Cross-sectional description of hospital pharmacy services in Puerto Rico in 2022 using the Practice Advancement Initiative 2030 Self-Assessment Tool

Idaliz Rodríguez-Escudero, PharmD, MS, Department of Pharmacy Practice, School of Pharmacy, University of Puerto Rico, San Juan, PR, USA

Glorimar Bonilla-Medina, PharmD, Department of Pharmacy Practice, School of Pharmacy, University of Puerto Rico, San Juan, PR, USA

Janice Cabrera-Martínez, PharmD, Department of Pharmacy Practice, School of Pharmacy, University of Puerto Rico, San Juan, PR, USA

Víctor Cintrón-Zayas, PharmD, Department of Pharmacy Practice, School of Pharmacy, University of Puerto Rico, San Juan, PR, USA

Purpose: The American Society of Health-System Pharmacists (ASHP) developed the Practice Advancement Initiative 2030 (PAI 2030) to support the continuous improvement of hospital pharmacy services in the United States. Puerto Rico (PR) hospitals' level of compliance with PAI 2030 recommendations is not currently known. The primary objective of this study was to describe the hospital pharmacy scenario in PR in the 5 areas addressed in PAI 2030 recommendations.

Summary: Through a collaboration between the state affiliate, a school of pharmacy, and ASHP, completion of the PAI 2030 Self-Assessment Tool was promoted among hospital pharmacy directors between August 2022 and March 2023. A total of 18 out of 66 hospitals completed the survey. The results were compared with national data provided by ASHP from 163 US hospitals. Areas where PR hospitals rated high were in PAI 2030 domain A (Pharmacy Technician Role, Education, and Training) and domain E (Pharmacist Leadership in Medication Use and Safety). PR hospitals rate their performance lower in domain A (Patient-Centered Care) and domain B (Pharmacist Role, Education, and Training). Specific focus areas for improvement by PR hospitals include pharmacist participation in medication reconciliation, 24/7 access to advanced clinical pharmacy services, expansion of the pharmacist's scope of practice, and training through the Board of Pharmacy Specialties and residency programs.

Conclusion: This study illustrates how the PAI 2030 Self-Assessment Tool can be used to benchmark pharmacy services at the state level. We suggest that changes are needed to close the gap between hospital pharmacies working towards optimizing the role of pharmacists in healthcare systems and those still struggling with dedicating staff to well-recognized pharmacist roles and responsibilities.

Keywords: hospital pharmacy services, pharmacists, pharmacy practice, pharmacy technicians, practice advancement

Am J Health-Syst Pharm. 2025;82:81-98

Address correspondence to Dr. Rodríguez-Escudero (idaliz.rodriguezescudero@upr.edu).

https://doi.org/10.1093/ajhp/zxae220

The American Society of Health-System Pharmacists (ASHP) Practice Advancement Initiative (PAI) was developed to guide the transformation of health-system pharmacy practice into the future.[1] PAI 2030 provides 59 recommendations for the acute care and ambulatory-care settings to progress by the year 2030. These recommendations foster optimal, safe, and effective use of medications through deployment of pharmacists as direct patient care providers.

In 2021, ASHP launched the PAI 2030 Self-Assessment Tool to encourage institution- and state-wide involvement with PAI. By August 2022, in Puerto Rico (PR), a territory of the United States, only one hospital had completed the online PAI 2030 Self-Assessment. Moreover, the status of hospital pharmacy services in PR had most recently been described in 2006.[2] The scarce available literature regarding hospital pharmacy in PR points to a

limited role of the pharmacists in the patient care process.[2,3] Consequently, the state of hospital pharmacy services in PR is largely unknown.

The PR ASHP state affiliate wanted to investigate the level of adherence of PR hospitals with PAI 2030 recommendations as a starting point for future educational and policy agendas. A similar effort was conducted in North Carolina before the PAI 2030 Self-Assessment Tool was launched.[4] In order to improve the response rate to PAI 2030, a member of the Puerto Rico Health-Systems Commission recruited doctor of pharmacy students enrolled in a capstone project course for development of this study. The objective of this study was to describe hospital pharmacies in PR in the 5 PAI 2030 domains: Patient-Centered Care; Pharmacist Role, Education, and Training; Technology and Data Science; Pharmacy Technician Role, Education, and Training; and Leadership in Medication Use and Safety. Knowing the status of the island's hospital pharmacy settings will allow for benchmarking with the United States and will give the state affiliate the opportunity to tailor future strategies to meet identified needs.

KEY POINTS

- Collaboration between a state affiliate, a school of pharmacy, and ASHP can help increase response to the PAI 2030 Self-Assessment Tool.
- The PAI 2030 Self-Assessment Tool can be used by state affiliates to describe the status of local hospital pharmacy services and identify areas of need.
- Pharmacists in Puerto Rico must increase their participation in transitions of care, patient education, and clinical decision-making to achieve the goals of PAI 2030, as well as foster further professional development of pharmacy practitioners through residency training and board certification.

Survey methodology

This study had an observational, cross-sectional design. All PR hospitals with a pharmacy department and inpatient services were invited to participate. Facilities providing exclusively ambulatory care services and long-term care facilities were excluded. A list of hospitals and pharmacy department contact numbers were obtained from the Puerto Rico Hospitals Association website (hospitalespr.org) and the Puerto Rico Pharmacists Association. Investigators identified 66 acute care hospitals that fulfilled the inclusion criteria.

A mixed-mode method of contact by telephone and email was used. Starting August 2022, investigators contacted all pharmacy departments by phone, briefly introduced the study, and requested the pharmacy director's email address. We were able to establish contact with 48 pharmacy departments. An email was sent with the link to the PAI 2030 questionnaire (https://pai2030tool.ashp.org/).

Participants were given detailed instructions, with screenshot images, on how to access the questionnaire. They were asked to choose "official" as the type of assessment, so that the information provided would represent an official response from their institution, and "organization" as the perspective from which they would complete the assessment. Seven days later, a reminder email was sent, with a repeat reminder sent after 2 weeks. Based on response rate, as determined by access to data by ASHP collaborators, further follow-up occurred at monthly intervals. Additionally, fourth professional year pharmacy students from the University of Puerto Rico voluntarily collaborated in reminding hospital pharmacy directors to complete the assessment while on their advanced pharmacy practice rotations. Data collection ended in March 2023.

