

Providing Pediatric Palliative Care Education Using Problem-Based Learning

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Abstract

Background: The Institute of Medicine and the American Academy of Pediatrics has called for improvement in education and training of pediatricians in pediatric palliative care (PPC). Given the shortage of PPC physicians and the immediate need for PPC medical education, this study reports the outcomes of a problem-based learning (PBL) module facilitated by academic general and subspecialty pediatric faculty (non-PPC specialists) to third year medical students.

Objectives/Setting: To test the effectiveness of a PPC-PBL module on third year medical students' and pediatric faculty's declarative knowledge, attitudes toward, perceived exposure, and self-assessed competency in PPC objectives.

Design: A PBL module was developed using three PPC learning objectives as a framework: define core concepts in palliative care; list the components of a total pain assessment; and describe key principles in establishing therapeutic relationships with patients. A PPC physician and nurse practitioner guided pediatric faculty on facilitating the PPC-PBL. In Part 1, students identified domains of palliative care for a child with refractory leukemia and self-assigned questions to research and present at the follow-up session. In Part 2, students were expected to develop a care plan demonstrating the three PPC objectives.

Measurements: Measures included a knowledge exam and a survey instrument to assess secondary outcomes.

Results: Students' declarative knowledge, perceived exposure, and self-assessed competency in all three PPC learning objectives improved significantly after the PPC-PBL, $p = 0.002$, $p < 0.001$, and $p < 0.001$, respectively. There were no significant differences in faculty knowledge test scores from baseline to follow-up, but scores were generally high (median >80%). Students and faculty rated palliative care education as "important or very important" at baseline and follow-up.

Conclusions: This study suggests that key concepts in PPC can be taught to medical students utilizing a PBL format and pediatric faculty resulting in improved knowledge and self-assessed competency in PPC.

Keywords: curriculum; medical; palliative care; pediatrics; problem-based learning; students

Introduction

THE INSTITUTE OF MEDICINE and the American Academy of Pediatrics have called for improvement in the education and training of pediatricians in pediatric palliative care (PPC).^{1,2} This is not surprising given the growing population of children with life-threatening and life-limiting illness³ and the limited access these children have to PPC and hospice care services. Currently, about 69% of children's hospitals offer

PPC services and 41% of hospices employ dedicated pediatric staff. However, only 10%–20% of dying children receive hospice care at the end of life (EOL).³ In response to the deficits in palliative care medical education, the Liaison Committee on Medical Education (LCME) now requires that medical education include EOL care and communication skills,⁴ and the Accreditation Council on Graduate Medical Education requires that pediatric training programs include instruction in the care of children with chronic or terminal illness.⁵

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Accordingly, 100% of U.S. medical schools have been offering education in palliative and EOL care since 2000. Unfortunately, this has not consistently translated into improved comfort and competence of graduating medical students in providing PPC. Given the already overburdened medical school curriculum, it is unlikely that more time will be spent learning these topics in the future.⁶ In a study of 250 trainees from 3 institutions and a variety of residency programs, 59% ($N=140/238$) reported their medical school preparation for managing pain was “fair” or “poor” and 36% ($N=84/235$) rated their residency preparation as “fair” or “poor.”⁷ Pediatrics residents from one U.S. program reported inadequate levels of training, experience, knowledge, competence, and comfort in virtually all areas of PPC ($N=49$).⁸ Even at the fellowship level, less than half of pediatric oncology fellows are comfortable providing EOL care,⁹ and 93% of neonatology fellows reported that training to discuss goals and decision making with families needs to be improved.¹⁰ Not surprisingly, many pediatric attending staff also feel inexperienced and uncomfortable taking care of children receiving PPC.^{11–13} Furthermore, bereaved parents report that pediatric physicians could improve upon communication, and pain and symptom management, when caring for terminally ill children.^{14–18} Research shows that pediatric intensivists and pediatric oncologists are more likely to consult PPC services for psychosocial support and symptom management if they themselves have had some palliative care training.¹⁹ Given the shortage of PPC specialists and the urgent need for PPC education, pediatric generalists, and nonpalliative care specialists must be able to facilitate PPC education for young physicians.¹

