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Vaccine administration by pharmacy technicians: Impact on vaccination volume, pharmacy workflow and job satisfaction

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ABSTRACT

Background: Immunizing pharmacy technicians (IPTs) have become more prevalent in recent years, but their impact on community pharmacy practice has yet to be determined.

Objectives: Determine the impact of implementing IPTs on vaccination volume in a community pharmacy chain and assess pharmacy staff's perspectives on the clinical abilities of IPTs and their impact on pharmacy workflow and job satisfaction.

Methods: Retrospective data analysis comparing the number of vaccines administered in a supermarket pharmacy chain from September to March 2019–2020 and 2020–2021 in pharmacies with IPT(s) versus those without IPT(s). For the secondary objective, investigators developed and deployed two role-based mixed quantitative/qualitative surveys among pharmacy staff.

Results: Pharmacies with IPT(s) observed a greater mean increase in vaccination volume from 2019–2020 to 2020–2021 versus those without IPTs (+159.35 vs. +104.57, $p = 0.011$). Among IPT survey respondents, 50/75 (66.7%) felt more satisfied with their job after receiving immunization training. Among pharmacist respondents, 80/119 (67.3%) felt that IPTs positively impacted their job satisfaction and 61.7% felt that pharmacist clinical services were either somewhat positively affected, or positively affected.

Conclusion: Implementing IPTs can increase the volume of vaccines administered in a chain pharmacy and may positively affect job satisfaction and pharmacy workflow.

1. Introduction

The role of the pharmacy technician in the United States (U.S.) has evolved significantly in recent years, from longstanding responsibilities such as prescription data entry, filling, and inventory management to emerging roles such as point of care testing, managing clerical aspects of patient care services, and continuous quality improvement initiatives. Despite the challenges brought on by this evolution, technicians demonstrated favorable attitudes, willingness, and self-efficacies towards performing several of these advanced roles.^{1,2} In October 2020, as part of the fourth amendment to the Public Readiness and Emergency Preparedness (PREP) Act for Medical Countermeasures Against

COVID-19, which provides liability immunity for the administration of medical countermeasures against certain diseases, the U.S. Department of Health and Human Services formally recognized pharmacy technicians as personnel capable of vaccine administration, and outlined the regulatory and training requirements to become a 'qualified' pharmacy technician under this Act. These requirements include that technicians must be licensed and/or registered in the state where they practice (if the state does not require licensure or registration, the technician must be certified by the Pharmacy Technician Certification Board or National Healthcareer Association), complete an Accreditation Council for Pharmacy Education (ACPE)-approved practical training program, have a current certificate in basic cardiopulmonary resuscitation, complete a

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minimum of two hours of ACPE-approved, immunization-related continuing pharmacy education during each licensing period, and inform families of the importance of well-child visits when vaccinating patients ≤ 18 years of age.³ As a result of the new guidance, immunizing pharmacy technicians (IPTs) have rapidly become more prevalent in both chain and independent community pharmacies. Despite this, few studies exist assessing the impact of implementing IPTs in community practice. One study reported successfully training twenty-five IPTs that subsequently administered 953 vaccines in community pharmacies from December 2016 to May 2017.⁴ Another report showed that just seven IPTs administered over 4800 vaccinations in one year to underserved patients at an Indian Health Service federal facility.⁵ Previous studies^{6,7} have stated the importance of assessing the potential of IPTs to impact community pharmacy practice on areas such as vaccination volume and pharmacy workflow, however, to date, no such study exists.

In the summer of 2020, clinical pharmacy specialists at a large supermarket pharmacy chain partnered with faculty at an affiliated college of pharmacy to develop an ACPE-accredited certificate training program in immunization administration for pharmacy technicians. The program, titled “Moving the Needle: Immunization Training for Pharmacy Technicians,” was designed to meet the training requirements of the PREP Act guidance and consists of three components: an online self-study (including a post-test knowledge assessment), a virtual live training session, and an in-person injection technique assessment. A brief description of the design and content of the training program is shown in Fig. 1.

