



## From skillful to empathic: Evaluating shifts in medical students' perceptions of surgeons through a combined patient as teacher and arts-based reflection program

## De la compétence à l'empathie : évaluation de l'évolution de la perception qu'ont les étudiants en médecine des chirurgiens dans le cadre d'un programme associant le patient comme enseignant et la réflexion basée sur les arts

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### Article abstract

**Introduction:** The purpose of this study was to identify whether the incorporation of a combined Patient as teacher (PAT) and arts-based reflection (ABR) program during a surgical clerkship rotation could influence more humanistic perceptions of surgeons, using an innovative evaluation approach.

**Methods:** A novel, single question evaluation tool was created. Third year medical-students were asked to "list the top 5 attributes of a surgeon, in order of perceived importance" both before and after their surgical clerkship rotations and participation in the PAT/ABR program. Attributes identified by students were coded as either "humanistic" or "non-humanistic," which were then analyzed using generalized linear regression models under a Bayesian framework.

**Results:** After participation in the PAT/ABR program, the predicted probability of students ranking a humanistic characteristic as the most important attribute of a surgeon had increased by 17%, and the predicted probability of students ranking a humanistic characteristic amongst their top three attributes for a surgeon had increased by 21%.

**Conclusion:** This innovative evaluative method suggested the success of a combined PAT/ABR program in encouraging a humanistic perspective of surgery and this approach could potentially be explored to evaluate other humanistic education initiatives.

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## From skillful to empathic: evaluating shifts in medical students' perceptions of surgeons through a combined patient as teacher and arts-based reflection program

De la compétence à l'empathie : évaluation de l'évolution de la perception qu'ont les étudiants en médecine des chirurgiens dans le cadre d'un programme associant le patient comme enseignant et la réflexion basée sur les arts

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### Abstract

**Introduction:** The purpose of this study was to identify whether the incorporation of a combined Patient as teacher (PAT) and arts-based reflection (ABR) program during a surgical clerkship rotation could influence more humanistic perceptions of surgeons, using an innovative evaluation approach.

**Methods:** A novel, single question evaluation tool was created. Third year medical-students were asked to "list the top 5 attributes of a surgeon, in order of perceived importance" both before and after their surgical clerkship rotations and participation in the PAT/ABR program. Attributes identified by students were coded as either "humanistic" or "non-humanistic," which were then analyzed using generalized linear regression models under a Bayesian framework.

**Results:** After participation in the PAT/ABR program, the predicted probability of students ranking a humanistic characteristic as the most important attribute of a surgeon had increased by 17%, and the predicted probability of students ranking a humanistic characteristic amongst their top three attributes for a surgeon had increased by 21%.

**Conclusion:** This innovative evaluative method suggested the success of a combined PAT/ABR program in encouraging a humanistic perspective of surgery and this approach could potentially be explored to evaluate other humanistic education initiatives.

### Résumé

**Introduction :** L'objectif de cette étude était de déterminer si l'introduction d'une nouvelle approche d'évaluation associant la participation de Patients comme enseignants (PCE) à une Réflexion basée sur les arts (RBA) dans un stage d'externat en chirurgie permettait de mieux percevoir les qualités humanistes chez les chirurgiens.

**Méthodes :** Un nouvel outil d'évaluation à question unique a été créé. Des étudiants en troisième année de médecine ont été invités à "énumérer les cinq principaux attributs d'un chirurgien, par ordre d'importance perçue", avant et après leur stage d'externat en chirurgie et le programme PCE/RBA. Les attributs identifiés par les étudiants ont été codés comme « humanistes » ou « non humanistes », puis analysés à l'aide de modèles de régression linéaire généralisée dans un cadre bayésien.

**Résultats :** Après leur participation au programme PCE/RBA, la probabilité prédite moyenne que les étudiants classent un trait humaniste comme l'attribut le plus important d'un chirurgien a augmenté de 17 %, et la probabilité prédite que les étudiants classent un trait humaniste parmi les trois premiers attributs d'un chirurgien a augmenté de 21 %.

