics within each domain (pediatric surgical diagnoses, skills and physiology), the four ranking methods were applied and compared with Spearman's correlations (ρ) in order to determine consistency among methods (Table 4). All four rankings methods were significantly correlated to one another. The frequency and importance methods had the lowest correlation ($\rho = 0.59$, $p < 0.01$), while the three-step model and multiplicative model were the most highly correlated methods ($\rho = 0.99$, $p < 0.01$).

2.4. Targeted needs assessment: boot camp format

Of the domains evaluated by our survey, participants ranked pediatric surgical diagnoses as most important, pediatric physiology as the second most important, and pediatric surgical skills as least important to focus on in a pediatric surgery boot camp.

The favored duration of the boot camp was three to four days ($n = 12$; 34%), followed by five to six days ($n = 8$; 23%), seven days or longer