This Thesis, Integrating Comics into Medical Ethics Education: Medical and Physician Assistant Students' Perspectives, presented by Amani Elghafri, and Submitted to the Faculty of The Harvard Medical School in Partial Fulfillment of the Requirements for the Master of Medical Sciences in Medical Education has been read and approved by:

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Integrating Comics into Medical Ethics Education: Medical and Physician Assistant Students’ Perspectives

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Integrating Comics into Medical Ethics Education: Medical and Physician Assistant Students’ Perspectives

Abstract

Purpose: This study explored comics as a tool for teaching medical and physician assistant (PA) students about end-of-life decision-making and advanced care planning.

Method: Using a mixed method convergent design, a survey (consisting of five-point Likert-scale ratings and open-ended questions) was administered to all second-year medical and first-year PA students enrolled in an Ethics and Professionalism at a US medical school. The survey evaluated whether the addition of a comic to assigned readings affected reported student engagement and understanding of the topic and examined students’ attitudes about the use of comics in the classroom. Quantitative results were compared by demographics and open-ended responses were coded and analyzed qualitatively for emergent themes.

Results: 145 students responded (83%), and 141 students (81%) were included in the final analysis. The mean engagement score was 3.8 (SD=0.6); and mean understanding score was 3.8 (SD=0.5) where minimum = 1 and maximum = 5. There were no significant differences in understanding or engagement by gender and student type. However, non-whites had higher engagement ($p=0.017$) and understanding ($p=0.034$) scores than whites. Qualitative analysis revealed five themes: 1) Comics effectively supplement text readings and can enhance the learning process; 2) Comics facilitate empathy; 3) Comics make the message stick; 4) Comics’
illustration/image quality is of great importance; 5) Comics are a refreshing alternative to traditional medical school media.

**Conclusion:** Contemporary medical and PA students are demanding creative media for learning alongside textbook-based learning. Integrating comics as a supplemental teaching tool in medical education is an innovative way to engage students.

**Keywords:** Medical Education; Educational Comic; Comics and Medicine, Medical Ethics; End of Life and Advance Care Planning.
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### Tables

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Table 1. Demographic Characteristics of Respondents to a Survey About Medical and Physician Assistant Students’ Attitudes Toward the Use of Comics in the Classroom, 2016

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Table 2. Engagement and Understanding Scores of Respondents’ Demographic Characteristics in a Study of Medical and Physician Assistant Students’ Attitudes Toward the Use of Comics in the Classroom, 2016
Acknowledgements

This work was conducted with support from Students in the Master of Medical Sciences in Medical Education program of Harvard Medical School. The content is solely the responsibility of the authors and does not necessarily represent the official views of Harvard University and its affiliated academic health care centers.

We sincerely thank the research participants and the staff who assisted with this research in the Department of Humanities at Penn State College of Medicine. Additional thanks to David Hirsh, Susan Farrell, and Aditya Joshi for generously offering their time, support, and guidance.
Introduction

Comics are increasingly being incorporated into medical schools curricula in light of promising research demonstrating their ability to convey experiences and information not found in other types of educational materials.\textsuperscript{1,2} The use of comics has been shown to improve students’ learning experiences in a broad range of disciplines.\textsuperscript{3,4} In medicine, one recent study suggests that comics can help portray illness and the realities of medical practice from myriad viewpoints not often found in medical textbooks and that the use of comics in education can help medical students gain a more holistic understanding of the practice of medicine than through texts alone.\textsuperscript{1} As Paul Gravett (a journalist and comics books author) noted in his keynote address at the 2011 Comics and Medicine Conference, “the reason I am drawn to comics is empathy, being able to understand other people’s lives and experiences and hopefully finding a connection in yourself. Even if it is something you’ve never experienced, you can open up your mind and heart to what other people are going through.”\textsuperscript{5,6} Comics’ potential to facilitate empathy and understanding may be particularly relevant for the teaching of ethics and end-of-life care, as recent studies have shown that medical students and interns are not adequately prepared to address end-of-life (EOL) issues with patients.\textsuperscript{7,8,9}
Although there is some evidence that comics can be effective teaching tools in medical education, they have not been evaluated in the context of medical ethics and EOL care education. The purpose of this study was to explore the impact on students’ experiences of integrating comics into a medical school ethics course during a session devoted to EOL care. We hypothesized that including a short, published graphic narrative, “Betty P.” as a supplement to text-only readings would better engage students and yield deeper understanding of both physicians’ and patients' experiences.

Methods

Study design

This study used a mixed methods (depicted in Figure 1), in which we collected quantitative and qualitative data simultaneously during a one-week phase, aiming at convergence between the outcomes. Results were integrated at the final analysis, with qualitative themes used to delve deeper into the quantitative data collected.