**Conclusion :** Cette méthode d'évaluation innovante porte à croire que le programme PCE/RBA réussit en effet à favoriser une vision humaniste de la chirurgie. Cette approche peut être explorée pour évaluer d'autres activités de formation axées sur l'humanisme.

## Introduction

Health professions educators increasingly call for more humanistic approaches to health education, with growing expectations of social responsibility and altruistic professionalism from physicians.<sup>1</sup> Humanistic education is derived from phenomenological perspectives that respect the unique ways in which individuals draw meaning from their life experiences.<sup>2</sup> This paradigm of education encompasses principles that focus on professional development of an empathic self while encouraging understanding of people within the context of their environments, moving beyond biological determinism.<sup>2,3,4</sup> Kumagai highlights that “medicine is a human science,” one which requires an understanding that goes beyond biomedical knowledge.<sup>5</sup> Thus health professions education needs to—and has been striving to—prioritize reflective understanding of oneself and others.<sup>5</sup>

Many health professions education programs incorporate patient as teacher (PAT)<sup>6-8</sup> and arts-based reflection (ABR) into education and training.<sup>9-11</sup> PAT and ABR programs have each individually shown benefit in fostering more compassionate views, encouraging appreciation of diverse values, challenging pre-conceived assumptions, and encouraging consideration of ethical issues.<sup>8,9,12</sup> PAT programs offer a patient-centered approach to education by prioritizing patient perspectives;<sup>13</sup> employing arts allows students to reflect on their PAT experiences in ways potentially unique relative to other reflective modalities.<sup>14</sup> These education initiatives have shown promise in improving trainee interprofessional skills, enabling them to be more attuned to their patients’ needs, better understand the ethical dimensions of care, improve attitudes toward patients in general<sup>15,16</sup> while encouraging reflexive and transformative learning.<sup>17,18</sup> In surgery, the humanistic skills developed through these programs are critical, as ineffective communication amongst surgeons has been shown to result in poorer quality of life for cancer patients.<sup>19-23</sup> The implementation of humanistic education programs has been increasing in the context of surgical education to balance the current reputation of surgeons and encourage development of more humanistic skills.<sup>24-26</sup>

The University of Toronto has taken a step toward promoting humanism within surgery by utilising a joint PAT and ABR program for surgical clerkship students.<sup>27,28</sup> The aim of this program is to help students appreciate the holistic role of surgeons and gain insight into the value of humanism within surgery. Through this insight, it is hoped

that over time perhaps medical students with humanistic interests may be encouraged to pursue surgery as a career, and those who pursue surgery may do so with a more holistic appreciation of surgical practice, thus eventually challenging the current culture of surgery and stereotypical demeanour of surgeons.

We anticipate that participation in a PAT and ABR program in surgical education can promote a shift in student perceptions of surgery to encompass a more humanistic perspective. Existing evaluation approaches tend to rely on self-report measures, or qualitative explorations, leaving considerable space for innovation in determining whether these types of programs influence the development of desirable but hard to measure outcomes such as communication skills, personal growth, and evolving perspectives.<sup>3</sup>

The purpose of this study was thus to use a novel evaluation approach to explore the utility of a PAT and ABR program amongst surgical education. Specifically, it evaluated whether a PAT and ABR program influenced student perceptions of the value of humanism amongst surgeons, and whether this change was meaningful. If our evaluation approach can capture a change in perspective amongst medical students, it may add crucial evidence in support of the value of implementation of humanistic education initiatives in surgery.

## Methods

### Participants

Throughout their eight-week surgical clerkship rotations, all University of Toronto (UofT) MD students participate in the PAT and ABR program, which consists of three interactive sessions. The UofT MD program consists of four distinct academies, each with different affiliated health care sites providing medical student education. At any given time, there are approximately 10-12 students pursuing their surgical clerkship at each of these academies across various health care sites. This study was approved by the institution review boards of the University of Toronto (REB # 36645) and Unity Health Toronto, St. Michael’s Hospital (REB # 17-045).