The assessment consists of 47 questions if the organization track is selected. The number of questions per domain is 16 in domain A (Patient Centered Care), 7 in domain B (Pharmacist Role, Education and Training), 8 in domain C (Technology and Data Science), 6 in domain D (Pharmacy Technician Role, Education and Training), and 10 in domain E (Leadership in Medication Use and Safety). If the practitioner track is selected, the assessment excludes 12 questions that relate to aspects of the health system as a whole. These are 5 questions from domain A (A8 parts 1, 2, 11, 12, and 13), 2 from domain B (B4 and B5), 1 from domain D (D5), and 4 from domain E (E5, E7, E8, and E9). Also, questions A6, A7, A14, and D1 are subdivided in the organization track into 7 settings of care: inpatient setting, outpatient setting, ambulatory care clinic, emergency department, long-term care, home infusion, and specialty care clinics. These 4 questions are not subdivided in the practitioner track. For further details about the instrument, please refer to the PAI 2030 website (pai2030tool.ashp.org).

The final data set for analysis included data from the PAI 2030 Self-Assessment Tool, stratified by ASHP staff in two categories: PR and US. ASHP provided the unidentified data in aggregated form. Frequencies were transformed to counts for statistical analysis. Data transformation was independently confirmed by two of the authors. In addition, the transformed data was validated against the original dataset to ensure that the transformation process had been carried out correctly. This was done by comparing the summary statistics provided by the statistical tests against the original aggregated data to detect any discrepancies or errors. Descriptive statistics were used to describe PR and US hospital performance in each domain. Inferential analysis was executed to compare PR and US hospitals' performance for specific items of interest. Ordinal scale questions were analyzed using a Mann-Whitney *U* test. Nominal items were analyzed with Fisher's exact

test. The a priori level of significance was set at 0.05. Analyses were conducted using Jamovi (version 2.3.26; The jamovi project, Sydney, Australia).

Results

A total of 18 PR hospitals completed the PAI 2030 Self-Assessment survey: 13 in the organization track and 5 in the practitioner track. The total sample represents 27% of the 66 eligible PR hospitals. However, as detailed above, because the practitioner track has fewer questions, some items had a reduced number of respondents accounting for 20% (13 of 66) of all eligible PR hospitals. Most of the participating institutions (n = 17, 94%) were medium to small in size and located in urban areas (Table 1). Data from 163 US hospitals nationwide was used for comparison, although US hospital characteristics were not provided. Selected results for PR hospitals and the US comparator data set are found in Appendix A. Results for the subset of respondents who chose the organization track (n = 13 rather than n = 18), are specified in the following sections.

Domain A: Patient-Centered Care. Patients have access to a pharmacist in inpatient settings always or most of the time in 46% (n = 6/13) of PR hospitals, compared to 85% in the US ($P = 0.0004$). In other hospital areas, patient access to a pharmacist is even lower. Only 3 of 11 PR hospitals (27%) provide pharmacist access within the emergency department, compared to 65% of hospitals in the US sample ($P = 0.0283$). Other settings such as outpatient pharmacy, ambulatory clinic, and home infusion were not considered based on limited availability in most of the participating PR hospitals.

While 31% of PR hospitals reported no advanced clinical pharmacy services (vs 6% of hospitals in the US sample, $P < 0.0001$), most have clinical services at least 8 hours per day, 5 days per week (Table 2). A majority of PR hospitals (77%, n = 10/13) grant the pharmacy workforce complete or mostly complete access to patient medical records in inpatient settings (vs 98% of hospitals in the US sample, $P = 0.0187$). Pharmacists document patient care activities in 72% of PR hospitals (vs 95% of hospitals in the US sample, $P < 0.0001$), and that information is accessible to other professionals within the healthcare system but not to external providers (Table 2). When asked about pharmacists leading comprehensive medication management in the inpatient setting, 85% of PR respondents (n = 11/13) indicated always or most of the time, compared to 87% of hospitals in the US sample ($P = 0.1501$; Figure 1).

PR hospitals indicate that the pharmacy workforce collaborates with healthcare professionals (65% of PR hospitals vs 76% of hospitals in the US sample; $P = 0.3669$) and patients (53% of PR hospitals vs 57% of hospitals in the US sample; $P = 0.2772$) in establishing models for seamless transitions of care always or most of the time. Medication reconciliation is performed by either pharmacists, technicians, interns, or student pharmacists in 24% of hospitals' emergency departments, 50% of inpatient wards upon admission, and 11% of inpatient wards upon discharge (corresponding figures for hospitals in the US sample are 66%, 73%, and 63%, respectively) (Figure 2). When asked if medication education for patients and caregivers is led by pharmacy staff, none of the 18 participating hospitals reported that happens always, and only 33% reported it occurs most of the time (9% of hospitals in the US sample provide pharmacist-led medication education always and 19% provide it most of the time; $P = 0.1867$) (Figure 1).

Domain B: Pharmacists' Role, Education, and Training. The results of two questions that assess the pharmacist's scope of practice revealed a broader scope in the US. In 33% of PR hospitals, pharmacists have some type of prescribing authority, either through a credentialing and privileging process or through protocols. This proportion was greater in the US hospital sample, with 79% having

Table 1. Characteristics of Surveyed Hospitals in Puerto Rico (N = 18)

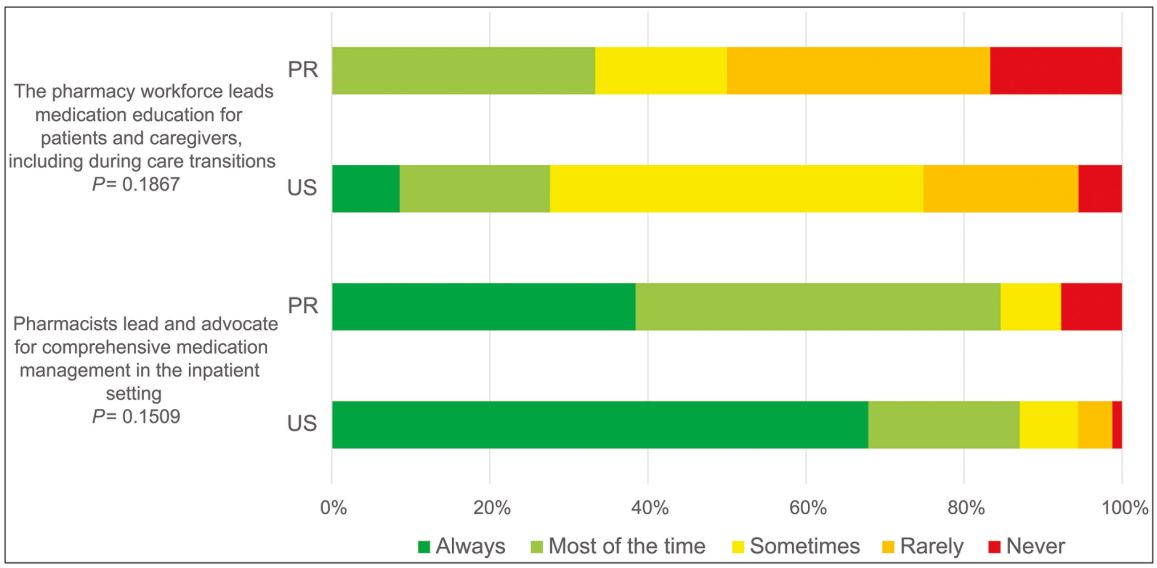
	No. (%)
No. of hospital beds	
<100	6 (33)
100-499	11 (61)
≥500	1 (6)
Region	
Urban	13 (72)
Rural	4 (22)
Suburban	1 (6)
Ownership	
For-profit	8 (44)
Non-profit	7 (39)
Government	3 (17)
Respondent's role in the organization	
Director of pharmacy	15 (83)
Other	3 (17)
Residencies	
Medical	6 (33)
Pharmacy, postgraduate year 1	2 (11)

