Development of a Test of Residents' Ethics Knowledge for Pediatrics (TREK-P)

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Abstract

Background Professionalism is one of the Accreditation Council for Graduate Medical Education's core competencies. Residency programs must teach residents about ethical principles, which is an essential component of professionalism.

Objectives We aimed to formally develop a valid and reliable test of ethics knowledge that effectively discriminated among learners in pediatric residency training and to improve methods for measuring outcomes of resident education in medical ethics.

Methods We created an instrument with 36 true/false questions that tested knowledge in several domains of pediatric ethics: professionalism, adolescent medicine, genetic testing and diagnosis, neonatology, end-of-life decisions, and decision making for minors. All questions and their correct answers were derived from published statements from the American Academy of Pediatrics Committee on Bioethics. We invited a range of participants from novices to experts to complete the test. We evaluated the instrument's reliability and explored item discrimination, omitting 13 items with the

least discriminatory power. Score differences between the 3 categories of examinees were evaluated.

Results The 23-item test, completed by 54 participants, demonstrated good internal reliability (Kuder-Richardson 20 statistic = 0.73). The test was moderately difficult and had a mean overall score of 17.3 (± 3.3 standard deviation). Performance appropriately improved with degree of expertise: median scores for medical students, postgraduate year-3 residents, and ethicists were 15 (65%, range, 11–19), 19 (83%, range, 14–23), and 22 (96%, range, 20–23), respectively. Ethicists' scores were significantly higher than those of medical students ($P < .001$) and residents ($P = .007$). Moreover, residents performed significantly better than medical students ($P = .001$).

Conclusions We developed a standardized instrument, entitled Test of Residents' Ethics Knowledge for Pediatrics (TREK-P), to evaluate residents' knowledge of pediatric ethics. The TREK-P is easy to administer, reliably discriminates among learners, and highlights content areas in which knowledge may be deficient.

Editor's Note: The online version of this article contains the survey instrument used in this study.

Introduction

Residency training programs must teach professionalism, an essential component of which is “adherence to ethical

principles.”¹ In addition, future federal policy may also link reimbursement incentives to educational outcomes in this domain.² As residency programs work to fulfill these requirements, they are significantly limited by insufficient evidence to inform their work in this area of medical education.

Although several reports have documented a need for teaching in this domain, and although a number of curricula have been developed,^{3–15} there are few validated assessment instruments to measure residents' knowledge of fundamental ethical principles or rules and even fewer instruments for evaluating the impact of curricular change.^{16,17} To date, no instrument has examined ethical dilemmas in pediatric practice. This may in part be due to the difficulty of creating a brief medical ethics test that can be administered quickly and yet can reliably discriminate among learners of varying competence.

In this study, we intended to fill this research gap by developing a Test of Residents' Ethics Knowledge for Pediatrics (TREK-P); we aimed to create a valid and reliable

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test of ethics knowledge that could effectively discriminate among learners in pediatric residency training.

Methods

Study Instrument

The test content was initially based on a list of ethical challenges that we have used in previously published work.⁸ We then added several items related to the Accreditation Council for Graduate Medical Education (ACGME) definition of professionalism that had not been addressed in our previous work. Next, we refined the preliminary test content by cross-referencing it with statements written or endorsed by the American Academy of Pediatrics (AAP) Committee on Bioethics.^{18–28} These revisions yielded test content in several domains. The initial TREK-P consisted of 36 questions, each with a true/false format, that assessed knowledge in the domains of professionalism (11 questions), adolescent medicine (5 questions), genetic testing and diagnosis (6 questions), neonatology (5 questions), end-of-life decisions (5 questions), and decision-making for minors (4 questions). AAP guidelines were used to establish the content validity of the overall instrument as well as the correct response for each item.

Questions were written by faculty with training in education (JCK) and test development (GM) and were assessed for clarity and appropriateness by faculty with expertise in medical ethics (JCK and SJ). The study was approved by the Institutional Review Board at the Dana-Farber Cancer Institute.