### Recruitment

All University of Toronto third-year medical students undertaking their surgical clerkships between March 2019 – January 2020 took part in the PAT and ABR program. They were asked, on a voluntary basis, to answer the same question before and after their surgical clerkship rotations.

This participant pool consisted of students from two different cohorts and from several different healthcare sites.

### Description of program

The combined PAT and ABR program consists of a series of workshop sessions that are integrated into the education curriculum of third year students in surgery. Surgical students participate in three workshops: two patient-led dialogues, and one on art-based reflection. The first and second session are led by patient-teachers, who share their experiential knowledge through personal stories, discussing the impact cancer and surgery has had on their lives. Patient-teachers reflect on their experiences with the health care system – engaging in dialogue with students they share their personal insights on how their cancer and surgery impacted their lives, encouraging an understanding of patient perspectives and the roles of surgeons beyond the operating room. Each patient led session has four different patient teachers participating who vary across the different sites. The third session takes place in the last week of the surgical clerkship rotation. Each student can choose how to make a creative reflection piece, including but not limited to poetry, art, music, or any other chosen creative medium. In creating their ABR piece, students have the opportunity to reflect on their learning from the first two workshops and how patient stories influenced their outlook and surgical clerkship experience. A university surgical faculty educator facilitates the group discussion.

The PAT program includes 35 unique volunteer patient teachers, each with a history of cancer requiring surgery, from diverse backgrounds and ages ranging between 26-70 years. Prior to sharing their stories through the PAT program each volunteer participates in an online training module and participates in a debrief session with a social worker. Each patient teacher has varying years of experience contributing to the program.

### Data collection

All students were invited to answer one question before and after participation in the PAT and ABR program. Students that participated were asked to “list the top 5 attributes of a surgeon, in order of perceived importance.” Number 1 represented the most important perceived surgeon attribute, with importance decreasing to number 5. Students who answered the question both pre- and post-participation were included for data analysis.

### Data analysis

Our analysis aimed to evaluate potential differences in ranking of humanistic characteristics of surgeons after participation in the PAT and ABR program. This difference in ranking was assessed by looking for a meaningful increase in the count of humanistic characteristics listed by respondents or through a meaningful change in the ranking of humanistic characteristics.

The results were first de-identified and anonymized, then each attribute was coded by two coders as either ‘humanistic’ or ‘non-humanistic’. In instances of disagreement, a third coder broke the tie. ‘Humanistic’ characteristics of surgeons were those that considered the well-being of the patient as a whole person. Therefore, ‘humanistic’ surgeons may, for example, be compassionate, empathetic, effective communicators, and act as advocates on behalf of their patients. Additionally, characteristics that described a focus on one’s own well-being by valuing mental health, happiness, and work-life balance were also considered ‘humanistic’. We considered characteristics or traits that did not fall into the ‘humanistic’ description to be ‘non-humanistic.’ Non-humanistic attributes included those related to medical knowledge, surgical skills, or surgical leadership.

Bayesian generalized linear regression models were used to quantify changes in ranking of humanistic characteristics of surgeons after participation in the PAT and ABR program.<sup>29</sup> Our first model estimated effects of program participation on counts of humanistic characteristics, and our second and third models estimated effects of program participation on the ranking of humanistic characteristics.

## Results

Between March 2019 – January 2020, 296 students completed their surgical clerkships and were given the opportunity to participate in answering our question regarding surgeon attributes. A total of 52 students from across the different UofT academies participated in answering both the pre- and post-question, representing a 17% response rate. Upon completion of their surgical rotation and participation in the PAT and ABR program, student perceptions of important surgeon characteristics shifted to encompass more humanistic attributes (Table 1).

