ORIGINAL RESEARCH

Development and Psychometric Analysis of the Measure of Perceived Adherence to the Principles of Medical Ethics in Clinical Educational Settings: Trainee Version (PAMETHIC-CLIN-T)

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Objective: This study was conducted to develop and assess psychometric properties of the "Measure of Perceived Adherence to the Principles of Medical Ethics in Clinical Educational Settings: trainee version (PAMETHIC-CLIN-T)" as a data collection tool to enhance research performance rigor in future medical ethics studies.

Patients and Methods: A multi-tiered six stage procedure was applied to develop the PAMETHIC-CLIN-T and assess its psychometric properties in a sample of Iranian medical science undergraduate students (n=263). The final constructed item pool contained 16 questions with the response options in five Likert-type categories. The higher total score indicated better compliance with the ethics and professional conduct regulations. Internal consistency reliability was examined and exploratory factor analysis (EFA) with direct oblimin rotation and principal components analysis (PCA) were carried out to reduce the overall constructed items into latent factors based on commonalities within the data set.

Findings: Factor analysis results revealed a 4-factor solution. All 16 items had factor loading greater than absolute value of 0.3 that accounted for 60.57% of the variance. The value of Kaiser Meyer Olkin (KMO) measure of sampling adequacy for factor analysis (0.909) and also Bartlett's test of sphericity (X^2=1630.63, df=120, *P*-value<0.001) approved interpretability of the EFA output.

Conclusion: Feasibility testing and psychometric analysis of the constructed scale yielded research evidence to support a four-factor model to be applied in future studies about the extent of perceived adherence to the principles of medical ethics in clinical educational settings.

Keywords: ethics, medical education, hidden curriculum

Introduction

Extant prevailed conformity exists on the importance of integrating medical ethics pedagogy into medical and health professions curricula as an indispensable part of their academic training requirements. However, there is little consensus about the exact processes by which these ethical guidelines must be operationalized.[1] Taking the Hippocratic Oath by new medical graduates as a manifesto of their lifelong commitment to the associated ethical principles of the medical profession is widespread among medical educational institutions,[2,3] but there is plethora of research

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evidence[4–9] to suggest recurrent pattern of deviance from these principles in healthcare delivery or medical education settings.

Persisting attempts to integrate medical ethics education into the current graduate and undergraduate medical education curriculum are being made,[10–13] but there is heterogeneity in practice and the observed outcomes. Moreover, the role the hidden curriculum might play in actual internalization of the ethics principle should not be dismissed.[10] Hidden curriculum by definition is referred to the prevailing unofficial and unacknowledged rules, values, and perspectives that trainees learn in an educational organization's overall structure and cultural environment.[14] The hidden curriculum may lead to a substantial inconsistency between the knowledge, attitudes, and values or skills intended to be transferred in the formal curriculum and the actual generated perceptions among the learners.[15]

Inadequacies in medical ethics training whether resulting from inconsistent curriculum or deficient educational environment could diminish clinical practice standards.[12] Increased focus on the effect of the hidden curriculum on students' personal development in their student life span[10,16-18] warrants more stringent investigation of the phenomenon in medical educational settings.

Lack of a reliable and feasible tool to collect baseline information on the impacts of hidden curricula on maintaining or relinquishing learners' motivation and focus on the formal intended educational activities and objectives may prohibit an unbiased evaluation of the educational attainments of trainees. Accurate measurement of the trainees' perception about degree of adherence to the principles of medical ethics and overall professional ethical climate in clinical educational settings may help in understanding and overcoming insufficiencies in theoretical and performance realms.

The main purpose of this study was to develop and assess psychometric properties of the "Measure of Perceived Adherence to the Principles of Medical Ethics in Clinical Educational Settings: trainee version (PAMETHIC-CLIN-T)" as a data collection tool to enhance research performance rigor in future medical ethics studies.

Methods
Item Generation and Content Validity
The endorsed multi-tiered six stage procedure by DeVellis[19] was applied to develop the PAMETHIC-CLIN-T and assess its psychometric properties in a sample of Iranian medical science under graduate students. These stages included generation of the items pool through an extensive literature review, proposing and refining of the measurement format and scaling rubric, assessment of the initial items pool by a panel of experts, and administering agreed items to a developmental sample and evaluation of their performance.