Study Population

Item performance characteristics were evaluated by administering the TREK-P to novices (first-year medical students who had not yet participated in the first-year medical ethics course), to our population of interest (residents completing their third year of training), and to experts (pediatric clinical ethicists at Children's Hospital Boston, all of whom had completed formal training in medical ethics and had at least 5 years' experience as lead consultants). While we focused primarily on pediatric residents, novices and experts served as comparison populations to validate our instrument.

Testing Process

Introductory letters were sent to a convenience sample of first-year medical students ($N = 25$) and pediatric clinical ethicists ($N = 6$), informing them of the purpose of our study and inviting them to participate; letters were accompanied by a paper version of the ethics knowledge test. Each participating medical student ($N = 22$; 88% response rate) and ethicist ($N = 6$; 100% response rate) received a \$5 gift card as a token of appreciation.

What was known

Residents need to know the principles of medical ethics, yet there are few validated instruments.

What is new

A 36-question standardized instrument was easy to administer, discriminated reliably between novices and experts, and highlighted deficiencies in knowledge.

Limitations

Small sample, single-specialty, single-site study, with voluntary participation and possible selection bias. Efficiency and brevity required the omission of some dimension of pediatric ethics.

Bottom line

A pediatrics ethics test efficiently identified residents who would benefit from additional training in this area. The design process for this assessment could be used to develop instruments for other specialties or competencies.

PGY-3 residents ($N = 40$) in 1 pediatric training program received an introductory E-mail informing them of the purpose of the study. The note included an electronic link to the TREK-P. A reminder E-mail was sent 1 week later. Each participating resident ($N = 26$; 65% response rate) also received a \$5 gift card.

Statistical Analysis

We evaluated each item's discrimination of data from all 3 groups, using the point-biserial correlation (Integrity; Castle Rock Research, Edmonton, Canada). This statistic is a correlation coefficient that conveys the relationship between a respondent's performance on a given item and his or her overall test performance. The statistic ranges from -1.0 to 1.0 . To ensure that performance on each test item would be optimally correlated with overall test performance, we omitted several items with low point biserial correlation from our initial 36-item test, taking particular care to exclude items with point biserial correlation less than 0. The resulting 23-item TREK-P (provided as online supplemental material) contained questions with various degrees of difficulty that allowed for discrimination among test takers. Internal consistency reliability of the test was evaluated by calculating the Kuder-Richardson 20 (KR-20) statistic, appropriate for tests with dichotomous (Yes/No) responses. KR-20 values can range from 0.00 to 1.00.

Score differences among the three categories of examinees were evaluated with a Wilcoxon rank sum test. We estimated that a sample of at least 15 residents was required to ensure 80% power to detect a 3-point score difference between residents and ethicists, assuming a within-group standard deviation (SD) of 2 and an α error of 0.05. The 3-point score difference was chosen because it

represents more than 10% of the possible score on the TREK-P.

Results

The TREK-P was completed by 53 participants (22 medical students, 25 PGY-3 pediatric residents, and 6 pediatric ethicists). The 23 survey items that were retained for the final test demonstrated robust internal reliability, with a KR-20 of 0.73. The test was of moderate difficulty with a mean overall score of 17.3 (SD = 3.3). The item difficulty mean was 0.73 (range, 0.16–0.97), and the corrected point biserial correlation mean was 0.26. Performance on the test improved appropriately with degree of expertise: median scores for medical students, PGY-3 residents, and ethicists were 15 (65%, range, 11–19), 19 (83%, range, 14–23), and 22 (96%, range, 20–23), respectively (FIGURE). Ethicists' scores were significantly higher than those of medical students ($P < .001$) and residents ($P = .007$). Moreover, residents performed significantly better than medical students ($P < .001$). Items most frequently answered incorrectly pertained to pediatric assent, responding to requests for genetic testing, and decision making about life-sustaining treatments. The test took approximately 15 minutes to complete. A score of 20 (the lowest score attained by a pediatric ethicist) as the minimal competency threshold for residents would result in 100% of medical students and 54% of residents "failing" the TREK-P.