From August to October 2020, a total of 238 technicians from 129 different pharmacy locations in Michigan and Illinois successfully completed the program and began administering vaccines under the supervision of qualified pharmacists. The primary objective of this study was to determine the impact of implementing IPTs on the amount of vaccines administered in a subset of chain community pharmacies in comparison to pharmacies in the same chain that did not implement IPTs. The secondary objective was to assess the pharmacy staff’s perspectives on the clinical abilities of IPTs and their impact on pharmacy workflow and job satisfaction.

2. Methods

For the primary objective, the total number of vaccines administered across all company pharmacies were tabulated during the timeframes of September 16, 2019 to March 1, 2020 (2019–2020) and September 16, 2020 to March 1, 2021 (2020–2021) by accessing the company’s electronic internal vaccine administration records database. These timeframes were selected to reflect the time periods by which pharmacies typically administer a higher volume of vaccines (seasonality of influenza and other respiratory infections). The mean increase in vaccines administered in the 2019–2020 period versus the 2020–2021 period were compared between IPT pharmacies (defined as pharmacies that employed at least one IPT during the 2020–2021 time period) versus non-IPT pharmacies (defined as pharmacies that did NOT employ any IPTs during the 2020–2021 time period). Mean increases were compared using an independent samples *t*-test (IBM SPSS Statistics version 28.0.1.1). The null hypothesis was that a larger mean increase in vaccination volume would occur in IPT pharmacies, thus a one-sided alpha was chosen with significance set at $p < 0.05$.

For the secondary objectives, study investigators created two role-based mixed quantitative/qualitative surveys (one assigned to IPTs and the other assigned to pharmacists) designed to assess the pharmacy staff’s perspectives on the impact of implementing IPTs on pharmacy workflow and job satisfaction. The IPT survey (Appendix A) consisted of seventeen questions that assessed work location, Pharmacy Technician Certification Board status, years of experience as a pharmacy technician, and average number of hours worked per week as independent variables, and job satisfaction, pharmacy workflow, direct patient care, and training as dependent variables. The pharmacist survey (Appendix B) consisted of nine questions that assessed work location as the sole independent variable, and job satisfaction, pharmacy workflow, training, and comfort with IPTs as dependent variables. The surveys were built using the Qualtrics® internet-based electronic survey platform. Prior to release, each survey was piloted by four volunteers (IPT survey taken by one layperson and one pharmacy technician, pharmacist survey taken by two pharmacists) who were excluded from the study. These volunteers provided feedback and suggested changes to the wording of the survey questions and overall flow of the survey for clarity. Links to each

1. Self-Study

- Module 1: Vaccines Overview
- Module 2: Vaccine Handling and Storage Requirements
- Module 3: Communicating and Collaborating with the Delegating Pharmacist
- Module 4: Vaccine Provision
- Module 5: Post-Vaccination Procedures and Regulatory Compliance

2. Self-Study Exam

- Twenty multiple choice questions, must score at least 70%, maximum of two attempts

3. Live Training

- Webinar with active learning exercises designed to apply concepts learned from self-study
- Demonstration of vaccine preparation, intramuscular (IM) and subcutaneous (SQ) injection technique

4. Injection Technique Assessment (ITA)

- Learners administer two IM and one SQ injections of 0.9% sodium chloride to a live patient under supervision of immunization-trained pharmacist
- Learners document administrations on an ITA form signed by assessing pharmacist and submit to program faculty to obtain continuing education credit and certificate of completion

Fig. 1. Moving the Needle: Immunization Training for Pharmacy Technicians – Program Design and Content.

survey were distributed to pharmacists and technicians via company email and made available to complete from March 5 to May 22, 2021, during which time three reminders to take the survey were emailed to eligible respondents.

Inclusion criteria for participation in the IPT survey were as follows: at least eighteen years of age, successfully completed all components of the immunization training program, and authorized to administer vaccines during the study's 2020–2021 time period. Only pharmacists who had supervised at least one IPT were eligible to complete the Pharmacist survey. Completion of the survey was voluntary, not incentivized, and failure to complete the survey had no effect on eligible participants, employment or otherwise. Likert-type questions were categorized for overall agreement and positive effect if respondents selected "agree" or "strongly agree" and "somewhat positively affected" or "positively affected," respectively. Survey results were analyzed using descriptive statistics. The project's protocol received institutional review board approval as an expedited research study (protocol number IRB-20-10-2860).