*Table 1. Representative shift of surgeon characteristics, non-humanistic and humanistic characteristics*

Non-Humanistic Characteristics	Humanistic Characteristics
Technical	Compassion
Knowledgeable	Empathy
Leadership	Comforting
Work well under pressure	Patience
Confidence	Communication
Composed	Connection
Efficient	Counselling
Decisive	Patient Advocate
Detail Oriented	Benevolence
Disciplined	Holistic Perspective
	Open Mindedness

We created an initial model of the number of humanistic characteristics listed by respondents as a function of time (pre- vs post-participation). This model was parameterized such that time was a population-level predictor and estimated varying effects for respondents to account for repeated measurements within each participant.

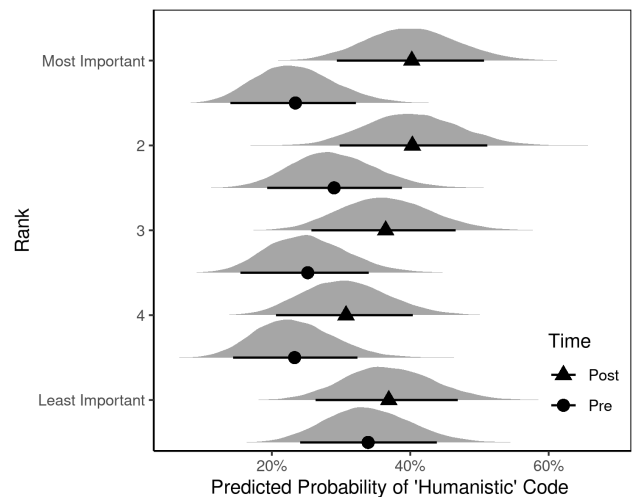
We constructed additional models to estimate the effects of program participation on humanistic characteristic trait ranking. Our second model quantified the probability of a characteristic at a given rank being coded as humanistic as a function of time (pre- versus post-participation). We included time and rank as population-level predictors and estimated varying effects for respondents to account for repeated measurements within each participant. We constructed our third model to estimate the probability of humanistic characteristics forming the majority in the top three rank positions. The number of humanistic characteristics in the top three rank positions were calculated and coded as a majority ( $\geq 2$ ) for each participant at each time point as a binary variable (majority = 1, non-majority = 0) with time as a population-level predictor and varying effects for respondents to account for repeated measurements within each participant.

*Table 2. Model 2 Results: Mean predicted probability of humanistic coding pre- and post-participation for each rank [with 89% confidence intervals].*

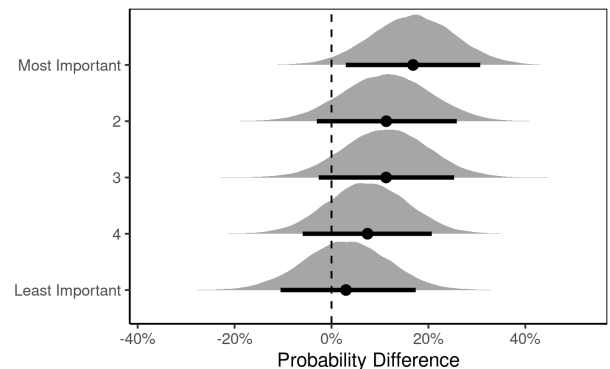
	Rank 1	Rank 2	Rank 3	Rank 4	Rank 5
Pre-participation probability	0.23 [0.1, 0.37]	0.28 [0.14, 0.44]	0.24 [0.12, 0.39]	0.23 [0.1, 0.37]	0.33 [0.18, 0.49]
Post-participation probability	0.4 [0.24, 0.57]	0.4 [0.24, 0.57]	0.36 [0.21, 0.53]	0.3 [0.16, 0.46]	0.36 [0.21, 0.53]

Our first model revealed that the overall number of humanistic characteristics listed by students pre- and post-participation did not result in a meaningful difference. However, our second and third probability models evaluating the change in ranking of humanistic characteristics did show meaningful differences.

