Published in final edited form as:

Acad Pediatr. 2020 ; 20(1): 81–88. doi:10.1016/j.acap.2019.07.008.

Pediatric Resident Experience Caring for Children at the End of Life in a Children's Hospital

Amy Trowbridge, MD, Tara Bamat, MD, Heather Griffis, PhD, Eric McConathey, BS, Chris Feudtner, MD, PhD, MPH, Jennifer K. Walter, MD, PhD

Division of Bioethics and Palliative Care, Seattle Children's Hospital and University of Washington (ATrowbridge), Seattle, Wash; Pediatric Advanced Care Team, The Children's Hospital of Philadelphia (T Bamat, E McConathey, C Feudtner, and JK Walter), Philadelphia, Pa; PolicyLab, The Children's Hospital of Philadelphia (H Griffis), Philadelphia, Pa; and Department of Medical Ethics, The Children's Hospital of Philadelphia (C Feudtner and JK Walter), Philadelphia, Pa

Abstract

OBJECTIVE: Pediatric residents are expected to be competent in end-of-life (EOL) care. We aimed to quantify pediatric resident exposure to patient deaths, and the context of these exposures.

METHODS: Retrospective chart review of all deceased patients at one children's hospital over 3 years collected patient demographics, time, and location of death. Mode of death was determined after chart review. Each death was cross-referenced with pediatric resident call schedules to determine residents involved within 48 hours of death. Descriptive statistics are presented.

RESULTS: Of 579 patients who died during the study period, 46% had resident involvement. Most deaths occurred in the NICU (30% of all deaths); however, resident exposure to EOL care most commonly occurred in the PICU (52% of resident exposures) and were after withdrawals of life-sustaining therapy (41%), followed by nonescalation (31%) and failed resuscitation (15%). During their postgraduate year (PGY)-1, <1% of residents encountered a patient death. During PGY-2 and PGY-3, 96% and 78%, respectively, of residents encountered at least 1 death. During PGY-2, residents encountered a mean of 3.5 patient deaths (range 0–12); during PGY-3, residents encountered a mean of 1.4 deaths (range 0–5). Residents observed for their full 3-year residency encountered a mean of 5.6 deaths (range 2–10).

CONCLUSIONS: Pediatric residents have limited but variable exposure to EOL care, with most exposures in the ICU after withdrawal of life-sustaining technology. Educators should consider how to optimize EOL education with limited clinical exposure, and design resident support and education with these variable exposures in mind.

Keywords

burnout; end-of-life care; palliative care; pediatrics; resident education

Address correspondence to Amy Trowbridge, MD, Division of Bioethics and Palliative Care, Seattle Children's Hospital, 1900 9th Ave, #689, Seattle, WA 98101 (amy.trowbridge@seattlechildrens.org).

The authors have no conflicts of interest to disclose.

THE INSTITUTE OF Medicine and the American Academy of Pediatrics (AAP) have stressed the importance of basic palliative care and end-of-life (EOL) skills for all residents regardless of career path,^{1,2} and the Accreditation Council for Graduate Medical Education includes related EOL skills in their milestones for pediatric trainees.³ Nevertheless, pediatric residents report inadequate training in several aspects of EOL care including symptom management, communication, and self-care in dealing with grief.⁴⁻⁹ Additionally, most program directors do not report using a formal curriculum on EOL care,⁴ although several curricula exist.^{3,8,10,11} Insufficient training in EOL care has a significant impact on residents, with residents describing the death of their patients as one of the most challenging aspects of residency.^{5,9}

To ensure residents receive adequate training and support in EOL care, educational interventions must rely upon accurate data about resident exposure to death, including where and when residents care for dying patients, as well as how those patients die. Significant gaps in our understanding of resident exposure to death exist because most published data rely on surveys of residents, which may be subject to recall bias and contain limited information about the modes of death to which residents were exposed.^{4,6,7}

To our knowledge, no studies have provided detailed quantification of pediatric residents' exposure to EOL care overall or with regard to specific patient mode of death. Our objective was to identify and describe all patient deaths that occurred over a 3-year period in one major, free-standing children's hospital and determine which of these patients had resident involvement in their care within the last 48 hours of life. We also sought to characterize resident exposure to patient death by resident year, location within the hospital, and mode of patient death.