3. Results

3.1. Impact on vaccination volume

Of 252 total pharmacies in the chain, 129 were deemed IPT pharmacies and 118 deemed Non-IPT pharmacies based on the criteria described in the Methods section. Five pharmacies were removed from the analysis due to being constructed after the start of the 2019–2020 study time period. Overall, IPT pharmacies observed a mean increase of 159.35 vaccines administered in the 2019–2020 vs. 2020–2021 time period in comparison to a mean increase of 104.57 observed in non-IPT pharmacies ($p = 0.011$). IPT pharmacies also observed a greater mean percent increase in vaccines administered in the same time period comparison (15.74% vs. 13.08%), though this difference was not found to be statistically significant ($p = 0.135$).

3.2. IPT survey

The response rate for the survey among IPTs trained in August or September 2020 was 31.5%. Pertinent demographic data among the 75 eligible survey respondents is shown in Table 1. Two-thirds (66.7%) of IPTs selected "agree" or "strongly agree" when asked whether they were more satisfied with their role as a pharmacy technician now that they had been trained to provide immunizations. Seventy-three percent felt that being able to provide vaccines increased their chance of being hired elsewhere in the healthcare field. In addition, 78.7% felt more essential as a pharmacy healthcare worker and 84% felt they had a greater impact on patients as a healthcare worker. IPTs were asked how the

Table 1

Characteristics of IPT survey respondents. *Percentages based on total respondents (75).

Demographics	Number of respondents (%)
Location (n = 75)	
Michigan	70 (93.3%)
Illinois	5 (6.7%)
Certified Pharmacy Technician (n = 72*)	
Yes	45 (60%)
No	27 (36%)
Years of Experience Prior to Training (n = 72*)	
< 2 years	8 (10.6%)
2 to <5 years	18 (24%)
5 to <10 years	20 (26.7%)
10+ years	26 (34.7%)
Hours worked weekly on average (n = 72*)	
< 16 h	3 (4%)
16 to <32 h	3 (4%)
32+ h	66 (88%)

implementation of technician-provided immunizations have affected various pharmacy workflow tasks – results are shown in Fig. 2.

Regarding the training program, IPTs were asked to rank six skill areas in which they would want more training (1 representing highest priority, 6 representing lowest priority). The most common area IPTs ranked first at 48.3% of responses was "overall vaccine knowledge," followed by "recognizing adverse events" (26.7%), "vaccine preparation" (16.7%), "communicating with the patient" (5%), vaccine administration (3.3%), and lastly, "communicating with the pharmacist" (0% ranked first, 50% ranked last).

3.3. Pharmacist survey

One-hundred and twenty-four survey responses were collected from pharmacists, of which 119 respondents were eligible. Five respondents reported that they had not worked with or supervised an IPT during the 2020–2021 study period, thus were excluded. The response rate for the survey was approximately 21%. Responses came from pharmacists practicing in the states of Michigan (83%) and Illinois (17%).

Pharmacists were asked how the implementation of technician-provided immunizations have affected various pharmacy workflow tasks – results are shown in Fig. 3. Pharmacists were also asked how IPTs have impacted their overall job satisfaction, 32.8% selected "very positively," 34.5% selected "positively," 13.4% selected "neutral," 0.8% reported "negatively," and zero respondents selected "very negatively." Twenty-two (18.4%) of respondents did not select an answer. Among respondents who answered the question, 82.5% selected "very positively" or "positively."

4. Discussion

In this study, pharmacies that implemented at least one IPT observed a larger mean increase in number of vaccines administered from the 2019–2020 to the 2020–2021 study time period, in comparison to pharmacies that did not employ at least one IPT. However, when the mean percentage increase of vaccines administered were compared, the difference was not found to be statistically significant.

