

# BMJ Open Quality Sequential third-year medical student quality assurance (QA) clerkship projects appear to introduce a culture of continuous quality improvement across New Jersey family medicine practices

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## ABSTRACT

**Background** In recent years, Rutgers New Jersey Medical School Department of Family Medicine has integrated a quality assurance (QA) project as a required component of their 5-week medical student clerkship. This project requires each student to conduct a QA study at an assigned family practice and discuss the results with their preceptor. The aim of this study was to determine if sequential medical student QA projects impact physician readiness to improve guideline adherence over time.

**Methods** A retrospective analysis of student reports was conducted to determine if physician readiness to improve compliance improved post implementation of the QA project using James Prochaska's Transtheoretical Model of Behavioral Change. Fisher's exact test or the  $\chi^2$  test were used as applicable to compare the change in results.

**Results** In academic year 2015–2016, there were 11 (6%) instances where physicians were precontemplating on change, 43 (24%) instances where physicians were contemplating, 101 (57%) instances where physicians were preparing to make change, 18 (10%) instances where physicians were acting, and 4 (2%) of instances where a physician were maintaining previous changes. The following year, the numbers were: 15 (8%), 38 (21%), 82 (46%), 34 (19%) and 11 (6%), respectively. There were increases of physicians in stages of precontemplation ( $p=0.047$ ), action ( $p=0.02$ ) and maintenance ( $p=0.047$ ), a decrease in physicians that were in the stage of preparation ( $p=0.05$ ) and no significant change in the instances they were in a stage of contemplation ( $p=0.60$ ).

**Conclusion** Student QA projects appear to leverage physician readiness to improve guideline adherence. Future studies will determine if raising awareness through these clerkship projects results in practice behavioural change.

## INTRODUCTION

Training medical students and other upcoming healthcare professionals on how to conduct quality assurance (QA) activities is critical to ensuring that they will have the tools necessary to evaluate their own practice, keep current with guidelines and improve patient outcomes in the future. An article

published by the American Association for Family Physicians emphasises how important it has now become to integrate quality training in the curriculum of medical schools and other training facilities, to improve the quality of care we provide.<sup>1</sup> Recognising this need, several universities have implemented, or are in the process of implementing a QA component into their medical student/residency curricula, requiring students to learn about quality improvement (QI) and often times direct their own subsequent QI projects.<sup>2–4</sup>

Studies have shown that these QA/QI initiatives are well received by students as well as their mentoring physicians, and often times these projects have ultimately led to changes in the on practice of the physician. One study demonstrated that a medical student led QA/QI initiative in a primary care practice resulted in improved compliance to guidelines for annual serum potassium and creatinine monitoring for patients taking a diuretic, ACE inhibitor, or angiotensin receptor blocker.<sup>5</sup> Additionally, in her article 'Quality improvement teaching at medical school: a student perspective', Pooja Nair emphasises the need for QI training in medical schools after witnessing the positive change in practices that resulted from her own school's programme.<sup>6</sup> Required by her school's curriculum, students implemented QA/QI projects under the guidance of several physicians and provided feedback to their physicians on current provider compliance and safety issues. Post initiative, many student ideas were implemented in different clinical settings, speaking to the activities potential to create change in other practices in the future.

Undoubtedly as shown in the studies above, QA initiatives have the ability to impact physician practice in the short term. However,



current literature fails to examine whether or not providers continue to adhere to evidence-based practice post achievement of temporary practice goals. It also fails to examine the effectiveness of strategies geared towards coaching the provider into transforming his/her practice to support a culture of continuous QI. Having a culture of continuous improvement is important in any practice, since guidelines are consistently being updated and changed due to new research findings.<sup>7</sup>

In recent years, the Department of Family Medicine at Rutgers New Jersey Medical School has implemented a required QA project as a part of their 5-week medical student clerkship, which requires every student to conduct an analysis to determine how often their assigned practice is adhering to the latest guidelines in a given area.<sup>8</sup> Originally intended as a purely educational initiative, it was observed often times that physicians would implement change into their practice following these individual QA projects. These clerkships are repeated throughout the academic year over eight rotations. In the following study, we retrospectively aim to determine if these repeated student QA projects have the potential to cause an evolution of provider mindset over time, consequently introducing a culture of continuous QI into practice.