The initial item pool consisted of 24 items that were sent to a panel of experts including 11 clinician/academic members of the Tabriz University of Medical sciences (TBZMED), Tabriz, Iran with working experience in the field of medical ethics. The panel members were asked to announce their degree of agreement about every question in four areas of simplicity, relevance, clarity, and importance. Moreover, in a brief instruction that added to the beginning of the questionnaire, the informants were asked to give their comments about relevancy and appropriateness of the questions. Based on the expert's feedbacks and Rubio et al's[20] recommended procedure, the Lawshe's content validity Index (CVI)[21] for all the scale items were calculated to check the level of agreement among the panelists. The Ayre C and Scally AJ's recommended cut-off points utilized to assess the estimated CVIs for being in the acceptable range.[22] The scale level content validity index (S-CVI) was also estimated to ascertain the degree to which the developed instrument has an appropriate sample of items for the construct being measured.

Small changes were made according to the panelists' feedbacks to improve lucidity of the items' wordings and their understandability for potential readers. The final constructed item pool contained 16 questions (Table 1) with the response options in five Likert-type categories including "in most cases", "in some cases", "rarely", "never", and "I do not know" options. The scoring of 5, 4, 3, 2, and 1 attributed to each of these responses consequently and, thus, the higher value indicated better compliance with the ethics and professional conduct regulations.

Questions about demographic characteristics of the respondents, ie, sex and age in line with the name of educational ward they were based at during the scale psychometric appraisal were also asked in an attached sheet to the main designed scale. The final draft of the prepared instrument was pilot tested on 20 medical and dentistry students, but no important recommendation for amendments was received.

Table 1 List of Items in the Measure of Adherence to the Principles of Medical Ethics in Clinical Educational Settings: Trainee Version (PAMETHIC-CLIN-T)

No	In the Educational Ward Where I Am Working:	Most Times	Some Times	Rarely	Never	I Do Not Know
1	HCPs are undertaking their duties regardless of patients SES status.					
2	Informed consent is obtained from patients prior to healthcare delivery.					
3	All information about patients' health status is kept confidential.					
4	Codes of professional practice and honesty are followed by HCPs.					
5	Close coordination exists among HCPs.					
6	HCPs are committed to fulfill their responsibilities.					
7	The relevant codes of ethics are followed when dealing with immedicable patients.					
8	Patients/their relatives' dignity are maintained regardless of their gender, ethnicity, and socio-cultural characteristics.					
9	Professional responsibilities are carried out at the right time and completely.					
10	Respectful relationships exist among all HCPs, regardless of their roles and responsibilities.					
11	Patients' interests have higher priority and preferred over corporate and business considerations.					
12	Equal care provision to patients is in practice regardless of recommendations, familial/other relationships, or other consideration.					
13	Patients' health is a high priority compared to economic interests of HCPs.					
14	Healthcare provision is carried out according to the agreed principles of medical ethics.					
15	The relevant codes of ethics are observed in dealing with end-stage patients.					
16	Professional ethics standards are followed when interacting with aggressive patients.					

Abbreviation: HCPs, Health Care Providers.

Internal Consistency and Test–Retest Reliability

Alpha-Cronbach's coefficient as a sole estimate of internal consistency and Intra-class Correlation Coefficient (ICC) with its 95% confidence intervals to assess reliability of the questionnaire over time were calculated. The ICC estimation was based on the extracted data from the self-completed questionnaires in a 1-week time interval by 20 students and in the presence of the researcher.

Construct Validity

Exploratory factor analysis (EFA) with direct oblimin rotation and principal components analysis (PCA) were carried out using SPSS version 23[23] to reduce the overall constructed items into latent factors based on the observed commonalities within the data. Eigenvalues greater than 1 and Scree plot were used to determine the number of factors.[24] The Kaiser Meyer Olkin (KMO) measure of sampling adequacy (ranges from 0 to 1) and Bartlett's Test of Sphericity to verify applicability of PCA were also calculated.