Table 2. Reported Access to Pharmacy Services with Advanced Clinical Capabilities (PAI 2030 Recommendation A11) and Availability of Pharmacist Documentation Related to Patient Care (PAI 2030 Recommendation A4)[a]

	PR survey respondents (n = 13)[b]	US national data (N = 163)
Advanced clinical pharmacy capabilities[c]		
24 hours/day, 7 days/week	3 (23)	115 (71)
16 hours/day, at least 5 days/week	1 (8)	14 (9)
8 hours/day, at least 5 days/week	5 (38)	25 (15)
No access to advanced clinical pharmacy service	4 (31)	9 (6)
Availability of pharmacist documentation[c]	**(N = 18)**	**(N = 163)**
Healthcare team	13 (72)	155 (95)
Patient	1 (6)	99 (61)
External healthcare providers	0	90 (55)
External pharmacy providers	0	36 (22)
Pharmacists at the site do not document	5 (28)	8 (5)

Abbreviations: PAI 2030, Practice Advancement Initiative 2030; PR, Puerto Rico.
[a]All data are No. (%).
[b]This question was not included in the practitioner-track survey; thus, only 13 responses were recorded.
[c]$P < 0.0001$.

Figure 1. Self-assessment results for Puerto Rico (PR) and US hospitals in key areas of PAI 2030 domain A (Patient-Centered Care): medication education and comprehensive medication management.



prescribing authority ($P < 0.0001$; Figure 3). Notwithstanding, an additional 22% of PR hospitals indicated that their pharmacists are at least allowed to perform dosage adjustments. Regarding pharmacist participation as part of emergency response teams, only 17% of hospitals in PR reported that pharmacists are a required team member, compared to 61% of hospitals in the US sample ($P < 0.0001$).

Contrary to the US, in PR the requirement of a pharmacy residency was considerably lower (preferred in 0% of PR hospitals vs 57% of US hospitals; $P < 0.0001$). Further, 100% (n = 13/13) of the hospitals in PR stated that having residency was not considered an important factor or was not a strong discriminator when comparing applicants with equivalent experience. In the US sample, 58% of hospitals described having residency as required or strongly preferred. With respect to board certification, 39% of the 18 participating PR hospitals consider this an important factor; in the US sample,

Figure 2. Self-assessment results for Puerto Rico (PR) and US hospitals in a key area of PAI 2030 domain A (Patient-Centered Care): medication reconciliation.

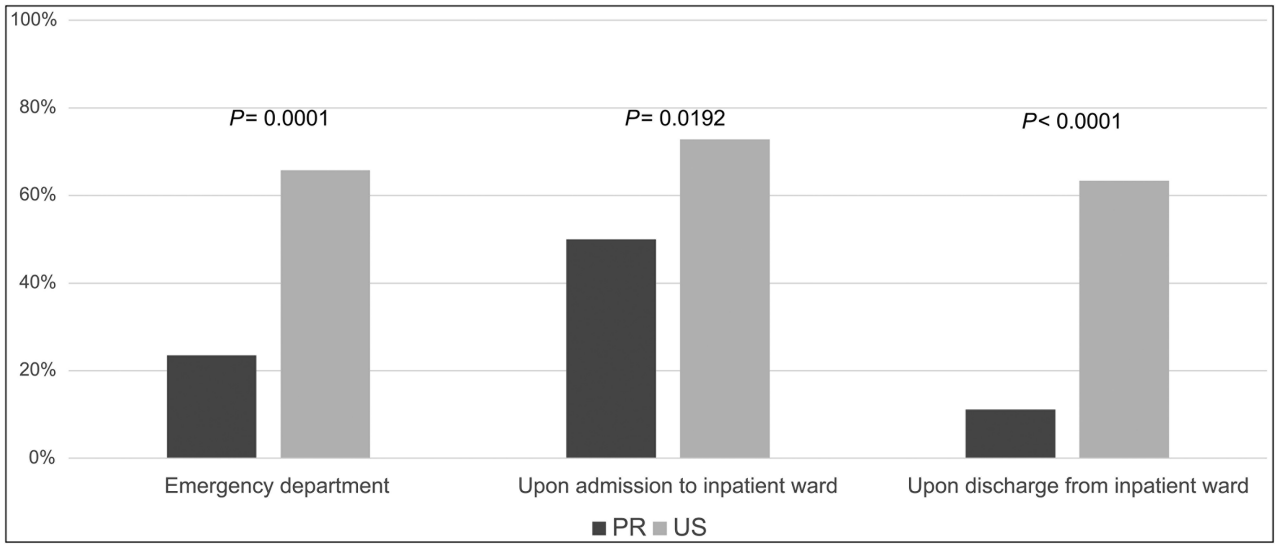
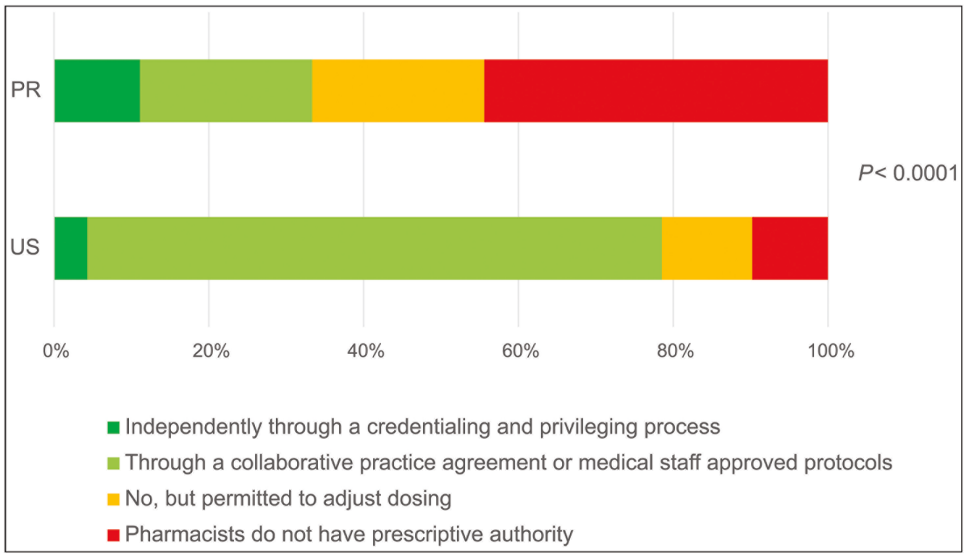