The survey results suggest that offering immunization training for technicians and providing a work environment that utilizes IPTs may increase technicians' professional satisfaction and improve pharmacy workflow productivity. This study is relevant to community pharmacy practice in several ways. Whereas the feasibility of technician-administered vaccines has been established in the literature,^{4,5} this is the first study to our knowledge that compares the volume of vaccines provided within a chain community pharmacy in locations with versus without IPTs. With regard to the literature surrounding the study's secondary objective, some have assessed technician willingness to perform clinical tasks such as vaccine administration² as well as current opinions of both pharmacists and technicians regarding IPTs in practice.^{8–10} For example, Bertsch, et al. performed a series of semi-structured interviews among nineteen pharmacists from a single pharmacy chain in Idaho who supervised at least one IPT.¹⁰ In this study, pharmacists expressed that IPTs were properly trained in vaccine administration, but also expressed the importance of selecting appropriate technician candidates for training as well as the occasional need for additional training for certain technicians.¹⁰ These findings are further supported by the results of the current study and emphasizes the concept that some technicians may require additional guidance and support prior to performing certain tasks independently.

Interestingly, while this manuscript was in progress, McKeirnan et al. published an article in May of 2023 outlining the results of fifteen key informant interviews conducted among IPTs in Idaho. All IPTs interviewed in the study reported "improved job satisfaction and feelings of being a valuable member of the pharmacy team" as well as beliefs that the concept of IPTs aided in pharmacy workflow.¹¹ The current research complements these interviews by adding supportive survey evidence of