METHODS

The Institutional Review Board of the Children's Hospital of Philadelphia approved this study.

STUDY POPULATION AND LOCATION

All patients who died between July 1, 2011 and June 30, 2014 at the Children's Hospital of Philadelphia (CHOP) were included and screened for resident involvement. At CHOP, residents are involved in the care of a portion of the patients in the 95-bed neonatal ICU (NICU), and 56-bed pediatric ICU (PICU), as well as on the oncology and other subspecialty service units.

Resident physicians who completed at least 1 full year of residency during the study period were included. In addition to residents in the 3-year categorical Pediatric Residency program, we included residents from CHOP's combined Pediatrics/Neurology program and its American Board of Pediatrics-approved Accelerated Research Pathway. These residents complete approximately 2 years of general pediatric residency training similar to categorical residents. A small number of residents in a 1-year preliminary program were also included. Residents in the combined Medicine/Pediatric and Pediatric/Genetics programs were

excluded due to significant differences in curricula. Residents that worked part time or took a leave of absence during the study period were also excluded.

All included residents completed the curriculum detailed in Table 1. Residents in all programs experienced the same curriculum during postgraduate year (PGY)-1. Residents in the combined Pediatric/Neurology or Accelerated Research Pathway had minor variations in rotation exposure during PGY-2.

DATA COLLECTION

Patient demographics (age, sex, race, and ethnicity), hospital length of stay, and date and location of death were extracted from the electronic medical record. Primary hospital care team(s) for each patient in the 48 hours preceding death were collected for each patient.

Resident characteristics, including year(s) in residency and residency program, were obtained from an official Graduate Medical Education department roster, and reviewed by a former chief resident on our study team (TB) to screen for inclusion and exclusion criteria.

Resident exposures to patient EOL care were determined by cross-referencing each patient's assigned primary hospital care team(s) in the 48 hours prior to death with archived resident call schedules. For every patient, if the assigned primary hospital care team(s) included residents, the date and time of patient death was compared to the resident call schedule to determine which resident(s) were assigned to work on that care team in the 48-hour period preceding death. Resident name, year in residency, and program were noted for each patient encounter. If a patient had more than 1 assigned primary hospital care team in the 48 hours preceding death (eg, if they were transferred from the medical floor to the intensive care unit), each care team was reviewed for resident assignments. Unit-based care teams include a small group of residents working together for 1-month period that share primary responsibility for direct patient care. While a patient may be assigned a "primary" resident, every resident on the team will be exposed and involved in the clinical care of every patient. Because residents do not write notes on every rotation and there is significant variability in order writing practices by unit, these methods would not as accurately capture exposure to a dying patient as using care team assignment. We chose a 48-hour time point to capture some of the clinical discernment of the dying process, symptom management specific to EOL care, and communication within the team and between the team and family that occurs leading up to a patient death, without over-characterizing the resident experience with EOL care. Even patients with failed CPR were likely to exhibit signs and symptoms of dying prior to a life-ending event and may have prompted goals of care conversations allowing families to request all resuscitative treatments. Deaths in the emergency department were excluded, as these patients do not have assigned care teams to determine resident involvement.

MODES OF DEATH

A constant comparison grounded theory approach was used to develop a codebook defining 5 distinct, mutually exclusive modes of death. Qualitative analysis of death notes, physician and nurse progress notes, and resuscitation records was performed for each patient by 2 authors (EM, AT) to assign 1 mode of death to each case. A detailed description of these methods, and the 5 modes of death, can be found elsewhere.¹² In brief, each death was

categorized as either: 1) *Withdrawal of Life Sustaining Technology (WLST)*: withdrawal of technology within 24 hours of death, 2) *Non-Escalation*: no resuscitation performed near time of death, no life-sustaining technology withdrawn. Natural death, or hospitalization for EOL care without escalation in therapies, would be included in this mode. 3) *Failed Resuscitation (Failed CPR)*: resuscitation attempt occurred within 24 hours of death, 4) *Withdrawal of Life-Sustaining Technology after Code (WLST after CPR)*: at some point during or shortly after a resuscitation the decision was made to remove life-sustaining technology, or 5) *Brain Death*: death by neurologic criteria using accepted standards.