Field Test

The convenience sampling method was employed to recruit 263 undergraduate registered students in the faculties of Medicine (30.4%), Dentistry (17.1%), Para-Medicine (17.8%), Nursing and Midwifery (19.5%), and Rehabilitation (15.2%) (all affiliated to the Tabriz University of Medical Sciences). The final draft of the developed scale was distributed among those who were spending their clinical training in the university-run educational wards from June 28 to August 28, 2016. Written informed consent was obtained from all the attendees after providing thorough information about the study procedures/objectives and they were requested to fill out the self-administered questionnaire within 20 minutes and return the completed form to the researcher. Quota sampling technique was applied to ensure equal distributions of the respondents with diverse field of study. The mean (SD) age of participants was 23.68 (1.83), and 169 (64.3%) of them were female. This research was conducted in accordance with the Declaration of Helsinki, and the study protocol was approved by the institutional level Medical Ethics Board of Trustees (MEBoT) within

the Tabriz University of Medical Sciences (TBZUMS) (approval number: 5-4-6673-94-06-30-100200).

Findings

Internal Consistency and Test–Re-test Reliability Analysis Results

The internal consistency measure of reliability (Alpha Cronbach) and the Spearman-Brown coefficient (as the recommended reliability statistic for the two-item sub-scale)[25] were calculated for grouped items in the suggested four-factor solution and are presented in Table 2.

The ICC analysis results indicated good temporal stability[26] of the PAMETHIC-CLIN-T at two time points (ICC=0.98; 95% CI=0.95–0.99).

Construct Validity Analysis Results

The value of KMO measure of sampling adequacy for factor analysis was 0.909, which was deemed to be appropriate. The Bartlett's test of sphericity was also significant (X^2=1630.63, df= 120, P-value<0.001), which represented the adequacy of the sample size for the factor analysis.

Factor analysis by Principal Component and Oblimin Rotation methods revealed a 4-factor solution. Among the items, nine had a factor loading greater than the absolute value of 0.3 (Table 3). The negative factor loadings of seven items in factors 3 and 4 means that people with

a high score on each of the items will tend to score low on the corresponding factor interchangeably. Therefore, instead of suggesting application of reverse-scoring mechanism on the negative loading items, the thematic labels of factors 3 and 4 were reworded to reflect a negative ambient of the clinical educational settings.

Field Test Results

The calculated scores of the reported adherence to the principles of medical ethics in the clinical educational settings of the TBZMED by the students' field of the study were indicated. As demonstrated the highest score was obtained by the students of occupational therapy and dentistry and the lowest ones by the students of anesthesiology and medicine. Considering the possible theoretical range of scores from 16–80, the highest score indicated better adherence to the ethical principles in the educational wards.

Discussion

Feasibility testing and psychometric analysis of the "Measure of Perceived Adherence to the Principles of Medical Ethics in Clinical Educational Settings: trainee version (PAMETHIC-CLIN-T)" yielded research evidence to support a four-factor model to be applied in future studies on

Table 2 Factor Loading for the Identified Four Factors in the Psychometric Appraisal of the Measure of Adherence to the Principles of Medical Ethics in Clinical Educational Settings: Trainee Version (PAMETHIC-CLIN-T)

The Extracted Factors	Items	Loadings	Cumulative Variance Explained	Cronbach's Alpha	Inter-Item Correlation	Spearman–Brown Coefficient
1. Following of the anti-patronage rules and higher priority of patients' health	11 13 12 10 14 9	0.744 0.741 0.713 0.603 0.451 0.443	40.98	0.84	0.46	0.81
2. Confidentiality and patients' informed consent	1 3 2	0.643 0.621 0.565	47.92	0.63	0.37	0.64
3. Ethically incongruous healthcare provision for immedicable and end-stage patients	15 7	−0.879 −0.765	54.28	0.64	0.45	0.63
4. Discrimination in healthcare provision and disregarding the professional code of conducts	6 5 4 16 8	−0.757 −0.751 −0.614 −0.488 −0.380	60.57	0.79	0.43	0.74

Table 3 Scores of Reported Perceived Adherence to the Principles of Medical Ethics in the Clinical Educational Settings (PAMETHIC-CLIN-T) of the TBZUMS by the Respondents' Study Field