## METHODS

Rutgers, New Jersey Medical School, Department of Family Medicine has historically conducted a clerkship that has assigned third-year medical students to family medicine practices, to be mentored by the attending physician. Students practice the basics of conducting a patient history and physical exam, diagnosing and development of a treatment plans. In addition to being taught the importance of a patient-centred home, during their 5-week stay at the practice, students become a part of that home, developing relationships with their attending physician, and with other staff and practice personnel.

There are 8 rotations of 20–25 students each who are placed in one of 45 family medicine practices during each academic year. Often practices may accept multiple students over the course of a year.

In academic year 2015–2016, a modification was introduced into the curriculum, requiring students to conduct a QA project during the duration of their stay at the practice. Originally intended as purely an educational initiative for third-year medical students, requiring students to learn the importance of practising evidence-based medicine (EBM) and adhering to the latest guidelines, the QA project has de facto become an unintended interventional initiative, where students give their attending physician advice and propelling real-time change in their assigned practice through discussions on the findings of their QA projects. The project involves students selecting a topic of interest (ie, diabetes, hyperlipidaemia, women's preventative health, etc), researching the appropriate guidelines for that topic, conducting a chart review study to determine how often their assigned practice is performing

up to standards, and ultimately, presenting these results to their attending physician, or, preceptor, at the end of their clerkship rotation. The students are then required to summarise their project in a five-page report that is submitted to the clerkship director for a grade. As a part of their report, they were required to include a section describing the reaction of their attending physician to the QA results.

This study is a retrospective review of these sequential repeated QA projects and discussions with the preceptors and involves analysing the impact of raising awareness to practice compliance to guidelines on physician readiness to improve adherence over time. This was determined by reading the student–preceptor discussion section of each paper that was submitted in academic years 2015–2016 and 2016–2017. The preceptor's responses to the student's comments and feedback were examined and then categorised as one of the stages defined in James Prochaska's Transtheoretical Model of Behavioral Change.<sup>9</sup> Per the model, the conscious behavioural change occurs in a series of stages which include: precontemplation, contemplation, preparation, action and maintenance. The definitions of each of these stages were used to categorise each preceptor's response to the student's feedback and comments. For example, if a preceptor stated that he/she does not think the analysis is representative of his/her actual performance, per definition, we categorised him/her as being in a stage of precontemplation. If a preceptor acknowledged that there was a problem, but thought that there was little he/she could do to fix it, we categorised him as being in a stage of contemplation. After hearing the results, if a preceptor stated that he/she was going to start making changes soon, we categorised him/her as being in a stage of 'preparation'. Similarly, if a preceptor started making changes to his/her practice and/or behaviour immediately after the discussion with the student, we categorised him/her as being in a stage of action. If a preceptor was already doing well and was satisfied with his/her performance, we categorised that preceptor as being in a stage of maintenance. The preceptor's stage was the only data point that was collected from each paper and recorded.

After categorising each discussion, the proportion of out of the total number of discussions for that academic year was calculated and were used to determine if there was a statistically significant change between years. The  $\chi^2$  difference of proportions test and Fisher's exact test were used to calculate the significance between proportions as applicable.

## Patient and public involvement

This study is a retrospective review of deidentified medical student–physician conversations that occurred during the student's family medicine clerkship. There was no patient information or interaction that was documented in the student reports or conversations. The aim of the clerkship discussions however was to make physicians aware of their adherence to recommended guidelines with

the goal of making them improve adherence. Improved adherence to guidelines will ultimately improve patient care and patient outcomes. Since this was a retrospective review and reports were deidentified, the results cannot be disseminated to individual students or physicians.

## RESULTS

The objective of this study was to analyse the impact of repeated medical student QA clerkship projects on physician readiness to increase guideline adherence. The QA portion of the clerkship curriculum was implemented in academic year 2015–2016. There were a total of 45 physicians that participated in the clerkship between academic years 2015–2016 and 2016–2017. Among these 45 physicians, there were a total of 177 medical student/physician discussions that took place in academic year 2015–2016 and 167 discussions that took place in academic year 2016–2017.