Model Two indicated that the probability of listing a humanistic characteristic was greater post-participation than pre-participation for each rank (Table 2; Figure 1). We compared the mean pre- and post-participation differences for each rank to assess whether this change was significant (Figure 2). Ranks 2-5 demonstrated no significant difference, however rank 1 the 'most important' characteristic of a surgeon demonstrated a significant difference. The probability of a humanistic characteristic being ranked as the most important had increased to 40% post-participation, demonstrating a 17% increase in mean predicted probability. Model three showed an increased probability of humanistic responses being ranked as the majority amongst the top three most important characteristics for a surgeon. After participation in the program the probability of humanistic characteristics forming the majority amongst the top three rankings increased by 21% (Figure 3).



*Figure 1. Model 2 Results: Comparing mean predicted probability of humanistic coding between pre- and post-participation results for each rank, with 89% confidence intervals.*



*Figure 2. Model 2 Results: Distribution of difference for each rank between mean predicted probability for pre- and post-participation results*

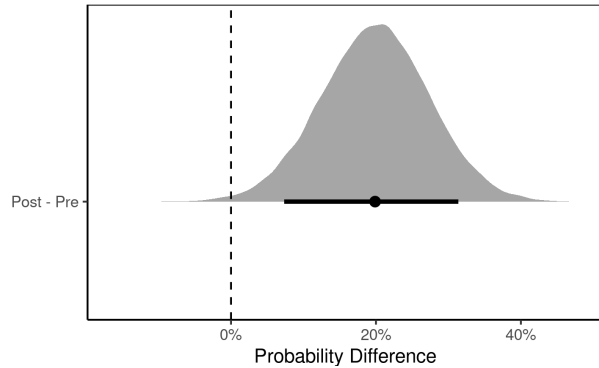


Figure 3. Model 3 Results: Distribution of differences between predicted majority (>2) probabilities for the top 3 ranked characteristics.

Our study results indicate that the PAT and ABR program was effective in influencing student perceptions regarding surgeon characteristics. Our data demonstrate a higher probability of 'Most Important' (rank 1) characteristics being humanistic after participation in the PAT and ABR program. Additionally, we saw an increase in the probability of humanistic characteristics forming the majority of the top three attributes after participation in the PAT and ABR program.

## Discussion

Demonstrating the utility of humanistic educational interventions on outcomes of interest, such as reflection, changes in perspective, communication skills, patient advocacy and an improvement in provision of compassionate care, is challenging.<sup>30,31</sup> This study attempted to evaluate the impact of a humanistic education program on an aligned outcome of interest. In particular, the impetus for this program was to help learners appreciate the importance of humanism in surgery. Our results demonstrate a clear shift in student perspective as to which characteristics a surgeon should exemplify, after having participated in a humanistic education program. These results are promising as they support the efficacy of a PAT and ABR initiative in encouraging humanistic perspectives and provide an outcome measurement method for evaluation of future programs. This discussion will focus on the contributions of our evaluation approach to the existing theory on the value of humanistic education. We will also acknowledge the challenge in quantifying humanistic education initiatives, while addressing the limitations of our study, and the next steps forward in applying our research to medical training.

The combined use of a PAT and ABR humanistic education program offers an approach within surgical education to address one of its longstanding challenges. The demeanour

of surgeons is stereotypically unempathetic, intimidating, and difficult to work with.<sup>32,33</sup> These stereotypical ideas of surgeons continue to persist, in part, perhaps, due to traditional surgical education styles endorsing these views by emphasising technical skill and biomedical knowledge while diminishing the importance of humanistic aspects of surgery.<sup>27</sup> PAT programs facilitate appreciation of patient experiences, which equip medical students with essential perspective that is complementary to their biomedical knowledge of disease processes.<sup>34</sup> This incorporation of patient stories fosters humanism in medicine by emphasising interpersonal connection that deepens clinician-patient relations.<sup>34</sup> Additionally, the use of art within health professions education provides an alternative lens to medicine and the experience of illness that cannot be explored through an entirely biological construct, which is often emphasized in traditional health professions education.<sup>35</sup>