This article reports on the outcomes of a problem-based learning (PBL) PPC curriculum facilitated by general and specialist (nonpalliative care) pediatric faculty (“PBL faculty”) to third year medical students at Albert Einstein College of Medicine (Einstein). Outcomes included medical students’ and PBL faculty’s declarative knowledge, attitudes toward, perceived exposure, and self-assessed competency in three PPC objectives. These objectives were: (1) define the core concepts of PPC, (2) list the components of a total pain assessment, and (3) describe the key principles in establishing a therapeutic relationship with patients. Our hypotheses were that compared with their baseline assessments, the students and faculty who participated in the PPC-PBL would display increased PPC knowledge, report increased competency in PPC, and have improved attitudes toward PPC. This study was approved by the Einstein-Montefiore Medical Center Institutional Review Board.

Methods

Development of the PPC-PBL

Utilizing Kern’s six-step approach to curriculum development,²⁰ we conducted a targeted curricular needs assessment using focus group and survey methodology with medical school faculty leaders, and assistance from the Dean of Medical Education and the Einstein Educational Competency Task Force Committee. Through a systematic review of the four-year curriculum, we identified gaps in the palliative care curriculum relative to The American Academy of Hospice and Palliative Medicine competencies.²¹ While the students were taught about opioid pharmacology, had an

Introduction to Clinical Medicine discussion entitled “Giving Bad News,” and participated in a half-day with a hospice patient during the Geriatrics Clerkship, the concept of the field of palliative care and its guiding principles were not explicitly taught. In addition, curriculum time and faculty expertise were cited as the main barriers to addressing these gaps. Through the support of a grant from the End of Life/Palliative Education Resource Center, we consulted with national experts David Weismann, MD, and Susan Block, MD, who helped us to shape our curricular reform to include a select set of palliative care objectives in both the Family Medicine (FM) and the Pediatrics Clerkships. This report focuses solely on the Pediatric Clerkship PPC curriculum.

In consultation with the Pediatrics Clerkship Director (M.S.), we discovered that the only time available for our initiative was within the established PBL series. PBL uses an active teaching approach, which demands self-directed learning, problem-solving proficiency, and team participation to acquire knowledge.²²

Faculty development

PBL faculty from all Einstein pediatric rotation sites met with one PPC specialist (K.M.) and a Family Nurse Practitioner with expertise in Palliative Medicine (M.M.) for a one-hour instructional on how to facilitate the PPC-PBL. Of note, none of the PBL faculty had formal training, expertise, or board certification in palliative care; however, some of them self-identified as PPC champions at their institutions. In addition to this one-hour orientation, which reviewed the core components of PPC and the PPC-PBL case, PBL faculty were directed to complete the Stanford University Continuing Medical Education modules on Giving Bad News and Establishing Goals of Care.²³

Intervention: Integration of PPC-PBL into curriculum

As a requirement for pediatric clerkship students, Part 1 of the PPC-PBL module followed a PBL case discussion of a child (JM) with bone pain who is eventually diagnosed with acute leukemia. Following discussion and initial management of the patient’s leukemia, instead of embarking on a new PBL case, this case was expanded upon with JM returning with refractory leukemia, worsening pain, and a terminal prognosis. As per the PBL format, students identify and prioritize problems and domains of care, self-assign open-ended questions within domains to research, and prepare to present to the group for discussion in Part 2 of the module (Table 1).

During Part 2, students were expected to develop a care plan framework that demonstrated the principles of palliative care, highlighted the importance of a total pain assessment, and revealed what physicians can do to establish therapeutic relationships, particularly in the setting of a terminal disease. Key messages that PBL faculty were asked to elicit in Part 2 were as follows:

- (1) Palliative care can be provided whether or not disease is possibly curable; however, curing the disease is not the primary goal. The primary goal is to relieve suffering through interdisciplinary care that addresses physical, psychosocial, and spiritual needs of

