# Impact of an eCase Intervention on Empathy in Doctor of Pharmacy Students

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## Background

**Empathy in Healthcare:** When health care professionals show empathy towards their patients, it has been shown to improve adherence, patient satisfaction and clinical outcomes.[1-3] The Accreditation Council for Pharmacy Education (ACPE) emphasizes patient-centered care and the Curricular Outcomes and Entrustable Professional Activities (COEPA) 2022 promote the importance of empathy.[4-5] There is evidence to support the use of active learning and simulation to promote empathy in health professions students, however there is no current consensus on the optimal methods for teaching empathy to pharmacy students.[6-7]

**ECase Development:** The authors created interactive fiction-based electronic cases (eCases) to teach clinical decision-making.[8-9] These eCases allow students to explore patient narratives, apply their knowledge and practice decision-making in a safe environment.[8] To assess the use of eCases for teaching empathy, an eCase was designed to simulate a typical day managing diabetes from the patient's perspective. Students were prompted to make decisions on diet, medication adherence, and blood glucose monitoring, while also navigating challenges related to resources and social determinants of health. The eCase was built using Twine (Twinery.org) and was fully text-based.

**Kiersma-Chen Empathy Scale:** The Kiersma-Chen Empathy Scale (KCES) was developed to measure cognitive and affective empathy in health professions' students.[10,11] It includes fifteen items which are scored on a 7-point Likert scale and has been used to assess empathy before and after educational interventions.[10,11] In 2022, changes to the KCES were recommended following further validation to address limitations, notably removing reverse-coded items due to poor correlation and likely misinterpretation by respondents. Although the original KCES was used for this study, these reverse-coded items were removed for the final analysis.

**Study Objectives:** This study assessed the effect of incorporating an interactive, digital day-in-the-life patient case (eCase) into the curriculum to enhance empathy in first-year Doctor of Pharmacy Students.

## Methods

**Student Participants:** First-year pharmacy students enrolled in USC Mann during the Spring semesters of 2023 and 2024 were invited to participate in the study by completing pre- and post-intervention surveys, including the KCES and questions assessing empathy towards patients with chronic conditions. Participation was optional and anonymous. Students were prompted to create an individual code for matching pre- and post-surveys.

**Pre- and Post-survey Items:**

Kiersma-Chen Empathy Scale: Cognitive Items[10]
1. It is necessary for a HCP to be able to comprehend someone else's experiences
3. I am able to comprehend someone else's experiences
4. I will not allow myself to be influenced by someone's feelings when determining the best treatment*
6. It is necessary for a HCP to be able to value someone else's point of view
8. I am able to view the world from another person's perspective
10. I am able to value someone else's point of view
13. It is necessary for a HCP to be able to identify with someone else's feelings
14. It is necessary for a HCP to be able to view the world from another person's perspective
15. A HCP should not be influenced by someone's feelings when determining the best treatment*

Kiersma-Chen Empathy Scale: Affective Items[10]
2. I am able to express my understanding of someone's feelings
5. It is necessary for a HCP to be able to identify with someone else's feelings
7. I believe that caring is essential to building a strong relationship with patients
9. Considering someone's feelings is not necessary to provide patient-centered care*
11. I have difficulty identifying with someone else's feelings*
12. To build a strong relationship with patients, it is essential for a HCP to be caring
  * Italicized items were reverse coded for analysis

**Empathy towards patients** (adapted from previously validated survey from Parker, et al., designed for assessment of empathy following a diabetes simulation[12])
I believe having a chronic condition would be difficult.
I believe that most patients are doing their best.
I believe patients experience real challenges in following the recommendations of their healthcare providers.

All items were scored used a 7-point Likert scale from strongly disagree to strongly agree.

**Empathy Class Session:** Students were invited to complete the optional survey at the beginning and end of the session.