Figure 3. Self-assessment results for Puerto Rico (PR) and US hospitals in key areas of PAI 2030 domain B (Pharmacists' Role, Education, and Training): prescribing authority and dosing adjustments.



93% of hospitals indicated that they require, prefer, or favor hiring board-certified pharmacists ($P < 0.0001$).

Domain C: Technology and Data Science. Health information technologies are seen as useful or highly useful to advance pharmacy practice in 83% of PR hospitals versus 79% of hospitals in the US sample ($P = 0.5412$). The most frequently used patient care technologies in PR are mobile applications and monitoring devices. Only 11% of PR hospitals frequently or somewhat frequently use virtual pharmacy services, such as telehealth, to provide patient care services, while in the US 55% do ($P = 0.0364$). Access to data scientists for collection and analysis of financial and clinical data was rated either excellent or good in 28% of PR hospitals, compared to 55% in the US ($P = 0.0092$).

Interestingly, 22% of PR hospitals do not compound sterile products. Of those that perform compounding, 50% rate as excellent or good the use of technology to support compounding of sterile products, compared to 71% of hospitals in the US sample ($P = 0.0209$).

Domain D: Pharmacy Technician Role, Education, and Training. Assignment of pharmacy technicians to advanced roles in the inpatient setting was similar in PR and the US, 42% (n = 5/12) versus 32% ($P = 0.7913$), as presented in Appendix A.

Pharmacy technician involvement is lower in the emergency department at PR hospitals, with only 20% (n = 2/10) reporting technician participation in advanced roles to the full extent legally allowed; in comparison, 25% of hospitals in the US sample report that level of participation (P = 0.6601). The most common advanced activities performed by PR pharmacy technicians include automated dispensing cabinet management, order fulfillment, hazardous drug management, sterile processes training and testing, supply chain management, obtaining medication history, and tech-check-tech product verification (Figure 4).

Domain E: Leadership in Medication Use and Safety. Pharmacists report that pharmacogenomic information has at least once been used for personalization of treatments in 17% of PR hospitals, compared to 60% of hospitals in the US sample (P = 0.0010). However, pharmacists report leading medication stewardship in 78% of responding institutions, compared to 72% of hospitals in the US sample (P = 0.7461). The practice of analyzing and reporting medication-use patterns and outcomes occurred always or most of the time in 61% of PR hospitals versus 77% of hospitals in the US sample (P = 0.0326).

In PR, 50% of responding hospitals are sustaining and improving the well-being and resiliency of their staff, compared to 67% of hospitals in the US sample (P = 0.1092). Most PR hospitals (n = 10/13, 77%) report having excellent or good policies and processes in their pharmacy department to achieve equity, diversity, and inclusion, compared to 71% of hospitals in the US sample (P = 0.9168).

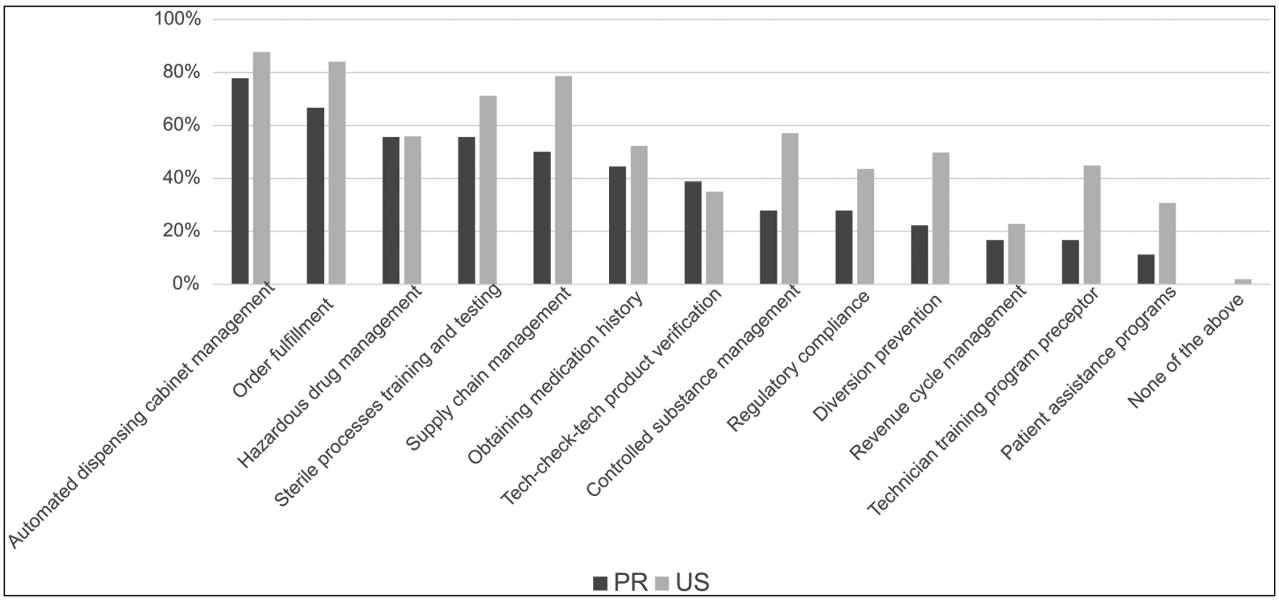
Discussion

This study represents the first report of hospital pharmacy practices in Puerto Rico in over 16 years. We describe a strategy that increased the use of the PAI 2030 Self-Assessment Tool from just one to 18 institutions through concerted efforts by the state affiliate, a school of pharmacy, and ASHP. A similar methodology was previously employed in Missouri to increase the response rate to the PAI Hospital Self-Assessment.[5]