ANALYSIS

Descriptive statistics were calculated for patient demographics, locations of death, modes of death, and resident involvement. Additionally, descriptive statistics were used to describe the frequency of exposures per resident during various years in residency and across a complete 3-year residency program. Finally, resident exposure to each different mode of death and within various hospital locations was summarized with descriptive statistics. Data were analyzed using Stata version 14.

RESULTS

A total of 579 deceased patients were included in the sample. A total of 193 pediatric residents were included in the study and accounted for 357 separate years of resident experience (Table 1). Seventy-six residents completed 1 year of residency during the study period, 80 completed 2 years, and 37 completed all 3 years (Table 1). One hundred seventy-six residents were in the categorical pediatric residency program, 10 were in the pediatric neurology residency program, 4 in the accelerated research pathway, and 4 in the PGY-1 preliminary program. Of the 579 deaths, at least 1 resident was involved for 271 (46.8%) (Table 2). The remaining 308 patient deaths either occurred on care teams without residents rotating (such as the Nurse Practitioner-based teams in the NICU or CICU), or in the emergency department, where resident involvement could not be determined. Almost half of patients with resident exposure to their EOL care were less than 1 year of age and of white, non-Hispanic race/ethnicity (Table 2).

PER-RESIDENT EXPOSURES TO PATIENT DEATHS

Only 1 PGY-1 resident had an exposure to a patient's EOL care (0.8%) (Fig. 1). During PGY-2, 113 of 118 (96%) residents had at least 1 exposure. The mean number of exposures during PGY-2 was 3.5, ranging from 0 to 12 exposures. During PGY-3, 81 of 104 (78%) residents had at least 1 exposure. The mean number of exposures during PGY-3 was 1.4, ranging from 0 to 5 exposures. For the cohort of 37 residents that completed their full 3-year residency during the study period, all had at least 1 exposure over the 3-year period, with a mean exposure of 5.6 and a range of 2 to 10 exposures.

LOCATIONS OF DEATH AND RESIDENT EXPOSURE

While the NICU was the most common location of death overall (172 deaths, 29.7% of all deaths), the PICU was most common place residents were exposed to EOL care (142 deaths, 52.4% of deaths with resident involvement) (Table 2).

During PGY-2, the most common location for residents to be exposed to EOL care was the NICU, with 80 (67.8%) PGY-2 residents having at least 1 NICU exposure (Fig. 2). Sixty-nine (58.4%) and 65 (55.1%) residents were exposed to at least 1 episode of EOL care in the PICU and Oncology units, respectively, during PGY-2. During PGY-3, resident exposures occurred almost exclusively in the PICU. Most PGY-3 residents (72, 69.2%) had at least 1 exposure in the PICU. For the cohort whose full 3-year residency was studied, 23 (62.2%) were exposed to at least 1 episode of EOL care in the NICU, 35 (94.6%) were exposed to at least 1 in the PICU, and 23 (62.2%) were exposed to at least 1 on the Oncology unit.

MODES OF DEATH

WLST was the most common mode of death overall (233 deaths, 40.2% of all deaths) and the most common mode with resident involvement (112 deaths, 41.3% of deaths with resident involvement) (Table 2). Nonescalation was the second most common mode of death that residents were exposed to (84, 31.0% of deaths with resident involvement), followed by 41 failed CPR (15.1%), 24 brain death (8.9%), and 10 WLST after CPR (3.7%) (Table 2).