Pre-session survey → Classroom instruction → eCase exploration → Large group debrief → Post-session survey

**Statistical Analysis:** The paired KCES pre- and post- survey scores were compared using the Wilcoxon signed rank sum test. For the three questions assessing empathy towards patients, the 7-point Likert scale responses were consolidated into 2 categories: positive (strongly/somewhat agree, agree) and negative/neutral (neither agree nor disagree, somewhat/strongly disagree). The categorized choices in pre- and post- data were compared using the McNemar test to determine the agreeance. A p-value of <0.05 was considered statistically significant. All analyses were conducted using SAS (version 9.4; SAS Institute).

## Patient Simulation eCase ("A Day in the Life")


**Figure 1. eCase Settings and Opening** The eCase simulated a "day in the life" of a patient with diabetes, augmented by additional challenges (**Left**). Students needed to proceed through the day using a text-based interface (**Right**), navigating a doctor's appointment, visit to the pharmacy, and a day at work, all while remembering to eat, drink, check their blood sugar, and take their medications. The challenges were initially randomized, but scenarios could be selected by users during later playthroughs for a different experience.


**Figure 2. Patient Inventory** Students had access to medications, an inventory for food / water, and a wallet (**Top**). The glucometer could be used at any time to measure blood glucose levels. Medication labels provided instructions (**Bottom Left**); however text scrambling was used to simulate poor health literacy or visual impairments (**Bottom Middle**) in certain scenarios. Food also came with nutritional labels (**Bottom Right**), and sugar content was directly tied to blood glucose values. The wallet could be used at the pharmacy and to purchase food.


**Figure 3. Provider Interaction** Students underwent interactions through the day, such as the doctor's visit shown here, where they were unable to understand the physician due to a language barrier.


**Figure 4. Final Assessment** At the end of the eCase, students were given a score based on how well they managed their diabetes, factoring in their medication adherence, blood glucose control, and diet. The score was independent of the challenges they may have faced in that scenario.

## Discussion

**Patient simulation eCase Design and Deployment**
This study marks the first instance of developing an eCase that simulated the patient's perspective. The development time was longer compared to other eCases, due to the enhanced interface, increased choices, and overall extensiveness. However, this was offset by smooth deployment, positive reception by students, and increased replayability compared to previous eCases. The option to customize the starting conditions and simulated challenges enabled students to explore diverse experiences and engage with multiple perspectives. Additionally, this eCase employed a gamified design with players earning a final score, a new element in eCase design

**Changes in Student Empathy from Pre- to Post-Intervention on the Kiersma-Chen Empathy Scale**
As with previous studies assessing the KCES before and after an educational intervention, statistically significant improvements in the cognitive, affective and total scores were observed in this study.[7,10,11,13] The pre-intervention and post-intervention scores in this study (84.5 vs. 88) were similar to those from previous analyses (84 vs. 86.6).[11] However, the magnitude of change was larger for this intervention. Furthermore, when removing the reverse-coded items, both our pre- and post-intervention scores were higher than the mean found by Aronson, et al when analyzing 47 previous administration of the KCES (66.1 in Aronson, et al, vs. 70.8 in our post-intervention analysis).[11]

**Empathy towards patients with chronic conditions**
Following the eCase intervention, more students expressed a positive response to each of the three items assessing student empathy towards patients with chronic conditions. This indicates a heightened sensitivity and understanding of challenges faced by patients with chronic illnesses, particularly type 2 diabetes.

**Limitations**
This study was IRB-approved and pilot-tested during the 2021-2022 academic year, prior to the revision of KCES to the KCES-R.[11] Therefore, the older version of the scale was utilized throughout this study. Additionally, the long-term impact of the intervention on student attitudes and behaviors was not assessed, which limits the ability to determine sustained changes in student empathy.

**Conclusions**
The results of this analysis indicate that the patient simulation eCase can significantly improve student empathy by exposing them to the challenges faced by patients with type 2 diabetes. The enhanced design, replayability, and gamification elements contributed to the success of the intervention, providing an engaging educational experience. Moving forward, incorporating long-term assessments and utilizing the updated KCES-R could provide further insights into the enduring impact of such interventions. Overall, this eCase represents a valuable tool in pharmacy education, promoting empathy and understanding among future healthcare professionals.