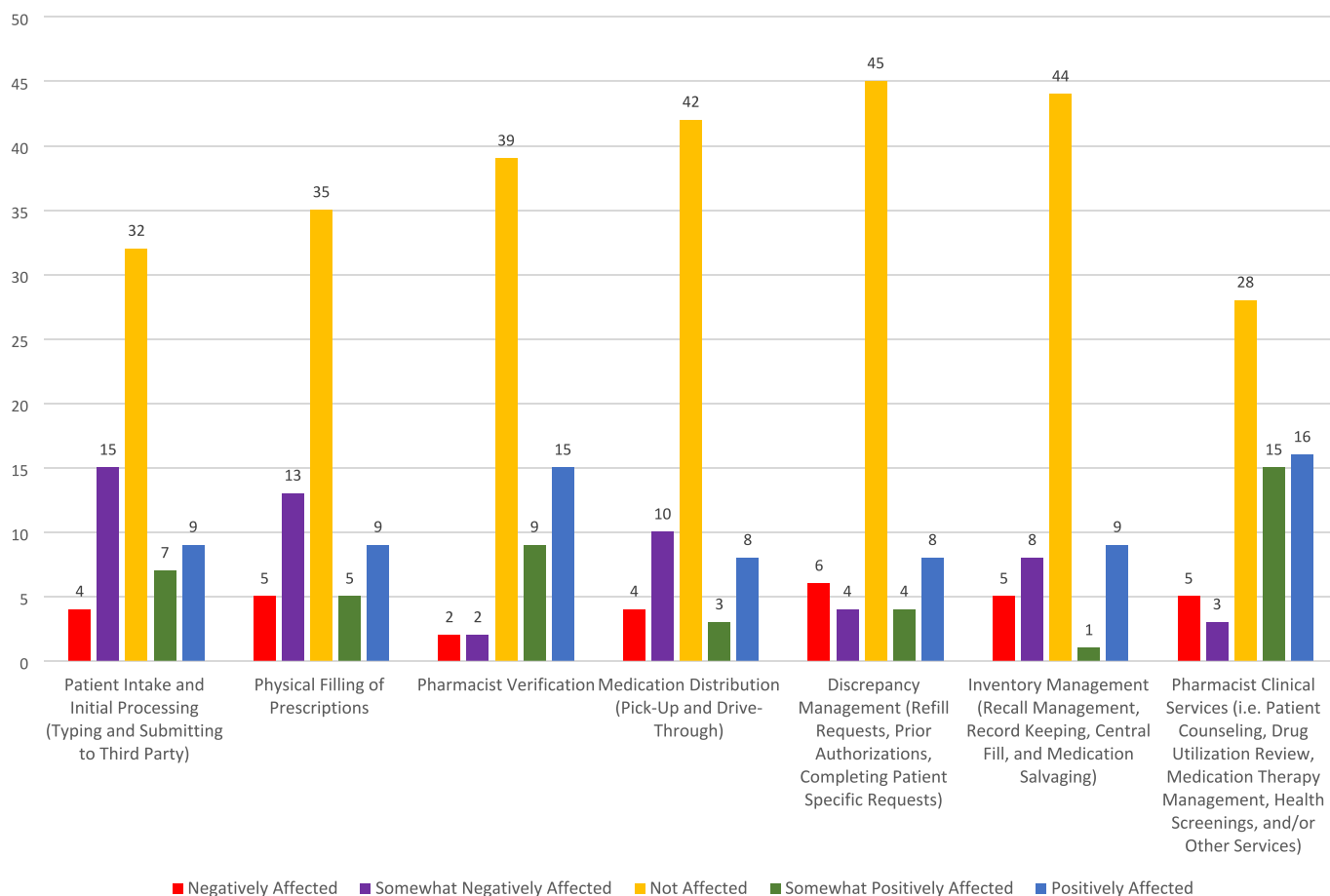


Fig. 2. IPTs' attitudes towards the impact of IPTs on pharmacy workflow tasks (n = 67).

IPTs' attitudes and beliefs in these areas and provides new insight in areas such as IPTs' opinions on their marketability in the healthcare workforce as well as their impact on patient care.

While novel in these ways, this study has several limitations. With regard to the primary objective – there were several variables that need to be considered when assessing the change in vaccination volume. First, the U.S. Food and Drug Administration's Emergency Use Authorization of the first COVID-19 vaccines in December of 2020 resulted in a large influx of patients receiving said vaccine at all pharmacies, which continued to increase as eligibility requirements expanded during the 2020–2021 study period. Though an attempt to account for this was made by comparing mean increase in vaccines administered between the time periods of 2019–2020 versus 2020–2021 (as opposed to raw number of vaccines), the larger mean increase observed by IPT pharmacies could have been a result of shifts in population demand for the COVID-19 vaccine as well as other vaccines that protect against respiratory illnesses. With that said, the same comparison using more recent and epidemiologically similar timelines such as 2021–2022 versus 2022–2023 may provide a more accurate depiction of the impact of IPTs on vaccination volume. Other variables unaccounted for which may have impacted vaccination volume within pharmacies include fluctuation in weekly prescription volume and non-vaccination-based clinical services provided, fluctuation in the number of full-time and/or part-time IPTs working at each pharmacy on a daily basis, and the variance in initial distribution of COVID-19 vaccines among pharmacies during the 2020–2021 study period.

With regard to the secondary objective, perhaps the most impactful limitation is the fact that the study used two non-validated, investigator-created surveys. Other key limitations needing mention include relatively low response rates for both surveys and the conduction of the

survey among employees of a single supermarket-based community pharmacy chain located in the Midwestern U.S., restricting internal and external validity, respectively. In addition, it is important to note that the opinions expressed in the surveys represent those of pharmacists and IPTs with just over six months of experience practicing in the pharmacy chain with the implementation of IPTs. It is unknown whether opinions would be significantly different given a longer period of time practicing with IPTs.

As mentioned above, there is much more to be learned and additional research is needed to more accurately assess the impact of IPTs. This study may encourage other pharmacy professionals to investigate similar outcomes on a larger scale and explore the impact of IPTs on different aspects of pharmacy and public health.

5. Conclusions

This study demonstrates that implementing IPTs can increase the volume of vaccines administered in a chain pharmacy and may positively affect job satisfaction and pharmacy workflow.

CRediT authorship contribution statement

Neil Kenneth Miran: Conceptualization, Methodology, Investigation, Data curation, Writing – original draft, Writing – review & editing, Visualization, Project administration. **Bonnie DeLor:** Conceptualization, Methodology, Validation, Writing – original draft, Writing – review & editing, Supervision, Project administration. **Michelle Baker:** Resources, Writing – review & editing, Supervision. **Joy Fakhouri:** Writing – review & editing. **Kyle Metz:** Writing – review & editing. **Eleonora Huskey:** Writing – review & editing. **Paul Kilgore:** Validation, Data