TABLE 1. PEDIATRIC PALLIATIVE CARE- PROBLEM-BASED LEARNING THE CASE OF JM: PRESENTATION AND TOPICS FOR DISCUSSION

<i>The case of JM</i>	<i>Sample topics of discussion</i>
<p>Part 1 Continuing from the previous PBL case discussion in which a four-year-old female child (JM) is newly diagnosed with acute myeloid leukemia (AML), we “fast forward” and describe the same child now as follows: JM is now 18 weeks from initial diagnosis and has completed three different regimens of chemotherapy. However, bone marrow aspiration shows that the AML persists. Her pain is escalating. No available bone marrow donor was identified and no further cure-directed therapies are available. A family meeting is scheduled.</p> <p>Between Parts 1 and 2, students assign themselves to research-relevant issues to this patients’ care plan and prepare to discuss them in the next session (e.g., pain management, psychosocial issues, legal/ethical concerns, and family values/ goals of care, experimental therapies, advance directives, and hospice and home care).</p>	<ol style="list-style-type: none"> (1) What is the differential diagnosis of JM’s pain now? (2) What do you want to know to help you manage her pain and suffering? (3) What aspects of the patient’s psychosocial history do you want to know and why? (4) What are your goals and expectations for the family meeting with JM and her family? (5) Who else from the healthcare team needs to be involved in the care of this patient?
<p>Part 2 Students present their findings and collaborate to develop a comprehensive palliative care plan for JM incorporating their research. Time for reflection about this case is also encouraged</p>	<ol style="list-style-type: none"> (1) What are the treatment options for JM? (2) What is the next step in caring for JM? (i.e., home, hospice, and hospital). If JM wants to go home, what will she need at home? (3) How can your communication style help provide support to the family?

PBL, problem-based learning.

children with life-limiting illness to improve quality of life for these children and their families.¹⁷

- (2) Pain must be assessed and taken seriously. The child’s report of his/her subjective pain experience coupled with the child’s caregiver report and clinical assessment give the most comprehensive picture of the pain experience.²⁴
- (3) Communication is critical in medicine, but may be even more so in patients with advanced disease. Appropriate communication (passive and active), central to the establishment of a therapeutic alliance, can be the most important and effective intervention a physician provides to improve a patient’s EOL experience.²⁵

Outcomes

Our outcomes correlate to levels 1 and 2 of Kirkpatrick’s Hierarchy of Outcomes Measure.²⁶ Level 1 measures “Reaction,” or the degree to which participants found the curriculum helpful, and level 2, “Learning,” measures knowledge, confidence, and modification of attitude and perception acquired during the course.²⁶

Our primary outcome was declarative knowledge of PPC. Students were asked to complete a baseline survey and knowledge examination, and a follow-up survey and knowledge examination at the end of the rotation. Acquisition of knowledge was evaluated with three multiple choice questions written using a clinical stem (patient-based case scenario) format consistent with standards described by the National Board of Medical Examiners.²⁷ Each question was directly linked to a learning objective. Students’ self-assessed competency was measured with Likert-type questions that asked whether the student felt competent in each of the three objectives (1 = not competent; 5 = completely competent). Modification in perception was measured with questions that

inquired whether the student thought he/she had been exposed to each of the three objectives (yes/no). Modification of attitude was assessed with Likert-type questions asking how important it was to learn each objective before graduation (1 = not at all, 4 = very important).

Similar to the medical student survey/examination, PBL faculty were surveyed on their perception that students had been taught each of the three learning objectives (yes/no), and they were asked how important it was that students learn each of these objectives before graduation (1 = not at all important, 4 = very important). PBL faculty were also asked two additional questions that were not posed to the students. These questions asked them to report who they thought should provide palliative care education and palliative care clinical services. In addition, PBL faculty were asked to complete an anonymous examination at baseline and after teaching the PPC-PBL, which explicitly tested knowledge of the learning objectives.

Sample size and data analysis

This is a prospective cohort study using a convenience sample of pediatric clerkship PBL faculty and third-year medical students. We define this as a convenience sample because we included any student assigned to the third-year pediatric clerkship and the PBL faculty who taught during the study timeframe. The study measures were sent to 26 PBL faculty and 190 third-year medical students. Assuming a 50% response rate, this study was expected to include ~ 14 faculty and 95 students. Descriptive statistics were used to compute median (interquartile range [IQR]) scores on the survey and test questions that measured attitudes, competence, and knowledge of medical students and faculty at baseline and at follow-up time points. Similar to a mean and standard deviation (SD), median and IQR measures the central tendency and spread, respectively, but are more robust against outliers