Participants and Setting

The study population consisted of all second-year medical students and first-year physician assistant (PA) students enrolled in a mandatory Ethics and Professionalism course at Penn State College of Medicine in Hershey, Pennsylvania in 2016. Comprising 12 sessions, the course met weekly for a one-hour plenary session after which students separated into small groups of 9-10 students for an hour of discussion. The course covered a variety of medical ethics topics, and students were asked to complete preparatory readings in advance of each class.
**Intervention**

“Betty P.” is a five-page comic written by Dr. Michael J. Green (author M.G.), a physician and bioethicist, and illustrated by Ray Rieck. Peer-reviewed and published in The Annals of Internal Medicine, “Betty P” raises questions concerning medical ethics and EOL care. The narrative centers around a dramatic situation faced by the author during his clinical training when he conducted futile CPR on a terminally ill patient who lacked an advance directive.

“Betty P.” was assigned to students as a required reading along with two other peer-reviewed articles and a short video on EOL care. Students convened for a one-hour lecture and then divided into small groups discuss to the lecture and readings, as usual (Figure 2).

**Survey development**

The authors (AE, JK, MG) developed and pilot-tested the survey questions for face validity and clarity with a convenience sample of three third-year medical students and three course facilitators. Researchers refined the questions through an iterative process.

The survey consisted of four sections: 1) Two pre-qualifier dichotomous questions; 2) Eleven attitudinal questions on a five-point Likert scale; 3) Demographic questions; and 4) Four open-ended questions: 1) What (if anything) did you learn or appreciate from the comic “Betty P.” that you might not have learned/appreciated from a typical text-only reading? 2) In what way did the comic format enhance or detract from your appreciation of the subject matter? 3) Would you like to have more comic readings in other subjects? Why/why not? 4) Any further comments. The purpose of the first pre-qualifier dichotomous question was to ensure that only participants who read the comic would complete the survey, and those who did not read the comic were excluded.
Data collection and Analysis

During the plenary session devoted to advance directives and EOL care (September 13, 2016), students were informed of the study and invited to participate via a post-class online survey. After the lecture and small group discussion sessions ended, students were sent an email, which included a description of the study and link to the online survey. Participation was voluntary and unrelated to course grades, and completion of the survey implied consent to participate. As an incentive, participants were entered into a raffle to win a Kindle e-reader upon completion of the survey. Responses were anonymous and collected via Qualtrics during a single week in September 2016.

Quantitative analysis

We analyzed students’ responses to the eleven Likert-scale questions by examining reported engagement and understanding and calculating a summary score for these categories separately; each score was calculated as the sum of the mean of the items divided by the total number of items. Due to the high response rate, we performed student’s t-tests with the assumption of a normally distributed population, and we analyzed engagement and understanding scores by demographics with P<0.05 considered statistically significant (Table 2). For statistical analysis, we used STATA version 14 software.

Qualitative analysis

We qualitatively analyzed students’ views about the use of comics as reported in the survey’s open-ended questions. Using an inductive approach, two researchers (AE, RRS) generated a codebook to improve reliability. They independently open-coded the first question’s responses and then compared their work, discussing how to proceed with the rest of coding. Any identified discrepancies were resolved until full inter-coder agreement was reached. 37 codes
generated from the data were compared and collapsed to 20 codes. The investigators further distilled these codes into five major themes. For qualitative data analysis, we used software ATLAS.ti 8 software.

Results

Participants

A total of 145 of 174 eligible students completed the survey, yielding a response rate of 83%. Of those who completed the survey, 141 (97%) students indicated that they read the comic before lecture and were therefore included in further analysis. Of these 141 students, 123 (87%) reported that they had read the comic carefully.

As shown in Table 1, the 141 participants consisted of 114 second-year medical students and 27 first-year physician assistant students. 85 (60%) of the participants were females and 99 (70%) were white. Participants’ ages ranged from 21 to 34 with a mean age of 25 years (SD 2.3).

Quantitative outcomes

Quantitative outcomes were assessed in two domains, engagement and understanding, and summary scores were calculated. Participants’ mean engagement score was 3.8 (SD=0.6, where 5=maximal engagement), and the mean understanding score was 3.8 (SD=0.5, where 5=maximal understanding).

There were no significant differences in understanding or engagement by gender and student type. However, non-whites had higher engagement \( (p=0.017) \) and understanding \( (p=0.034) \) scores than whites (Table 2).
Notably, 89% of participants felt that “Betty P.” helped them better understand the consequences of not completing advance directives with patients, and 84% felt that adding comics to pre-course readings would increase their engagement with subjects they were learning. Further, 84% of students felt that the comic did not distract them from focusing on the serious subject presented (Refer to Figure 3 and Figure 4 for more detail).