During PGY-2, 80 (67.8%) residents were exposed to a WLST death. Of the PGY-2 residents exposed to at least 1 WLST death, the mean exposure was 1.8 WLST deaths. Eighty-four (71.2%) PGY-2 residents were exposed to at least 1 nonescalation death, with a mean exposure of 2 nonescalation deaths. Most PGY-2 residents were not exposed to the other modes of death (Fig. 3). During PGY-3, less than 50% of residents were exposed to any 1 mode of death. The most common PGY-3 exposure was to WLST with 42 (40.4%) residents being exposed, followed by nonescalation (27, 26.0%) and failed CPR (24, 23.1%) (Fig. 3).

For the cohort of residents that completed their 3-year residency within the study period, 32 (86.5%) had exposure to WLST with a mean exposure of 1.9 WLST deaths, while 32 (86.5%) were exposed to nonescalation, and 20 (54.1%) to failed CPR (Fig. 3).

DISCUSSION

This study, using resident call schedules and standardized descriptions of modes of death, found that resident experience with EOL care is limited and highly variable, even among residents within the same program. The highest number of exposures occurred during PGY-2 when the residents spent the most time in the ICUs, although about half of residents also had at least 1 exposure on the oncology unit. Finally, residents are most commonly exposed to WLST or nonescalation, with only a minority experiencing death after attempted resuscitation.

LIMITED RESIDENT EXPOSURE TO PATIENT DEATH

In our study sample of pediatric residents, the average resident completing a full, 3-year, categorical pediatric residency program was exposed to EOL care 5.6 times, although some were exposed only twice throughout their entire residency. Our finding is similar to 2 survey-based studies published in the last 15 years, where PGY-3 residents reported being present for an average of 5.9 and 6.2 patients deaths during their residency.^{6,7} A study published in 1984, by contrast, cited an average of greater than 35 exposures to patient death

at residency completion.¹³ The vast improvements in medical technology and resulting decline in pediatric mortality rates likely contribute to decreased resident experience with EOL care.¹⁴ Lower rates of exposure to patient death may also be affected by the expansion of palliative care and hospice services that have shifted some deaths out of the hospital.¹⁵

The low numbers of exposures to direct EOL care for residents are relevant when we consider how to improve competency in EOL care. In a national survey of pediatric residency directors, only 38% felt that their matriculating residents are competent in palliative care.⁴ Several surveys of pediatric residents reveal low levels of self-assessed competency in various EOL care tasks such as pain and symptom management, declaring death, discussing withdrawal of technology, and coping with personal grief.⁵⁻⁷ In order to improve resident competence in these and other EOL tasks, educators will need to consider a multipronged approach, including formal curriculums, maximizing the learning opportunity when a patient death does occur, and considering ways to increase clinical exposure.

First, consideration should be given to curriculum that emphasizes training opportunities away from the bedside. Residency programs currently have widely variable methods for augmenting EOL education, ranging from no “official” didactics to full day seminars.^{4,8} Several published curricula already exist that could be more widely implemented, including the AAP’s Curriculum on Grief and Resilience that includes a variety of didactic and interactive sessions.³ Simulation has also been used extensively to teach communication skills^{16,17} and could play a role in increasing trainee experience and confidence with EOL care, as it has in nursing education.^{18,19}

Second, because “hands-on” bedside teaching is widely believed to be the most effective mode of learning,^{4,20} educators can consider how to harness and maximize the learning that does occur when a patient dies. Future studies are needed to understand current practice both in the types of training residents receive in EOL care and how educators can provide optimal bedside teaching to residents when caring for patients at the EOL while also tending to the unique needs of each patient and family.

Finally, consideration should be given to the creation of additional opportunities for residents to take part in the care of patients at their EOL. Residency programs may consider rotations with their hospital’s palliative care team or opportunities to partner with local hospice organizations. A rotation with the palliative care team can provide residents specific teaching in EOL symptom management, communication specific to the EOL period, and an interdisciplinary approach to relief of both patient and family suffering and promotion of quality of life.