Variables	N	Mean	SD	95% CI (Mean)		Minimum	Maximum
				Lower Bound	Upper Bound		
Medicine	80	49.01	8.57	47.11	50.92	32.96	70.08
Dentistry	45	61.22	11.90	57.65	64.77	32.00	79.04
Midwifery	14	58.71	10.21	52.82	64.61	42.08	70.08
Nursing	37	53.97	8.51	51.13	56.81	32.96	68.96
Operating Room Nursing	13	55.54	11.30	48.71	62.36	40.00	75.04
Anesthesiology	16	45.31	8.87	40.58	50.04	20.96	55.04
Radiology	18	51.72	9.39	47.05	56.39	34.08	64.96
Physiotherapy	14	59.71	11.61	53.01	66.41	40.00	76.96
Occupational Therapy	13	61.62	10. 73	55.13	68.09	36.96	75.04
Speech Therapy	13	58.08	8.36	53.02	63.13	48.00	72.00
Total	263	54.24	10.98	52.91	55.57	20.96	79.04

Abbreviation: TBZUMS, Tabriz University of Medical Sciences.

assessment of trainers perceptions on the extent of adherence to the principles of medical ethics in clinical educational settings. This may help researchers to overcome the current challenges which exist[14,27-29] in performing relevant studies with use of a more objective data collection tool and, therefore, make a possible comparison of the findings resulting from a wide range of individual studies in different clinical educational settings throughout the world.

Explicit instruction of medical ethics principles to all students and trainees in hospitals' educational wards is pivotal within the formal educational processes to make them familiar with different aspects of their ethical responsibilities but magnitude of the hidden curriculum must not be underestimated. The PAMETHIC-CLIN-T was prepared in a manner that could be applied for self-report of a perceived ethical climate within the educational settings in a time-efficient and cost-effective method.

This scale construction could help initiation of a new line of research that explores the relationship between the hidden curricula which is emanated from the ongoing professional practice climate in medical education institutions and internalization of the ethical values by trainees. This scale could also be used as a self-appraisal tool by academic staff and educational managers to realize pitfalls and overcome insufficiencies in the educational settings. Ease of interpretability and low respondent burden are the main attributes of this scale that makes its application potentially feasible in diverse and cross-cultural settings. However; further studies are required to formally assess the applicability of this scale for examining normative understandings

of trainees about the ethical climate in other clinical educational settings.

The worst reaction to the undesirable ethical climate or deviant professional role of modeling in the educational settings will be its ignoring or hiding in order to exhibit a positive organizational image for outsiders. Development of this scale could make a contribution to the medical ethics education, and provision of an ethically sound climate in educational institutions for boosting application of ethical codes of conduct in realm.

Limitations

The self-perceived degree of adherence to the medical ethics guidelines in clinical educational settings could be impressed by the respondents own emotional attitude, their egoistic characteristics, and also the level of knowledge and mastery with the medical ethics principles. Therefore, the reported purview about the ethical climate of an educational institution might not be consistent necessarily with the real world state of constancy with the medical ethics guidelines. Response bias due to social desirability of responses or having a kind of preservation in answering the scale questions (causing a ceiling effect in the scale's score) or having pessimistic taught about the ethical climate within the clinical education setting (causing a floor effect) should also not be ruled out completely.

Despite such a limitation, development of the scale is an important first step that will help to empirically examine a construct that has so far existed but confront methodological constraints in its measurement.

The generalizability of the findings to the spectrum of the ethical climate within the educational wards of the TBZMED must also be approached cautiously due to non-random selection of the participants.

The original developed and applied questionnaire in this study was in Persian. The experts were also requested to give their comments about consistency and reliability of the Persian version. The questionnaire items, however, were presented in this report in English for potential English-language readers. Therefore, the English version of the scale needs to be psychometrically tested for application in any English-language sample.

Conclusions

A valid and reliable tool to assess trainees' perception about the ethical climate within the clinical educational settings was developed. This study contributes to research methodology which can be used to assess the role of the hidden curriculum in incarnation of ethical values by trainees.

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