## Results

**Table 1.** Matched pairs analyzed by year of administration

| | N |
| --- | --- |
| Spring 2023 | 73 |
| Spring 2024 | 72 |

**Table 2.** KCES Scores Pre- and Post-eCase Use (including reverse-coded items)

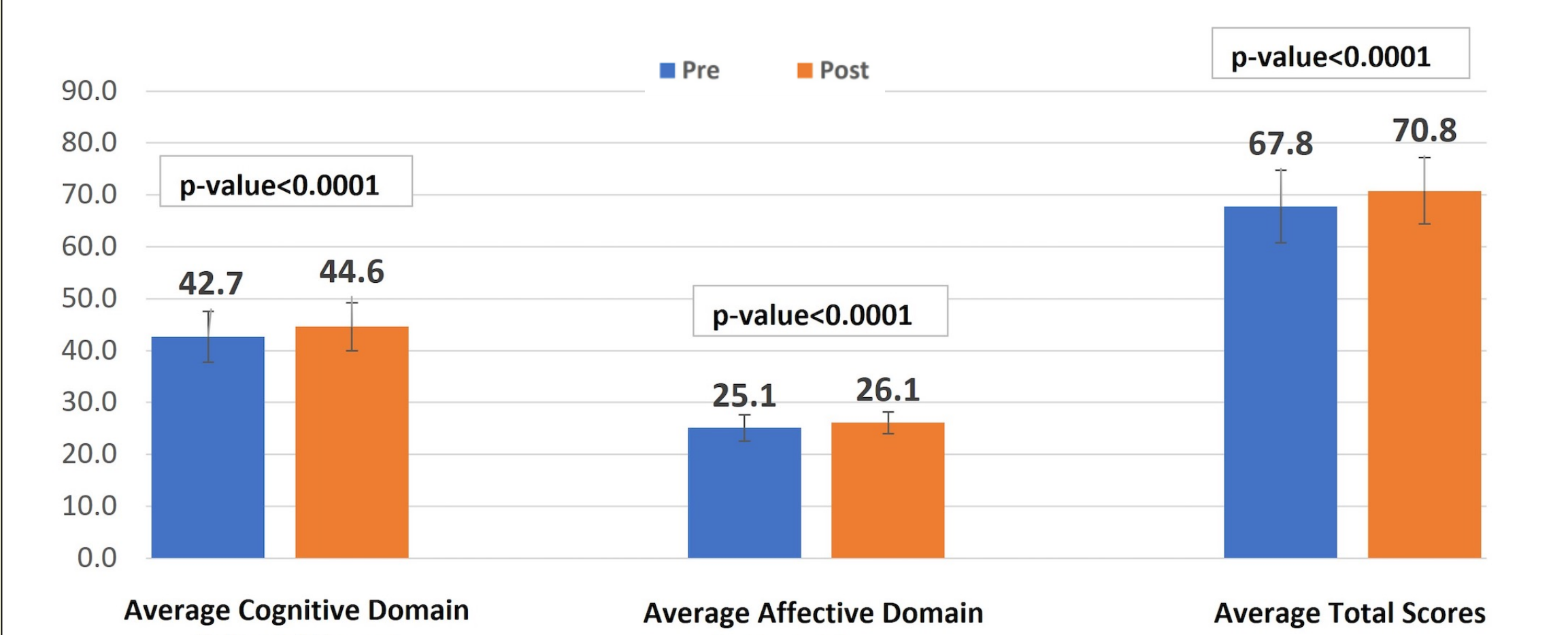| | Pre-session | Post-session | P-value |
| --- | --- | --- | --- |
| Cognitive Subtotal | 49 | 51.8 | <0.0001 |
| Affective Subtotal | 35.4 | 36.3 | 0.02 |
| Total score | 84.5 | 88 | <0.0001 |