Standards of practice in the pharmacist's patient care process are comprehensive medication management and transitions of care. When queried about these practices, PR hospital pharmacies self-rated highly. However, specific services and processes such as advanced clinical pharmacy services and medication reconciliation upon admission to inpatient wards and upon discharge, rated low. The presence of a clinical pharmacist 24 hours a day, seven days a week continues to be unusual in PR[2] while commonplace in the US. Moreover, patient access to a pharmacist in specific hospital areas is scant, possibly reflecting a wider prevalence of centralized pharmacy departments than in the US. Despite ample literature on the importance of medication reconciliation upon hospital discharge and the pharmacist's role,[6,7] only 11% of surveyed pharmacy hospitals in PR reported being involved in the process. Workforce issues, such as shortage of pharmacists[8] and absence of these responsibilities in job descriptions, could be contributing to the observed phenomenon.

In addition to PAI national results, we reviewed results from the 2006 survey of PR hospital pharmacies. Although a different survey instrument was used, some limited comparisons can be made on the basis of published results. There has been an increase in

Figure 4. Self-assessment results for Puerto Rico (PR) and US hospitals in a key area of PAI 2030 domain D (Pharmacy Technician Role, Education, and Training): advanced practice activities.



pharmacist documentation to 72% from 44% in 2006.[2] However, this information is not shared with external healthcare providers, thus limiting seamless transitions of care. Furthermore, in 2006 nurses had the primary responsibility of patient medication education (60% in PR).[2] Still, in the year 2022 pharmacy personnel were rarely or never involved in providing patient education in 50% of surveyed hospitals. Pharmacists leading patient medication education remains an area to improve both in PR and the US.

One PAI 2030 initiative that has received much focus is medication use optimization and access through pharmacist prescribing.[9] However, our data indicate that prescribing authority through a credentialing and privileging process is uncommon in both PR and the US. Nonetheless, prescribing through collaborative practice agreements or protocols was reported by 74.2% of US hospitals. The practice, though, is less common in PR, even though Puerto Rico pharmacy law allows for collaborative practice agreements. Given the low participation of PR hospital pharmacists in activities that already lie within their scope of practice, we suggest that priority should be given to promoting those activities to start closing the gap with nationwide pharmacy practice.

In stark contrast with the US, neither residency training nor board certification through the Board of Pharmacy Specialties (BPS) are considered important factors when hiring new pharmacy practitioners in PR. In fact, only 98 out of 3,477 pharmacists in PR (2.8%) are board certified (data from the BPS online database and the Puerto Rico Pharmacists Association). Also, there are only 4 ASHP-accredited residency programs on the island, for a total of 8 annual residency positions available as of December 2023. If the pharmacist role is to evolve toward practicing in specialty areas as healthcare providers, more opportunities for residency should be created and board certification should be incentivized with proper compensation.

In regard to technology, in 2006 only 25% of surveyed hospital pharmacies in PR had computer access to laboratory data for drug monitoring.[2] The number seems to have increased by 2022, and 83% of hospitals indicated that health information technologies help advance the pharmacist's role in patient care, although the PAI survey does not specifically inquire about access to laboratory data. The fact that a different questionnaire was used in 2006 limits our ability to make further comparisons. Nonetheless, it is reasonable to believe that accreditation standards and Centers for Medicare & Medicaid Services requirements have propelled wider implementation of information technologies in hospitals in past years.

The use of technology to promote safer practices in the composition of sterile substances in PR is common but could be greatly expanded. Studies have demonstrated that the use of technology, as opposed to using manual processes, is associated with improving safety in sterile preparations.[10] Also, a need for data science specialists in PR and in the US has been identified, although the need is more pronounced in PR.

An area of strength in PR is the employment of pharmacy technicians in advanced roles. In 2006, 60% of hospitals indicated expansion of pharmacy technicians' responsibilities,[2] while 100% of surveyed hospitals in 2022 indicated that technicians perform at least one advanced role, such as management of automated dispensing cabinets, hazardous drug management, and sterile process training and testing. In regard to training, Puerto Rico pharmacy law requires all technicians to complete formal education in a program approved by the Puerto Rico Department of Education, 1,000 practice hours as an intern, a standardized test, and pharmacy technician state board certification. This contrasts with some US states that only require on-the-job or less formal training.[11]

Regarding leadership in medication use and safety, pharmacogenomics continues to be underutilized in PR and the US despite efforts from professional pharmacy organizations.[12-14] However, participation in leadership roles for medication stewardship is high in Puerto Rico, possibly due to recent Puerto Rico Health Department requirements for antimicrobial stewardship programs in hospitals.[15]

There are several limitations to this study. First, since 55% of responding institutions belonged to just 2 of PR's 7 geographical regions, the results may not be generalizable to the entire country. Also, with there being only 2 postgraduate year 1 (PGY1) residency programs in PR and 11% of the responding hospitals reporting having a PGY1 residency, the sample may disproportionately represent institutions with more advanced practice and training. In addition to having a low response rate (27.3%, n = 18/66), 5 respondents mistakenly completed the assessment in the practitioner track, further reducing the response rate for several questions to 20% (n = 13/66). As is the case with all self-reported metrics, this study was subject to social desirability bias, which could have shifted responses towards greater adherence to PAI 2030 recommendations. Lastly, most Puerto Ricans are native Spanish speakers and have learned English as a second language. With the PAI 2030 Self-Assessment Tool being written in English, understanding could have been variable among respondents. Of particular concern are those questions with uncommon terminology.

To address the gaps in practice identified in this study, we recommend 4 areas of focus for the PR state affiliate and hospitals:

1. Promote credentialing and privileging of pharmacists in organizations to fully employ their clinical knowledge and skills within their scope of practice.
2. Promote medication reconciliation and patient education by the pharmacy workforce through continued education for pharmacists and value proposition statements to administrators.
3. Develop cost-effective strategies to increase 24/7 availability of pharmacy

services with advanced clinical capabilities.