**Qualitative outcomes**

The vast majority of respondents (99%) answered the first three open-ended questions, additionally, 41 (29%) answered the fourth question. The qualitative responses were organized into five main themes.

1. **Comics effectively enhance learning and are useful supplements to text readings**

Numerous participants noted that the comic was more effective than traditional readings at communicating complex ideas around EOL care. Students felt they could more quickly understand the issues being addressed via a comic than through text alone.

   “I was able to visualize the scenario differently from my own imagination. I feel like I was able to capture [a] similar amount of information (in terms of the feelings and the atmosphere of the place) in lesser time…[just] reading the descriptions.”

That comics tend to be shorter than text-only readings also helped students stay engaged with the material.

   “We have a lot of readings to do as medical student. Comics are more concise while still getting the point across, allowing me to fully engage in it rather than skim while still getting a deeper understanding of the point at hand.”

Further, participants expressed that comics helped them better visualize the experience, understand the ethical complexity of the topic, and appreciate the importance of EOL care.
“I thought that I understood the importance of an advance directive (and having one/encouraging others to have one well before it would be used), but this comic really brought that importance to the forefront.”

A few participants suggested that comics may be better suited for teaching some subjects over others. They opined that topics within humanities might be better suited for comics than other more scientific fields of medicine.

“I think they would be best suited for subjects like humanities, ethics, and critical thinking.”

“I think it may depend on the subject matter. Having comics in more clinical or scientific subjects may detract from the overall learning of the topic.”

2. Comics facilitate empathy

Students indicated that reading the comic helped them understand the experience of caring for a patient at the end of life, and that this could enhance ethical decision-making during their careers as clinicians. For example, they described how the comic clearly demonstrated possible consequences of not discussing EOL decisions with patients in advance.

“It was a really clear illustration of the trauma that can be caused when a DNR or living will is not in place. Very vivid description of the damage a doctor can do trying to save the life of someone who is very, very ill.”

Some students described how the medium of comics helped them process difficult emotions often associated with making weighty decisions. By enabling students to envision themselves as the patient or doctor in the narrative, the comic triggered important questions in their minds as to how they would behave in a similar situation and what kind of decisions they would want to make.

“The clear depiction of fright, anger, and despair on the face of the resident communicates realities that go over and beyond a simple, stale text reading. The comic
allowed me to put myself in the shoes of the resident and further connect with the scenario.”

Similarly, the comic helped students relate to the earlier experiences of a senior doctor, and to learn from his experience.

“I liked the visualization of the attending’s flashback to his time in residency when half of his face was shown at the two ages. It was a beautiful representation of the memories and lessons learned earlier in life being expressed in the present moment.”

“I appreciated the dual timelines used to illustrate the importance of discussing advanced directives. A teacher using his experience as a student to teach the next generation of doctors.”

3. Comics make the message stick

Many participants indicated that engaging with the story in comic form had an enduring emotional and visual impact, and that the images not only had remained on their minds in the days after the course but would also endure through their careers as clinicians.

“I thought the comic enhanced my appreciation. I can still see the images in my head many days later, when if I had just read the story, I probably would have forgotten many of the details.”

“The ability to view the emotions of the characters through the illustrations created a strong emotional response that I feel will stick with me as I move into my career.”

4. Comics’ illustration/image quality is of great importance

Many students mentioned how the high quality of the illustrations conveyed nuance and realism that would not be possible without the visual richness of the medium, enhancing students’ engagement with the story. They felt that in addition to the story itself being compelling, the illustrations were essential to the deep experiential impact the comic had. Several students described how well the comic’s illustrations depicted characters’ emotions and the complexities
of the situation. They gained an appreciation not only of what was at stake in this narrative, but also in EOL care and medical ethics in general.

“Reading about an older patient experiencing pain through CPR compressions may be traumatizing, but actually seeing a visual provided of a feeble woman with IV tubes was more difficult to see and it was able to provide a larger emotional connection than simply reading text.” Empathy not the image quality

“The character's struggles seemed more relatable, and I think the artist's skill in depicting his/her character's emotions through their facial expressions made it easier to empathize with the characters involved in this comic.”

“The quality of the comic illustrations plays a large role in how helpful it is”

5. Comics are a refreshing alternative to traditional medical school media

Many participants believed that medical schools focus on text-based learning more than any other medium, despite students’ preferences for a variety of learning media. Not only did they enjoy learning with comics, but they also felt that the comic was effective, approachable, and engaging. They expressed a broader desire for academic institutions to include diverse media for learning, including videos, readings, and comics, and they felt that this would result in better understanding and retention of information.

“I really enjoyed the comic. I think high-level academia focuses far too much on lengthy articles when they could let us read a comic that gets the point across much more effectively and in a much less daunting way. I was much more eager to read the comic compared to the other 2 short articles for the same week that contained no pictures.”