Conclusions

We developed a standardized test (the TREK-P) to evaluate residents' knowledge of pediatric ethics and established face and content validity by basing the test on nationally

recognized statements related to ethics. We established internal reliability by demonstrating a high KR-20 value and construct validity by demonstrating score differences across groups of learners of varying experience and expertise.

The test is easy to administer, discriminates among learners, and can identify content areas in which knowledge may be deficient. Moreover, this novel assessment instrument fills a notable gap in medical education. As the ACGME and others require residency training programs to engage in robust assessment of professionalism, a test of ethics knowledge represents an initial step toward achievement of these accreditation requirements. Although optimal assessment measures attitudes, skills, and behaviors in addition to knowledge, the TREK-P could serve as 1 component of a broader approach to teach ethics to pediatrics residents.

Among the residents we surveyed, we found deficits in knowledge about pediatric consent and assent, decision making about life-sustaining therapies, and responding to parental requests for genetic testing. Knowledge gaps among pediatric providers with regard to ethical dilemmas encountered in end-of-life care, including decisions about life sustaining therapies, have been previously described.⁹ Moreover, decision making at the end of life and pediatric assent are areas in which pediatricians report low levels of confidence.⁹ Pediatricians' knowledge about genetic testing and diagnosis have not been previously assessed, although the need for pediatricians to be knowledgeable about these topics is well established.^{29,30}

The TREK-P may assist pediatric training programs in evaluating an important component of professional knowledge in a straightforward way. Clarification of the domains residents find most challenging can be a useful needs assessment when engaging in curriculum development and planning. This test can be administered quickly and easily, suggesting areas in which programs can address individual or group knowledge gaps. The instrument can also be used by programs to evaluate the impact of ethics-targeted educational interventions.

Based on the minimum score of our pediatric ethics staff and acknowledging that all items are considered required learning, we suggest a minimal threshold score of 20 of 23 items correct (87%) to identify trainees who could benefit from additional educational efforts. To identify this minimal score threshold, we used a compromise approach that incorporated the method of contrasting groups.³¹ However, depending on the purpose of the assessment and the relative priorities of sensitivity and specificity, educators might legitimately choose to use different thresholds when administering the TREK-P.

Our study has several limitations. First, the test was developed in a single pediatric training program. Second, although good overall, internal reliability might have been higher if respondents had performed more similarly on items within some subscales of the final TREK-P. Future work might focus on generating and validating additional items to establish reliability within subscales. Third, participation was voluntary and might have introduced selection bias. Fourth, the TREK-P gives insight regarding knowledge but does not measure residents' attitudes, skills, or behaviors. Finally, although the TREK-P measures knowledge in several content domains, brevity and efficiency required that some domains of pediatric ethics be excluded from the instrument.

In summary, we successfully developed a valid and reliable test that can be administered to easily identify trainees who would benefit from additional training in pediatric ethics. The methodology described here may be applied to the development of assessment instruments for use in other competencies and medical specialties.