4. Lobby to expand the scope of practice of pharmacists in Puerto Rico to include prescribing.

We suggest that the same PAI 2030 Self-Assessment Tool be readministered in the years 2026 and 2030 to determine the evolution of the practice in Puerto Rico.

Conclusion

This study highlights how ASHP's PAI 2030 Self-Assessment Tool can be used by state affiliates to describe their current pharmacy services, identify areas of need, and compare themselves with national data. Areas of strength for hospital pharmacies in Puerto Rico include appointment of pharmacy technicians to advanced roles and leadership in medication-use programs. Areas that require further development relate to well-described direct patient care activities that lie within the pharmacist's scope of practice as well as activities that expand the scope of practice, such as pharmacist prescribing authority and appropriate development through residency training and board certification. The authors encourage the state affiliate and hospital pharmacies in PR to continue to work toward improvement in these areas and to continue using the PAI 2030 Self-Assessment Tool for benchmarking such efforts.

Acknowledgments

The authors acknowledge Eric Maroyka, PharmD, of the Center on Pharmacy Practice Advancement at ASHP, for providing the self-assessment data. The authors thank Kyle Melin, PharmD, for manuscript revision.

Data availability

The data underlying this article will be shared on reasonable request to the corresponding author.

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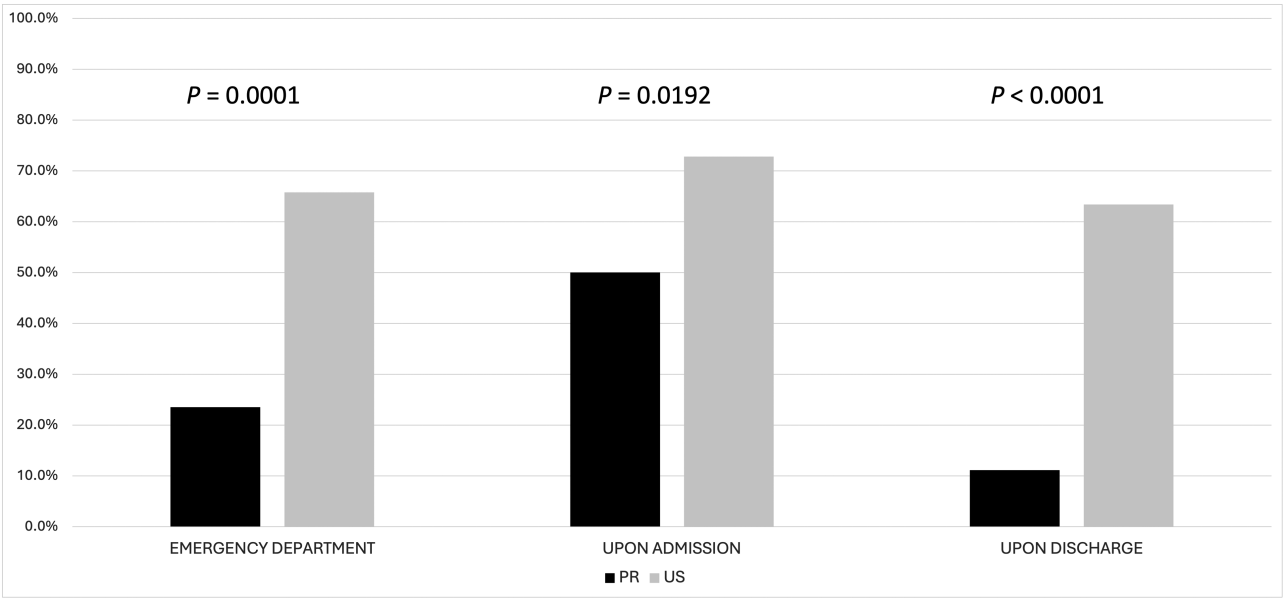
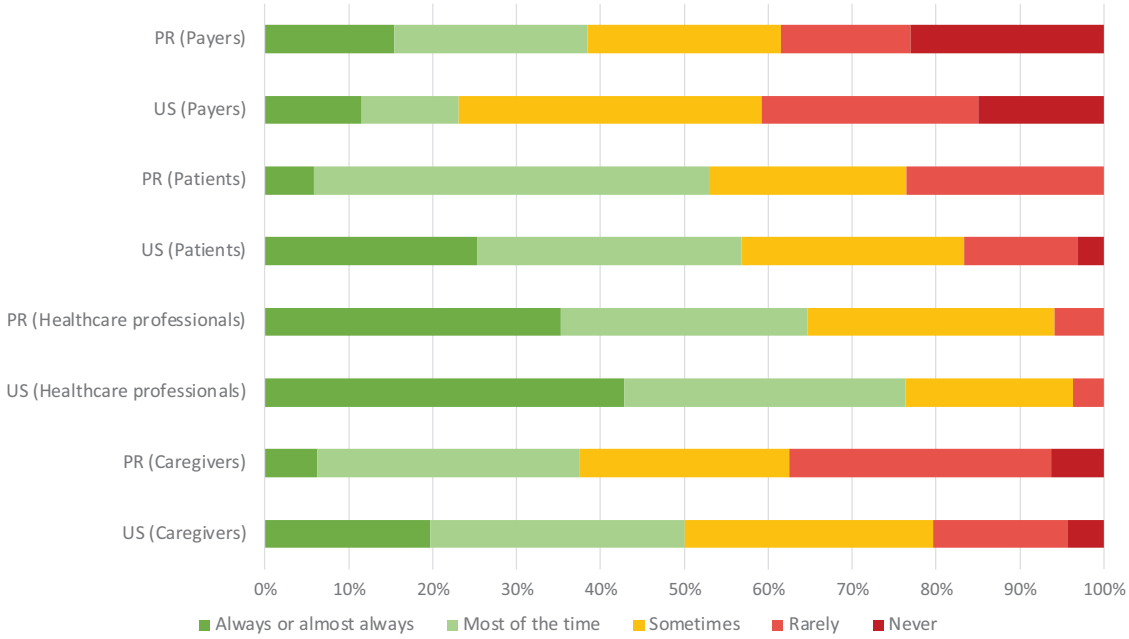
Appendix A—Select comparative PAI 2030 self-assessment results for Puerto Rico and US hospitals

Domain A: Patient-Centered Care

Recommendation A2. The pharmacy workforce should lead medication reconciliation processes during care transitions (eg, emergency department, upon admission and discharge, ambulatory care setting, community pharmacy, long-term care).



Recommendation A3. The pharmacy workforce should collaborate with patients, caregivers, payers, and healthcare professionals to establish consistent and sustainable models for seamless transitions of care.