Post discussion of the results regarding practice adherence to guidelines for academic year 2015–2016, we found that there were 6% of instances where physicians were in a stage of precontemplation, 24% of instances where physicians were in a stage of contemplation, 58% of instances where they were in a stage of preparation, 10% of instances when they were in a stage of action and 2% of instances where they were in a stage of maintenance. In academic year 2016–2017, the corresponding percentages were 8%, 21%, 46%, 19% and 6%, respectively. As shown in [table 1](#), in both academic years, physicians were least commonly in stages of precontemplation and maintenance, and most commonly in stages of contemplation and preparation post discussion of results.

[Table 1](#) also summarises the results of the  $\chi^2$  and Fisher's tests conducted to determine if there were significant changes in physician readiness to change between academic years 2015–2016 and 2016–2017. The results revealed that there were statistically significant improvements in the proportion of instances that providers were in states of precontemplation, action and maintenance between academic years 2015–2016 and 2016–2017 with p values of 0.05, 0.02 and 0.05 respectively. There was a statistically significant decrease in the proportion of instances providers were in a stage of preparation (p=0.05). There was not a statistically significant decrease

in the proportion of instances that providers that were in the stage of contemplation post discussion, with a p value of 0.60.

## DISCUSSION

Medical student/resident QA/QI stand-alone courses/projects have been traditionally used for educational purposes. In this study, we used QA projects as a means for engaging family physicians in a real-time discussion of their practice performance. Per our findings, there appears to be an impact on physician readiness to improve adherence to evidence-based practice post discussion, and these discussions may have increased physician readiness increased over time. Undoubtedly, taking into consideration other factors that may have influenced change in readiness over time (such as implementation of an EMR system, existing attempts to improve compliance that were in place in practice), based on our results (primarily, the fact that the proportion of preceptors that initiated making change to their practice post discussion with their students doubled from 10% to 19%), we believe that these findings may also have implications regarding the potential of medical student–physician engagements to making a difference in medical practice. We are particularly convinced that this change in behaviour can be largely attributed due to the QA discussions because there were no statewide common institutional changes implemented across the board.

There is strong evidence to support that practising EBM improves patient outcomes,<sup>10–12</sup> which makes the results of our study particularly important. Studies have demonstrated that following guidelines for treating patients diagnosed with chronic diseases such as hypertension and diabetes has improved outcomes in patients. Furthermore, it was shown that adhering to guideline-based practice has assisted patients in better managing their condition.<sup>13 14</sup> Yet, studies show that many physicians are often non-compliant with adhering to guidelines. For example, one study demonstrated that only 50% of all patients receive recommended preventative care.<sup>15</sup> More specifically, only about 30% of all eligible females obtain a recommended pap smear, 1 in 20 receive an annual mammogram and only 25% of all children receive recommended vaccinations.<sup>16</sup> In addition, only 60% of patients

**Table 1** Evolution in preceptor mindset between academic years 2015–2016 and 2016–2017

Stage as defined by Prochaska's transtheoretical model	Per cent of preceptor discussions in academic year 2015–2016 (n=177)	Per cent of preceptor discussions in academic year 2016–2017 (n=167)	P value
Precontemplation	6	8	0.047
Contemplation	24	21	0.60
Preparation	57	46	0.05
Action	10	19	0.02
Maintenance	2	6	0.047



receive recommended preventative care and 70% receive the recommended care for chronic conditions.

Studies show that there are several factors that influence provider non-adherence as well as provider unwillingness to improve adherence. Advocates of personalised medicine argue that practising standard medicine does not work because ‘one size does not fit all’.<sup>17</sup> Scholars have rebutted this argument clarifying that there is in fact not a distinction between the practice of standardised medicine and personalised medicine—personalised medicine becomes standardised medicine through increasing our knowledge base.<sup>18</sup> Due to the gap in understanding, this ongoing controversy can undoubtedly have an impact on the current practice of many physicians, as they may question the validity of being constrained through the practice of following standard guidelines.<sup>19</sup> Additional factors that may contribute to provider non-adherence include a lack of time, resources, cultural barriers, patient non-compliance and insurance issues, among many others.<sup>20</sup>

As aforementioned, in spite of the problems noted above and possible confounders (which could have possibly include institutional changes), there appears to be a strong possibility that the student/preceptor discussions have an impact since the proportion of instances of that physicians implemented change into their practice immediately post discussion of current practice compliance almost doubled from 10% in academic year 2015—16%–19% in academic year 2016–2017. It is unlikely that all of the change could have been attributed to confounders themselves since data were collected across several independent practices across New Jersey and there were no common institutional changes across practices that we were aware of during this time frame. We also found that there was a decrease in the proportion of instances that physicians were in a stage of preparation between academic years 2015–2016 and 2016–2017, possibly related to the significant increase in the proportion of physicians that were in the action stage. Furthermore, there was a statistically significant increase in the proportion of providers that implemented change and were in the process of trying to maintain that change in academic year 2016–2017.