LOCATION OF RESIDENT EXPOSURE TO DEATH

Our second finding was that residents are exposed to patient EOL care primarily in the ICUs and on oncology wards. Of the approximately 45,000 children who die every year, approximately 75% die in a hospital, and of that, approximately 80% die in ICUs.^{12,14} Thus, it is not surprising that the majority of resident exposure to EOL care occurs in the ICU setting. A curriculum that prepares residents for EOL care and communication should therefore occur before rotation in ICUs. Since previous studies have documented an increase

in resident burnout during ICU rotations²¹, and after recent patient death^{22,23}, further research should investigate whether prerotation preparation can serve as a mitigating factor. The resident experience of EOL care outside of the ICU, where death occurs less frequently, is likely to be different than deaths occurring in the ICU. The skillset of the supervising physician in EOL care may be less developed leading to less advanced learning. However, if the physician is adequately skilled, the opportunities for learning and support may be greater on a ward unit than in a busy ICU. Educational and emotional support may need to be structured differently in these diverse settings.

RESIDENT EXPOSURE TO MODE OF DEATH

Residents had the most experience with WLST and nonescalation deaths. Previous studies have documented that withholding or withdrawing life-sustaining therapies is the most common mode of death in pediatric ICUs.^{12,24} Variable resident exposure to different modes of death has important implications for the educational needs of residents. While ethicists argue that withdrawal and nonescalation are morally equivalent,²⁵ clinicians note that the cultural, psychological, social, or emotional experience of the 2 modes of death are significantly different.^{26–28} Despite the need for family centered communication, shared decision-making, and values-oriented communication regardless of the mode of death, discussions around withdrawal of life-sustaining technologies require different knowledge and skills than discussions around nonescalation or disclosure of a failed resuscitation.^{26,29} Medical management, as well as important cultural and ethical considerations, varies widely by mode of death.^{26,28–30} These distinctions, however, are not consistently or thoroughly addressed in existing EOL care curricula.^{3,8,10,11} Residents involved in the care of patients who die after failed resuscitation attempts may require additional psychological and bereavement support given increased risk of adverse psychological outcomes.³¹ Finally, consideration should be given to resident exposure to deaths that occur at home with hospice. While nonescalation deaths in the hospital may expose residents to comfort-directed care and a more natural dying process, deaths occurring at home present a unique learning and training opportunity.

LIMITATIONS

Our study has several limitations that warrant consideration. First, we were unable to attribute every death that was potentially attended by a resident. We did not capture any exposures in the emergency department, where 17 deaths occurred on average per year, most after failed CPR.¹² Residents also spend 2 months at a level III NICU in an affiliated hospital, not included in our data, where an average of 15 deaths per year occurred. Additionally, we did not have a mechanism to count any exposure that may have occurred on electives (particularly for residents who completed a palliative care elective). On average, the palliative care team has 8 to 9 residents per year who complete a 4-week elective.

Second, we defined resident involvement narrowly, with a focus specifically on resident involvement in direct patient care very near the time of death. We recognize that residents may continue to learn from their patients after their “official” time on the care team ends via clinical updates from their peers or by reviewing patient charts for educational purposes.

Third, we did not ascertain the level of resident involvement for each patient. Educational experience may vary depending on relationship with the patient (primary vs cross-covering resident) and actual involvement in provision of EOL care. Our data may overestimate actual resident learning if, for example, the team's fellow or attending provides key components of EOL care independently, without resident involvement. Our study did not assess experience with specific EOL care tasks, such as communication, symptom management, death pronouncement, or completion of death certificate information.

The generalizability of our study is limited because we only studied a single institution. Institutions may vary in how they deploy residents, fellows, and mid-level providers, which could impact exposures to EOL care. However, we believe that our data are comparable to residency programs in other large, quaternary children's hospitals. The Accreditation Council for Graduate Medical Education has strict residency program rotation requirements that standardizes time a resident spends in the ICU. Studies have demonstrated similar locations of patient death in other larger children's hospitals, increasing the possibility of generalization to institutions like CHOP.^{12,32,33} Our findings may not reflect the experience of smaller or community-based residency programs.