**Figure 5.** Kiersma-Chen Empathy Scale Pre- and Post-eCase Use with Reverse-coded Items Removed (Final scores were calculated using only items 1, 2, 3, 5, 6, 7, 8, 10, 12, 13, 14)
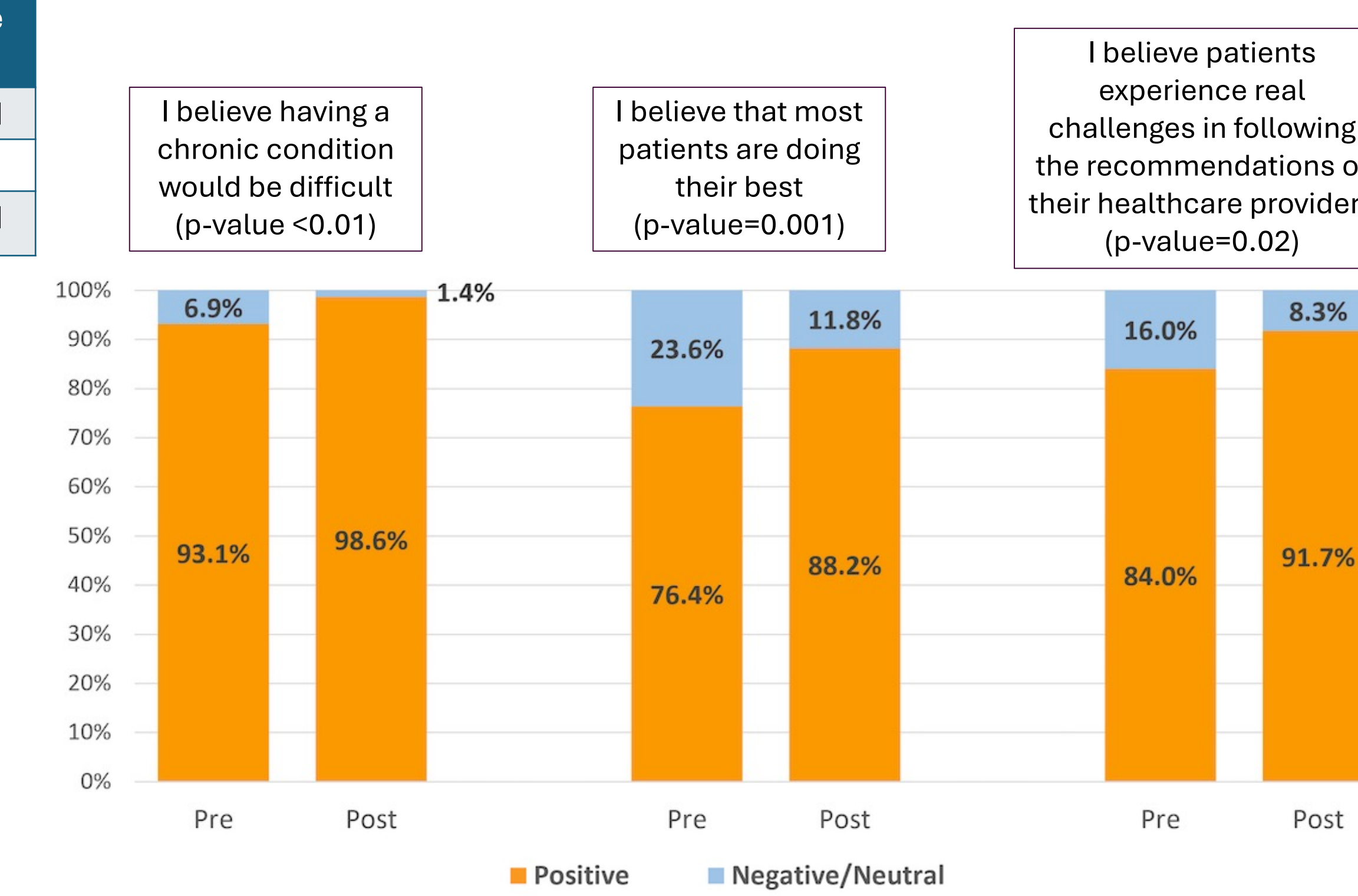

**Figure 6.** Empathy Towards Patients Pre- and Post-eCase Use
Responses were scored on a 7-point Likert scale. Responses were categorized into 2 categories: Positive (strongly agree, agree, somewhat agree) and neutral/negative (strongly disagree, disagree, somewhat disagree, neither agree nor disagree)

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