However, utilisation of a PAT program in isolation has the potential to essentialize patients into a single narrative. Programs involving patient engagement have been critiqued for their lack of racial, age, and socioeconomic diversity as they do not adequately represent the diverse patient demographic health professionals will encounter throughout their careers or the uniqueness of every patient's experience.<sup>7</sup> A lack of representation amongst patient teachers can inadvertently perpetuate stereotypes about patient needs and overlook the experiences of marginalised populations.<sup>7</sup> Perhaps intertwining PAT with ABR practice may enhance the traditional structure of PAT programs by furthering the perspectives through which patient stories are realised. Arts in conjunction with PAT programs may help expand understanding of the experiential knowledge of patients by utilising reflection to integrate this knowledge with sources of knowledge and ways of knowing.<sup>36</sup> Studying these possible effects or mechanisms was not the purpose of the current study and raises questions for future exploration.

Historically, the effect of humanistic education has been challenging to measure in terms of quantitative outcomes of interest. The Jefferson Scale of Empathy is one tool that is widely used (though critiqued) to overcome this; however, aspects of humanism beyond empathy are not well encompassed within the parameters of this scale, limiting its use within our context.<sup>37,38</sup> By allowing students to self-nominate characteristics of surgeons we captured a wider and more holistic definition of humanism within medicine beyond the traditionally limited categories of



compassion and empathy.<sup>31</sup> Additionally, unlike traditional assessments of learning and evaluation of education innovations, which often measure the increase in performance of a skill, humanistic education initiatives need to capture effects that align, paradigmatically, with the intended outcomes of such approaches to education. To measure the qualitative changes expected in humanistic education programs, we leveraged qualitative data generation with a Bayesian regression analysis as an innovative evaluation tool, rather than null hypothesis testing, which may not align with qualitative outcomes.<sup>39</sup>

<sup>40</sup> Our combination of a qualitative approach with a quantitative, Bayesian statistical model is promising in its ability to evaluate the impacts of future humanistic education programs.

## Limitations of study and next steps

Our current study is limited to the measurement of learners' perspectives. Although we were able to measure shifts in perspective, we did not demonstrate how this actualised, or whether these shifts in perspective influenced student decisions in pursuing surgical careers or the patient care they would provide in the future. Next steps in this research would include using similar methods to study learners' career choices in relation to surgery and patient experiences and interactions resulting from trainees' experiences in a PAT and ABR program. An additional limitation to our study is our response rate of 17% and the lack of a control group i.e., a group who did not participate in the humanistic education program. However, our Bayesian analysis is an explanation of our data through a generative model that quantifies uncertainty of estimated parameters and predictions. Without a control group, we remain considerably uncertain if changes in student perspectives could be due to the surgical clerkship itself. That said, extant literature suggests participation in surgical clerkship can challenge the pre-conceived perceptions students have of surgery and we know that humanistic characteristics, such as empathy, can decline throughout medical training.<sup>41,42</sup> This extant literature thus makes it unlikely students would inherently have a change in attitude toward a more humanistic perception of surgeons simply through presence in their clerkship rotations. Further supporting our assertions that the PAT and ABR program contributed to students' perspective shifts, our study participants completed their surgical clerkships at different hospital sites. Additionally,

participating students were from two different cohorts. Yet the vast majority of students experienced the desired perspective shift. These two aforementioned factors might add a degree of variability in student experiences, making participation in surgical clerkship alone unlikely to be an attributable factor in altering student perspectives amongst our cohort. However, the PAT and ABR program was the consistent factor amongst each students' surgical clerkship rotation, which favors its role in shifting student's perspectives.

## Conclusion

Our innovative model combining qualitative data generation and Bayesian statistical analyses showed promise as a method to demonstrate the impacts of humanistic educational programs that aim to shift perspectives. With reasonable certainty, we conclude that patients teaching medical students followed by student reflection through art was an effective combined intervention to shift student perspectives regarding importance of humanistic characteristics amongst surgeons.

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