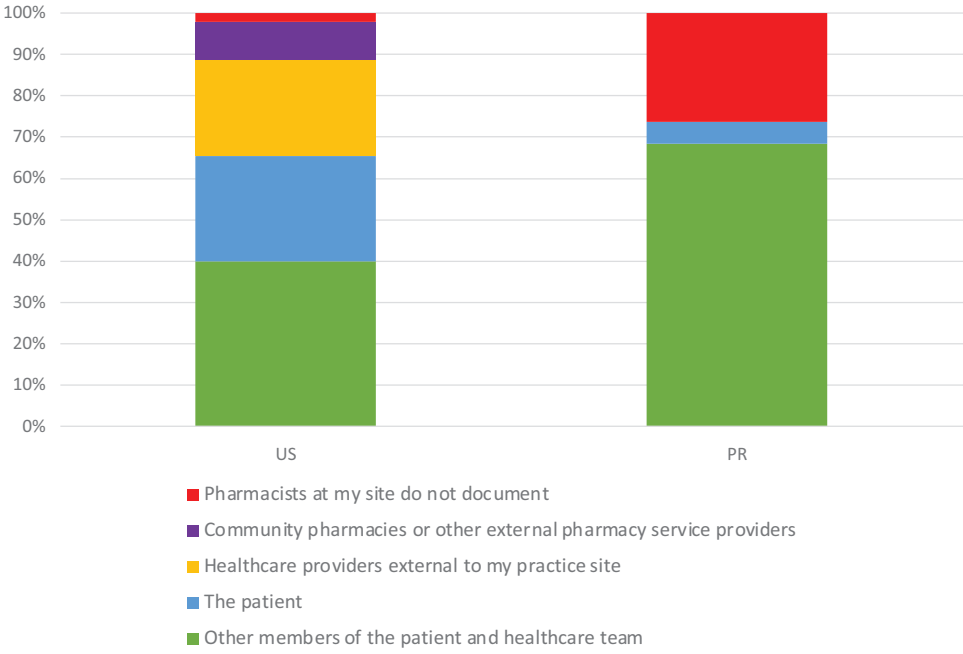
Payers, $P = 0.6982$

Patients, $P = 0.2772$

Healthcare professionals, $P = 0.3669$

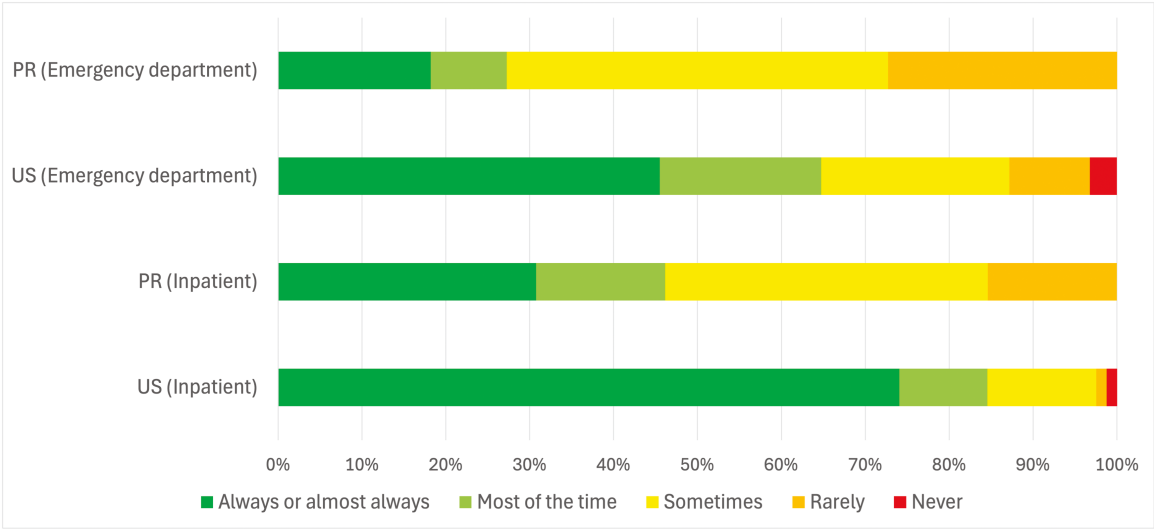
Caregivers, $P = 0.1266$

Recommendation A4. Pharmacist documentation related to patient care must be available to all members of the healthcare team, including patients, in all care settings.



$P < 0.0001$

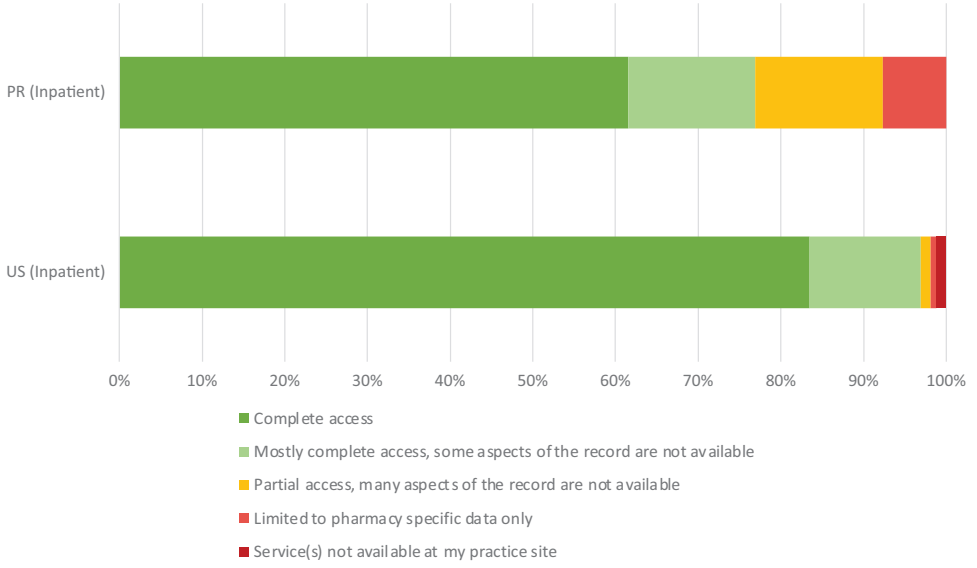
Recommendation A6. Patients must have access to a pharmacist in all settings of care.