Despite these limitations, we think this study has significant implications for enhancing the ability of educators to think critically and creatively about how to improve the implementation of existing resident curriculums on EOL care, as well as design new curricula or educational opportunities. Residents have variable exposure to the EOL care of patients, and significantly less than in previous eras of pediatric medicine. Most exposures occur in the ICU, and in the setting of WLST or nonescalation. Our findings would support an approach where substantial EOL care training occur prior to the first ICU exposure, while recognizing that resident exposure to death outside the ICU may warrant additional support and debriefing, and that attaining competency in EOL care requires ongoing training and reflective practice.

Acknowledgments

The authors thank the Y.C. Ho/Helen & Michael Chiang Foundation for support of Dr. Trowbridge's fellowship in Pediatric Palliative Care and the Cambia Foundation and the National Heart, Lung, And Blood Institute of the National Institutes of Health under Award Number K23HL141700 for support of Dr. Walter. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health.

REFERENCES

1. Institute of Medicine. Dying in America: Improving Quality and Honoring Individual Preferences Near the End of Life. Washington DC: The National Academies Press; 2015.
2. Section on Hospice and Palliative Medicine and Committee on Hospital Care. Pediatric palliative care and hospice care commitments, guidelines, and recommendations. *Pediatrics*. 2013;132:966–972. [PubMed: 28448256]
3. Serwint JR, Bostwick S, Burke AE, et al. The AAP resilience in the face of grief and loss curriculum. *Pediatrics*. 2016:e20160791 10.1542/peds.2016-0791.
4. Baker JN, Torkildson C, Baillargeon JG, et al. National survey of pediatric residency program directors and residents regarding education in palliative medicine and end-of-life care. *J Palliat Med*. 2007;10:420–429. 10.1089/jpm.2006.0135. [PubMed: 17472514]

5. Khaneja S, Milrod B. Educational needs among pediatricians regarding caring for terminally ill children. *Arch Pediatr Adolesc Med.* 1998;152:909–914. 10.1001/archpedi.152.9.909. [PubMed: 9743038]
6. Kolarik RC, Walker G, Arnold RM. Pediatric resident education in palliative care: a needs assessment. *Pediatrics.* 2006;117:1949–1954. 10.1542/peds.2005-1111. [PubMed: 16740835]
7. McCabe ME, Hunt EA, Serwint JR. Pediatric residents' clinical and educational experiences with end-of-life care. *Pediatrics.* 2008;121:e731–e737. 10.1542/peds.2007-1657. [PubMed: 18346988]
8. Serwint JR, Rutherford LE, Hutton N, et al. "I learned that no death is routine": description of a death and bereavement seminar for pediatrics residents. *Acad Med J Assoc Am Med Coll.* 2002;77:278–284.
9. Vazirani RM, Slavin SJ, Feldman JD. Longitudinal study of pediatric house officers' attitudes toward death and dying. *Crit Care Med.* 2000;28:3740–3745. [PubMed: 11098983]
10. Feldman J, Slavin S. Planning for the evaluation of a pediatric end-of-life curriculum. *J Palliat Med.* 2000;3:487–492. 10.1089/jpm.2000.3.4.487. [PubMed: 15859704]
11. Bagatell R, Meyer R, Herron S, et al. When children die: a seminar series for pediatric residents. *Pediatrics.* 2002;110:348–353. 10.1542/peds.110.2.348.. [PubMed: 12165589]
12. Trowbridge A, Walter JK, McConathey E, et al. Modes of death within a children's hospital. *Pediatrics.* 2018;142:11.
13. Sack WH, Fritz G, Krener PG, et al. Death and the pediatric house officer revisited. *Pediatrics.* 1984;73:676–681. [PubMed: 6718126]
14. Centers for Disease Control and Prevention, National Center for Health Statistics. Underlying Cause of Death 1999-2015 on CDC Wonder Online Database, released December, 2016. <http://wonder.cdc.gov/ucd-icd10.html>.
15. Feudtner C, Feinstein JA, Satchell M, et al. Shifting place of death among children with complex chronic conditions in the United States, 1989-2003. *JAMA.* 2007;297:2725–2732. 10.1001/jama.297.24.2725. [PubMed: 17595273]
16. Brock KE, Cohen HJ, Sourkes BM, et al. Training pediatric fellows in palliative care: a pilot comparison of simulation training and didactic education. *J Palliat Med.* 2017 10.1089/jpm.2016.0556.
17. Brown CE, Back AL, Ford DW, et al. Self-assessment scores improve after simulation-based palliative care communication skill workshops. *Am J Hosp Palliat Med.* 2018;35:45–51. 10.1177/1049909116681972.
18. Gannon J, Motycka C, Egelund E, et al. Teaching end-of-life care using interprofessional simulation. *J Nurs Educ.* 2017;56:205–210. 10.3928/01484834-20170323-03. [PubMed: 28383743]
19. Shaw PA, Abbott MA. High-fidelity simulation: teaching end-of-life care. *Nurse Educ Today.* 2017;49:8–11. 10.1016/j.nedt.2016.10.014. [PubMed: 27866111]
20. Anderson WG, Williams JE, Bost JE, et al. Exposure to death is associated with positive attitudes and higher knowledge about end-of-life care in graduating medical students. *J Palliat Med.* 2008;11:1227–1233. 10.1089/jpm.2008.0058. [PubMed: 19021486]
21. Wolfe KK, Unti SM. Critical care rotation impact on pediatric resident mental health and burnout. *BMC Med Educ.* 2017;17:181 10.1186/s12909-017-1021-1. [PubMed: 28982349]
22. McFarland DC, Malone AK, Roth A. Acute empathy decline among resident physician trainees on a hematology-oncology ward: an exploratory analysis of house staff empathy, distress, and patient death exposure. *Psychooncology.* 2017;26:698–703. 10.1002/pon.4069. [PubMed: 26776456]
23. Rodriguez-Rey R, Palacios A, Alonso-Tapia J, et al. Burnout and posttraumatic stress in paediatric critical care personnel: prediction from resilience and coping styles. *Aust Crit Care.* 2018 10.1016/j.aucc.2018.02.003.
24. Burns JP, Sellers DE, Meyer EC, et al. Epidemiology of death in the PICU at five U.S. teaching hospitals. *Crit Care Med.* 2014;42:2101–2108. 10.1097/CCM.0000000000000498. [PubMed: 24979486]
25. Principles of Biomedical Ethics - Paperback - Tom L. Beauchamp; James F. Childress - Oxford University Press <https://global.oup.com/ushe/product/principles-of-biomedical-ethics-9780199924585?cc=us&lang=en&>. Accessed November 15, 2018.