and nonnormal data. The primary outcome of this curriculum assessment was the change in medical students' knowledge test scores from baseline to follow-up. The median pretest scores were compared to the median posttest scores using a Mann–Whitney U test. With a sample of 95 students, we would have 86% power to detect a 20% difference on scores at an alpha level of 0.05. Continuous variables were summarized by estimating mean \pm SD (for normally distributed variables) and medians (with IQR: [25th, 75th percentiles]). Categorical variables were summarized by computing proportions. Baseline and follow-up scores were treated as independent variables, as the surveys were anonymous and we did not link individual pre and post results. Mann–Whitney U tests were used to compare perceived exposure to learning objectives at baseline with follow-up.

Results

One hundred ninety students participated in the PPC-PBL representing six clerkship cycles. Overall, 81 (43%) medical students completed baseline questionnaires and 108 (57%) completed questionnaires following the PPC-PBL sessions. All, but two students were in their third year of medical school. To encourage participation, all surveys were completed anonymously.

Students' declarative knowledge on the three objectives, as measured by the number of exam questions answered correctly, showed significant improvement from baseline (Table 2).

Self-assessed competency and students' perceived exposure to all three objectives showed significant improvement after receiving the PPC-PBL. All three objectives were rated as important by students at both time points (Table 2).

Since the FM clerkship had also recently instituted a palliative care curriculum in parallel with this initiative, we tested the relationship between completion of the FM rotation and exposure to the PPC learning objectives. Although there was no significant relationship between having completed the

FM rotation and exposure to objective 2, there were significant associations between this prior experience and perceived exposure to objectives 1 and 3. Specifically, those who had exposure to palliative care content in the FM clerkship were roughly thrice more likely than those not exposed to report exposure to objective 1 (odds ratio [OR]=3.3 [95% confidence interval, CI 1.5–7.3], $p=0.003$) and objective 3 (OR=3.5 [95% CI 1.5–8.2], $p=0.003$) at baseline.

Twenty-four faculty completed baseline assessments and 13 faculty completed surveys after teaching the PPC-PBL course. The reduction in postintervention faculty assessments was secondary to both attrition and the fact that not all faculty assessed at baseline ended up leading the PPC-PBL. A significantly increased percentage of faculty at follow-up reported that medical students were exposed to the first learning objective (69.2%) compared with baseline (8.7%), $p<0.001$. However, there were no statistically significant changes in the percentage of faculty reporting medical student exposure to objectives 2 and 3 from baseline (59.1% and 39.1%) to follow-up (53.8%, and 53.8%), $p=0.76$ and 0.39 , respectively. This is in sharp contrast to the perceptions of the students, which showed significant increases in perceived exposure to all three objectives. It is unclear why PBL faculty had such a different view; however, the small sample size and attrition of faculty may be contributing to this finding. In the opinion of the faculty, both at baseline and follow-up, all three learning objectives were viewed as "very important" for medical students to learn before graduation (mean rank over 70% for all values, $p>0.45$ for all comparisons). Nearly all faculty reported that palliative care education should be shared equally by physicians and other members of the healthcare team at baseline (96%) and follow-up (100%), respectively. Most faculty reported that the responsibility for providing palliative care services should be shared equally among primary and specialist physicians at baseline (87%) and follow-up (100%). There were also no significant differences in faculty knowledge median (IQR) test scores from baseline (90% [73–100]) to follow-up (80% [75–90]), $p=0.29$.

TABLE 2. RESULTS

Outcomes	Baseline median (IQR)	Postintervention median (IQR)	p
Primary outcome			
Declarative knowledge on three objectives measured by exam	3.0 (2–3)	3.0 (3–3)	0.002
Secondary outcomes			
Define the core concepts of PPC (Objective 1)			
Self-assessment of competency in Objective 1	3.0 (2–3)	4.0 (4–4)	<0.001
Exposure to Objective 1	11%	96%	<0.001
Importance of Objective 1	3.0	3.0	0.87
List the components of a total pain assessment (Objective 2)			
Self-assessment of competency in Objective 2	3.0 (2–3.5)	4.0 (3–4)	<0.001
Exposure to Objective 2	14%	88%	<0.001
Importance of Objective 2	3.0 (3–4)	3.0 (3–4)	0.97
Describe key principles in establishing a therapeutic relationship with patients (Objective 3)			
Self-assessment of competency in Objective 3	3.0 (2–4)	4.0 (3–5)	<0.001
Exposure to Objective 3	17%	84%	<0.001
Importance of Objective 3	3.5 (3–4)	3.0 (3–4)	0.82

IQR, interquartile range; PPC, pediatric palliative care.