It is also notable that there were very small percentages of providers that were in a stage of precontemplation post discussion of practice compliance in both academic years 2015–2016 and 2016–2017, 6% and 9%, respectively. This finding may be indicative of overall provider acknowledgement and acceptance of practice compliance issues, importance of the practice of EBM, as well as the concept of QA/QI in general. Alternatively, simply being reminded that there are guidelines and that students are assessing adherence may have been motivation for change.

It is notable, however, that the increase in the proportion of providers that were in a stage of precontemplation between academic years 2015–2016 and 2016–2017 is statistically significant. The primary reason for this could be that the topics students select for their QA analysis were not uniform over academic years. Consequently,

the introduction of new topics into practice can cause different triggers in mindset. For example, a physician who may have been in a stage of action in attempt to rectify compliance to guidelines for hyperlipidaemia may now be in a stage of precontemplation when introduced to another topic that they are performing poorly in. Despite the non-uniformity of topics, we still find that the proportion of providers in a stage of precontemplation in academic year 2016–2017 is much less than any of the proportion of providers that were in stages contemplation, preparation or action, indicating that the QA projects have the potential to leverage providers to becoming more guideline adherent, irrespective of topic. Thus, the reported effect of raising awareness to guideline adherence or lack of guideline adherence thereof appears to be in and of itself sufficient to make preceptors more aware of guidelines and ready to make change in their practice. This effect is even more robust since it appears to be independent of specific topics.

The results of this study suggest that raising awareness to practice compliance issues through providing sequential real-time data can trigger physician readiness to increase compliance, and also suggest that providers are receptive to medical student feedback and suggestions. It demonstrates that making physicians aware of their performance can have the potential to encourage them to make conscious change in their practice, and that their willingness can increase over time. In other studies, it has also been shown that raising awareness to physician performance through the use of the EMR, the clinical decision support system, and practice facilitation has led to increased compliance in guidelines and patient outcomes.<sup>12 21 22</sup> Student-led QA initiatives can be an inexpensive method through which physician readiness to change current practice can be facilitated, while at the same time, training our current as well as future providers to be self-sufficient by teaching them about the tools they need to ensure that they are following a guideline compliant practice. As shown in a previous study, physicians agree that the clerkship effectively teaches students about how clinical care is supposed to be delivered, and it also provides physicians with tools and the skills they need to start their own QI initiatives in practice, speaking to a future of hope and quality care in practice.<sup>23</sup> In this review, we also found that many of the students mentioned in their discussion summaries that physicians had implemented a practice modification, as suggested by a prior student, indicating that these student-driven projects can introduce a culture of continuous QI into practice over time.

Future studies are needed to determine if physician readiness to change is directly associated with improved physician guideline adherence and subsequent improved patient outcomes. In addition, long-term studies may examine the impact of these QA/QI stand-alone courses or clerkship projects on the practice of our future physicians postgraduating from their medical school, residency or fellowship programme.

## Study limitations and future direction

First of all, one of the major limitations of this study is that data were only collected and compared between academic years 2015–2016 and 2016–2017. We would need to compare the results over several years in order to further support and strengthen any possible conclusions drawn from this study. Also, for the purposes of this study, we did not track changed behaviour from year to year in respect to specific topics, as our goal was to show that the reported effect was independent of topic. Additionally, this manuscript does not speak to change in actual adherence or improvement in patient outcomes, which is the ultimate goal of QA/QI. Yet, this analysis is important because it speaks to physician potential for improvement—possibly in cases where there was once a lack of appreciation for or interest in being compliant with the latest guidelines.

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**Data availability statement** Data are available upon reasonable request. Data available are deidentified data with each preceptor's mindset as characterised by Prochaska's readiness to change model for both academic years 2015–2016 and 2016–2017. Data availability is contingent on specific request per author's discretion. Please email [cramdin@njms.rutgers.edu](mailto:cramdin@njms.rutgers.edu) with a specific request for further details regarding availability and release.

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