26. Gedge E, Giacomini M, Cook D. Withholding and withdrawing life support in critical care settings: ethical issues concerning consent. *J Med Ethics*. 2007;33:215–218. 10.1136/jme.2006.017038. [PubMed: 17400619]
27. Somers E, Grey C, Satkoske V. Withholding versus withdrawing treatment: artificial nutrition and hydration as a model. *Curr Opin Support Palliat Care*. 2016;10:208–213. 10.1097/SPC.0000000000000225. [PubMed: 27348795]
28. Giacomini M, Cook D, Dejean D, et al. Decision tools for life support: a review and policy analysis. *Crit Care Med*. 2006;34: 864–870. 10.1097/01.CCM.0000201904.92483.C6. [PubMed: 16521283]
29. Bone RC, Rackow EC, Weg JG, et al. Ethical and moral guidelines for the initiation, continuation, and withdrawal of intensive care. *Chest*. 1990;97:949–958. 10.1378/chest.97.4.949. [PubMed: 2182302]
30. Campbell ML. How to withdraw mechanical ventilation: a systematic review of the literature. *AACN Adv Crit Care*. 2007;18:397–403; quiz 344–345. 10.1097/01.AACN.0000298631.53276.f7. [PubMed: 17978613]
31. Vanyo L, Sorge R, Chen A, et al. Posttraumatic stress disorder in emergency medicine residents. *Ann Emerg Med*. 2017;70:898–903. 10.1016/j.annemergmed.2017.07.010. [PubMed: 28826753]
32. Osenga K, Postier A, Dreyfus J, et al. A comparison of circumstances at the end of life in a hospital setting for children with palliative care involvement versus those without. *J Pain Symptom Manage*. 2016;52:673–680. [PubMed: 27693899]
33. Keele L, Keenan HT, Sheetz J, et al. Differences in characteristics of dying children who receive and do not receive palliative care. *Pediatrics*. 2013;132:72–78. 10.1542/peds.2013-0470. [PubMed: 23753086]

WHAT'S NEW

Pediatric residents care for dying patients infrequently during their residency, although there is a wide range. Residents are most frequently exposed to end-of-life care in the ICU and when life-sustaining treatments are withdrawn.