Discussion

We describe the effectiveness of a PPC-PBL initiative, facilitated by general and non-PPC specialist pediatric faculty, to improve PPC knowledge, self-assessed competency, and attitudes in third-year medical students. This finding is important because the critical barriers to PPC education include lack of available PPC faculty expertise, lack of curricular time, and often insufficiency of didactic methods alone.^{28,29} While palliative care curricula in medical schools are most often implemented through didactic methods and are often rated as insufficient,²⁹ a few studies report using PBL methods to teach palliative care to health science students and also found it to be effective.^{30–32}

The Social Cognitive Career Theory³³ (SCCT) may, in part, explain why PBL is an effective method for teaching PPC. Compared with traditional didactic methods, PBL often leads to greater learner satisfaction and interest.²² SCCT states that students are more likely to be interested in engaging in a particular activity if they feel they have self-efficacy to perform successfully and the expected outcome holds value for them.³³ Acquisition of self-efficacy is dependent on one's personal experience of successes and failures, vicarious experiences, learning in a low anxiety state, and social models that provide positive reinforcement. PBL is a type of learning that incorporates all of these elements.²² Palliative care, and particularly PPC, can elicit anxiety on the part of the learner related to their own personal attitudes toward death and dying.³⁴

Research shows that learning through a PBL format increases learner confidence, provides a supportive environment that encourages teamwork, improves interpersonal communication and problem-solving skills, and encourages reflection and self-awareness.²² These skills are central competencies for the physician providing PPC.²⁸ Therefore, utilizing a teaching method that bolsters these skills is especially helpful for teaching PPC. Even more importantly, this PPC-PBL can result in increased confidence in one's ability to implement the new information in a clinical setting and reframe the outcome as something they can affect positively (i.e., provide emotional support to family, facilitate chosen place of death for family, and manage pain).²² This is essential since a common barrier to quality PPC is comfort of the practitioner.³⁵

Another advantage to PBL is that the facilitators do not need to have in-depth knowledge in the subject area.³⁶ Rather, they require enthusiasm and expertise in group dynamics.²² Our facilitators were pediatricians from a variety of specialties, but none was a PPC specialist. This is important because of the widespread shortage in the availability of PPC physicians and the clear and present need for this education. The implication of this finding is that medical schools can effectively teach this important topic to medical students with limited additional training of pediatricians, which will also improve the expertise of the faculty.

Limitations

There are several limitations of this study. Medical students were not graded on this curriculum; therefore, we do not have objective data regarding their PBL performance. In addition, the medical student outcomes were anonymous; so calculations of change in scores for each individual were not performed. We also did not test medical students at any ad-

ditional time point; so we cannot assess whether the effects of the intervention persist over time. Another weakness is that we only used one knowledge item tied to each objective for the exams and one knowledge item could not possibly capture all aspects of a specific learning objective. The major limitation in our faculty assessment was a small sample size due to a high rate of turnover and attrition in our PBL faculty sample. This may account for our lack of significant improvement in the PBL faculty perceptions of student exposure to objectives 2 and 3 and lack of improvement in the PBL faculty knowledge exam. Our faculty and student body were already experienced in PBL facilitation and participation, respectively. PBL facilitator training is an endeavor that requires several hours and an institutional commitment to using PBL as a teaching framework. This may be a barrier to other institutions, interested in teaching palliative care, using this format. Finally, although an advanced practice nurse co-lead the faculty development, the PBL sessions included only physicians and as such did not offer exposure to interprofessional education, which would have more closely mirrored PPC in practice.

Conclusion

This study shows that key concepts in PPC can be successfully taught to third-year medical students utilizing a PBL format and pediatric faculty without PPC expertise, resulting in improved student knowledge and self-assessed competency in PPC.

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Author Disclosure Statement

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