“I think approaching a subject with multiple methods (normal reading, video, comic) is superior than a single method (just reading). It gives a more complete understanding of a subject.”

Discussion
Using “Betty P.” alongside text-only readings helped students better understand the importance of discussing EOL care with patients, the role of advance directives, and the value of effective communication. Rather than viewing the comic’s format as a distraction from the seriousness of the topic at hand, students found the comic to be an accessible way to address a complex ethical topic. Students relished the opportunity to engage with a medium not typically used in medical curricula and felt that comics could capture and convey nuance that would be difficult to do with text alone.

Medical educators appropriately expect students to acquire information from reliable and scholarly sources, and our research suggests that high quality comics could be powerful supplementary teaching tools in medical education. Comics are particularly well suited for explaining complex subjects efficiently and quickly. In light of the changing workload and reading styles of present day medical students, the addition of comics into the medical curriculum can make medical school less daunting.

Further, fields such as narrative medicine and anthropology have long recognized the pedagogical value of narrative to illustrate important themes or aspects of individuals’ experiences. By visually depicting narratives, comics may help students bridge the gap between classroom instruction and experiential learning, helping to forecast the experiences of clinicians and patients within a classroom setting.

Which topics are best suited for comics in the medical classroom? Research shows that for comics to effectively supplement textual media they must reflect the complexity of the ideas and language presented in the text. Some students in this study speculated that humanities concepts were better suited for graphic representation than concepts in basic science. Yet curriculum developers are experimenting with using comics to convey basic science concepts as
well. JP Medical’s “Eureka” series combines detailed molecular, physiological, and anatomical illustrations with holistic depictions of patients, illustrating aspects of the patient’s experience, presentation, diagnosis, and management of medical conditions.\textsuperscript{31,32} Although such developments are underway, there have been no systematic evaluations comparing the efficacy of such a text with that of a traditional textbook. This comparative work would be valuable in assessing the success of a comic-integrated text in enhancing students’ learning experiences and outcomes.

Several respondents in this study attributed their deep engagement with the comic and its themes to the high quality illustrations and the artist’s aptitude in conveying situational and emotional nuance. Recent studies on the use of images in medical education suggest that design details, such as typeface and font size can impact how a reader perceives ideas in the comic or text. Further, readers’ ability to empathize with characters in comics may depend on how they are visually depicted.\textsuperscript{30} That said, even simply illustrated comics can effectively communicate powerful messages,\textsuperscript{1,31} and though image quality may meaningfully shape readers’ experiences of narrative, the comic format itself can elicit strong reader response and engagement regardless of the illustration quality.

One surprising finding in this study was the difference in mean engagement and understanding scores between white and non-white students. In the quantitative portion of the survey, non-white students more commonly reported that the comic enhanced their engagement with and understanding of ideas in EOL care and advance care planning. To date there have been no studies specifically exploring racial differences in reader engagement with comics in medicine, and thus further research is needed to more fully explore this finding and determine its significance.
**Limitations**

Because the comic was integrated into a single ethics course session, only one sample population over a short period of time was observed. However, the structure of this study could easily be replicated at other medical schools using “Betty P.” to supplement ethics and EOL care education or using other comics to enhance the study of other topics in medicine.

Although students suggested that this experience could inform their thinking about EOL care in the future, without longitudinal study we may not be able to determine the long-term impact of this comic. Future research could follow a cohort of students into their first years of clinical practice to determine if the particulars of the comic and its lessons stayed with them and affected their clinical decision-making.

Lastly, the present study was not randomized, and there was no control group to represent the standard case wherein students received text-only readings to learn about EOL care. Given the promising results of this study, future studies would benefit from employing a randomized-controlled trial structure to improve the generalizability and rigor of the outcomes.

**Conclusions**

The addition of the comic “Betty P.” into the medical school curriculum facilitated better understanding of key topics in ethics and EOL care while deepening students’ engagement with the moral and clinical complexities presented. Students were optimistic about and eager for further use of comics in medical education.

This study contributes to a growing body of research examining the role of comics in medical education to enhance learning outcomes and help students better visualize clinical situations. Although there is a need for new types of learning materials to more effectively
engage and teach medical students today, medical schools have not fully explored comics’ potential as educational tools among different subjects within medical education. By directing resources to developing comics-based case studies for other topics in medicine and researching their effectiveness, medical institutions will be able to create and evaluate the use of new media to engage the next generation of learners.

Conflict of Interest

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Ethical approval

Ethical approval has been granted by IRBs at Harvard Medical School (July 1, 2016, Ref #: 16-0680) and by Penn State College of Medicine (July 16, 2016, Ref #: 00005296).
Appendices

Appendices 1. Betty P. Comic, a required pre-reading for “end-of-life decision-making and advance care planning” session.
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