Figure 1.
Distribution of number of exposures to patient end-of-life care by resident year.

Figure 2.
Resident exposure to patient end-of-life care by location and resident year.

Figure 3.

Resident exposure to patient end-of-life care by mode of death and resident year.

WLST= Withdrawal of Life Sustaining Technology within 24 hours of death

Non-Escalation= No resuscitation performed near time of death, no life-sustaining technology withdrawn.

Failed CPR= Resuscitation attempt occurred within 24 hours of death

WLST after CPR= Withdrawal of Life Sustaining Technology after Code; at some point during or shortly after a resuscitation the decision was made to remove life-sustaining technology

Brain Death: death by neurologic criteria using accepted standards.

Table 1.**Resident Physician Characteristics**

Characteristic	Number (%)
Total individual residents	193
Individual residents completing full 3-year residency during study period	37 (19)
Resident-years included * (n = 357 observed years)	
PGY-1	127 (36)
PGY-2	122 (34)
PGY-3	108 (30)
CHOP pediatric residency rotations	
	PGY-1 PGY-2 PGY-3
Inpatient wards [‡]	8 2-5 3
NICU (CHOP) [‡]	0 1-2 0
NICU (UPenn) [§]	1 0 1
PICU	0 1-2 1
Oncology	0 1 0
Emergency	1 2-3 2
Outpatient/electives	3 2-4 5
Teaching rotation	0 0 1

* "Resident-Year" refers to a full year of training completed by an individual resident. Total resident years is greater than the number of individual residents because some residents completed more than 1 year in the study period.

[‡] General Pediatrics and Subspecialty.

[‡] Level IV Referral NICU for region.

[§] Level III NICU-University of Pennsylvania.

Table 2.

Patient Characteristics, Modes of Death, and Location of Death

Characteristic	All Patients n (%)	Patients With Residents Involved n (%)
Total	579	271
Sex		
Male	290 (50.1)	145 (53.5)
Female	289 (49.9)	126 (46.5)
Age		
Mean (25th, 50th, 75th percentile) years	4.3 (0.05, 0.4, 6.2)	6.1, 2.2 (0.2, 2.2, 10.6)
0–364 days	349 (60.3)	116 (42.8)
1–12 years	146 (25.2)	99 (36.5)
Over 13 years	84 (14.5)	56 (20.7)
Race/ethnicity		
White, non-Hispanic	213 (36.8)	117 (43.2)
Black/African-American	135 (23.3)	56 (20.7)
Hispanic/Latino	57 (9.8%)	29 (10.7)
Other	174 (30.1%)	69 (25.4)
Mode of death		
WLST	233 (40.2)	112 (41.3)
Nonescalation	148 (25.6)	84 (31.0)
Failed resuscitation	132 (22.8)	41 (15.1)
WLST after CPR	35 (6.0)	10 (3.7)
Brain death	31 (5.4)	24 (8.9)
Location of death		
Cardiac intensive care unit (CICU)	96 (16.6)	4 (1.5)
Emergency department	50 (8.6)	0 (0.0)
Neonatal intensive care unit (NICU)	172 (29.7)	78 (28.8)
Non-ICU ward	4 (0.7)	3 (1.1)
Operating room/PACU	10 (1.7)	7 (2.6)
Oncology unit	38 (6.6)	37 (13.7)
Pediatric intensive care unit (PICU)	163 (28.2)	142 (52.4)

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

Characteristic	All Patients n (%)	Patients With Residents Involved n (%)
Special delivery unit (SDU)	46 (7.9)	0 (0.0)