References

- 1 Accreditation Council for Graduate Medical Education. Program requirements for Pediatrics. http://www.acgme.org/acWebsite/downloads/RRC_progReq/320_pediatrics_07012007.pdf. Last accessed April 7, 2012.
- 2 Iglehart J. Health reform, primary care, and graduate medical education. *N Engl J Med*. 2010;363(6):584–590.
- 3 American Board of Pediatrics Medical Ethics Subcommittee. Teaching and evaluation of interpersonal skills and ethical decision making in pediatrics. *Pediatrics*. 1987;79(5):829–834.
- 4 Alfandre D, Rhodes R. Improving ethics education during residency training. *Med Teach*. 2009;31(6):513–517.
- 5 Bercovitch L, Long TP. Ethics education for dermatology residents. *Clin Dermatol*. 2009;27(4):405–410.
- 6 Goold SD, Stern DT. Ethics and professionalism: what does a resident need to learn? *Am J Bioeth*. 2006;6(4):9–17.
- 7 Grossman E, Posner MC, Angelos P. Ethics education in surgical residency: past, present, and future. *Surgery*. 2010;147(1):114–119.
- 8 Kesselheim JC, Johnson J, Joffe S. Pediatricians' reports of their education in ethics. *Arch Pediatr Adolesc Med*. 2008;162(4):368–373.
- 9 Manson H. The need for medical ethics education in family medicine training. *Fam Med*. 2008;40(9):658–664.
- 10 Manthous CA. Introducing the primer of medical ethics. *Chest*. 2006;130(6):1640–1641.
- 11 Packer S. The ethical education of ophthalmology residents: an experiment. *Trans Am Ophthalmol Soc*. 2005;103:240–269.
- 12 Robb A, Etchells E, Cusimano MD, Cohen R, Singer PA, McKneally M. A randomized trial of teaching bioethics to surgical residents. *Am J Surg*. 2005;189(4):453–457.
- 13 Salih ZN, Boyle DW. Ethics education in neonatal-perinatal medicine in the United States. *Semin Perinatol*. 2009;33(6):397–404.
- 14 Sulmasy DP, Marx ES. Ethics education for medical house officers: long-term improvements in knowledge and confidence. *J Med Ethics*. 1997;23(2):88–92.
- 15 Wenger NS, Liu H, Lieberman JR. Teaching medical ethics to orthopaedic surgery residents. *J Bone Joint Surg Am*. 1998;80(8):1125–1131.
- 16 Green MJ, Farber NJ, Ubel PA, et al. Lying to each other: when internal medicine residents use deception with their colleagues. *Arch Intern Med*. 2000;160(15):2317–2323.
- 17 Barry D, Cyran E, Anderson RJ. Common issues in medical professionalism: room to grow. *Am J Med*. 2000;108(2):136–142.
- 18 American Academy of Pediatrics. Bioethics: AAP policy statements. <http://www.aap.org/sections/bioethics/Policy.cfm>. Accessed April 7, 2012.
- 19 American Academy of Pediatrics. Confidentiality in adolescent health care. *AAP News*. 1989;4:151.
- 20 American Academy of Pediatrics. Bioethics: Guidelines on foregoing life-sustaining medical treatment. *Pediatrics*. 1994;93(3):532–536.
- 21 American Academy of Pediatrics, Committee on Bioethics. Informed consent, parental permission, and assent in pediatric practice. *Pediatrics*. 1995;95(2):314–317.
- 22 American Academy of Pediatrics Committee on Bioethics. Ethics and the care of critically ill infants and children. *Pediatrics*. 1996;98(1):149–152.
- 23 American Academy of Pediatrics Committee on Bioethics and Committee on Hospital Care. Palliative care for children. *Pediatrics*. 2000;106(2 Pt 1):351–357.
- 24 Ethical issues with genetic testing in pediatrics. *Pediatrics*. 2001;107(6):1451–1455.
- 25 Consent for emergency medical services for children and adolescents. *Pediatrics*. 2003;111(3):703–706.
- 26 Diekema DS, Botkin JR. Clinical report—forgoing medically provided nutrition and hydration in children. *Pediatrics*. 2009;124(2):813–822.
- 27 Fallat ME, Glover J. Professionalism in pediatrics. *Pediatrics*. 2007;120(4):e1123–e1133.
- 28 Bell EF. Noninitiation or withdrawal of intensive care for high-risk newborns. *Pediatrics*. 2007;119(2):401–403.
- 29 Cunniff C. Prenatal screening and diagnosis for pediatricians. *Pediatrics*. 2004;114(3):889–894.
- 30 Lose EJ. The emerging role of primary care in genetics. *Curr Opin Pediatr*. 2008;20(6):634–638.
- 31 Measurements Research Associates. Criterion referenced performance standard setting. <http://www.measurementresearch.com/media/standards.pdf>. Accessed April 7, 2012.