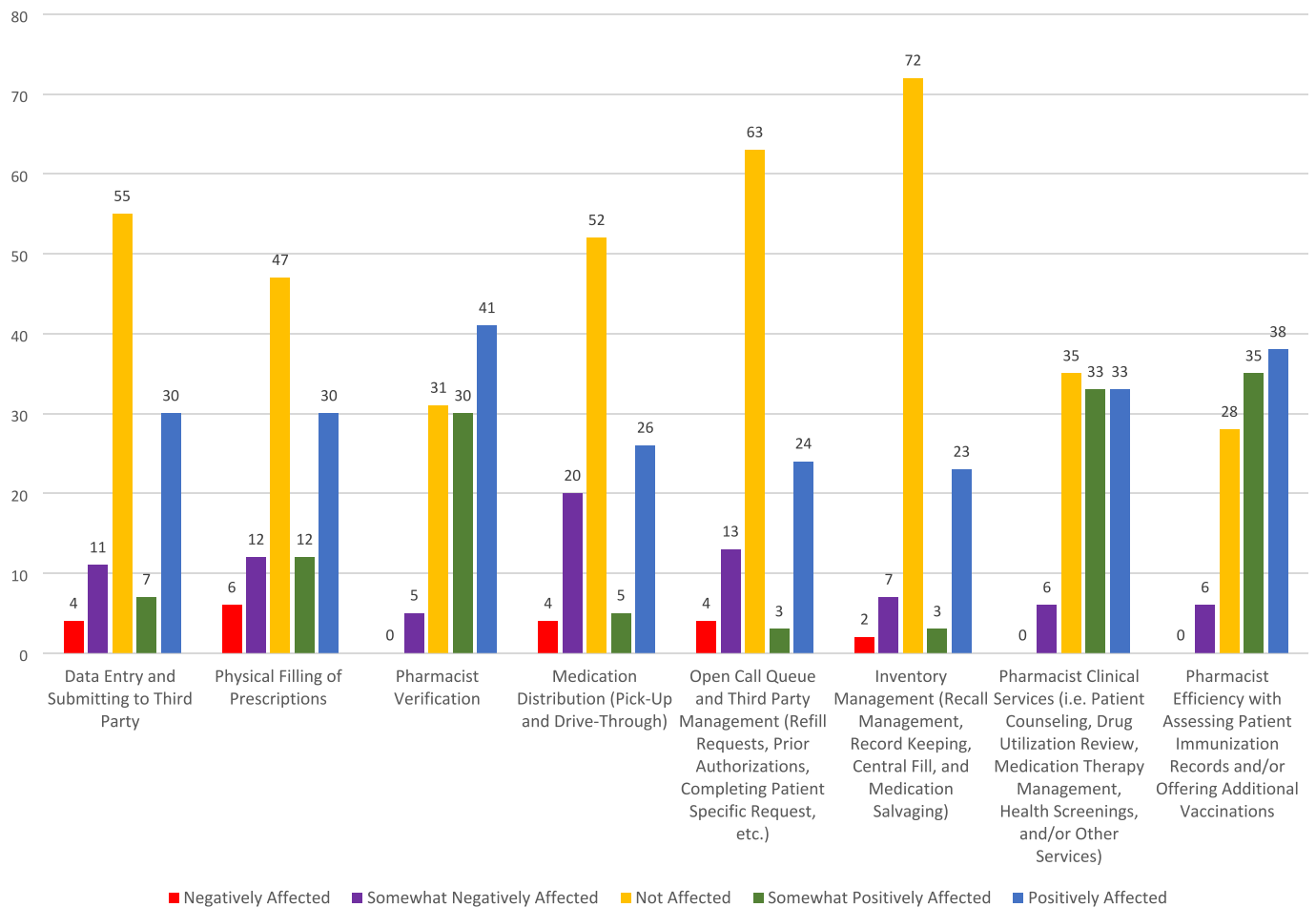


Fig. 3. Pharmacists' attitudes towards the impact of IPTs on pharmacy workflow tasks (n = 107).

curation, Writing – review & editing. **Joseph P. Fava:** Conceptualization, Methodology, Validation, Formal analysis, Investigation, Resources, Data curation, Writing – original draft, Writing – review & editing, Visualization, Supervision, Project administration.

Declaration of Competing Interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests. Bonnie DeLor is an employee and shareholder of Pfizer Inc.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.rcsop.2023.100397>.

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