Emergency department, $P = 0.0283$

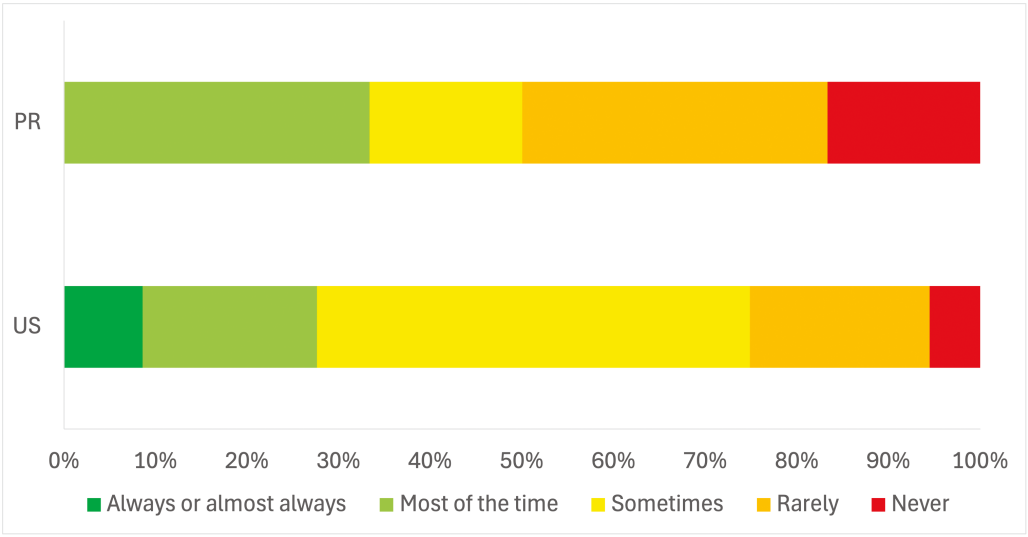
Inpatient, $P = 0.0004$

Recommendation A7. The pharmacy workforce, in all care settings, must have access to complete patient medical records and related health information.



$P = 0.0187$

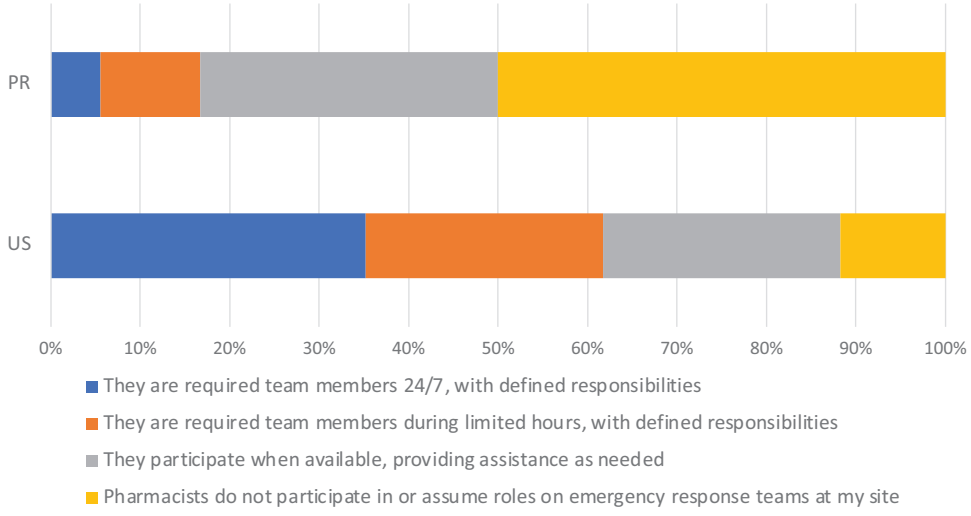
Recommendation A9. The pharmacy workforce should lead medication education for patients and caregivers that optimize outcomes, including in care transitions.



$P = 0.1867$

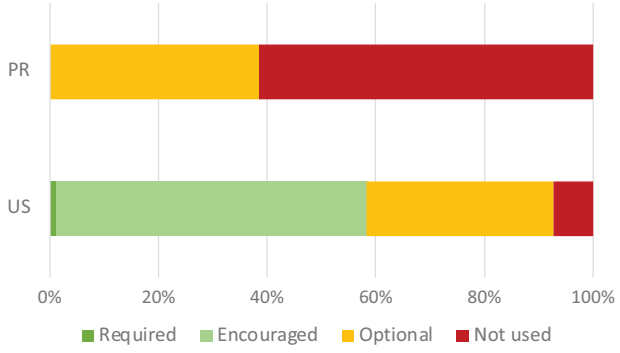
Domain B: Pharmacist Role, Education, and Training

Recommendation B3. Pharmacists should participate in and assume key roles on emergency response teams.



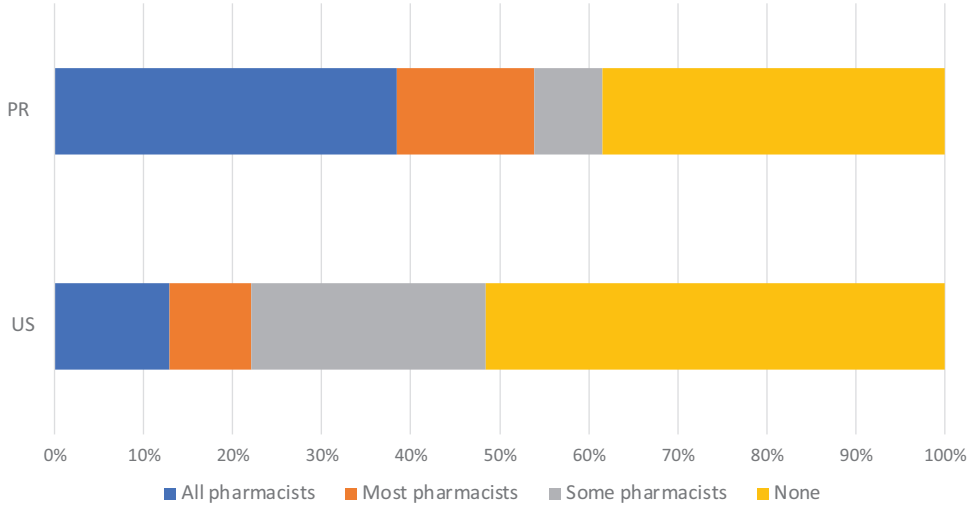
$P < 0.0001$

Recommendation B4. Health systems should require completion of ASHP-accredited residency training as a minimum credential for new pharmacist practitioners.



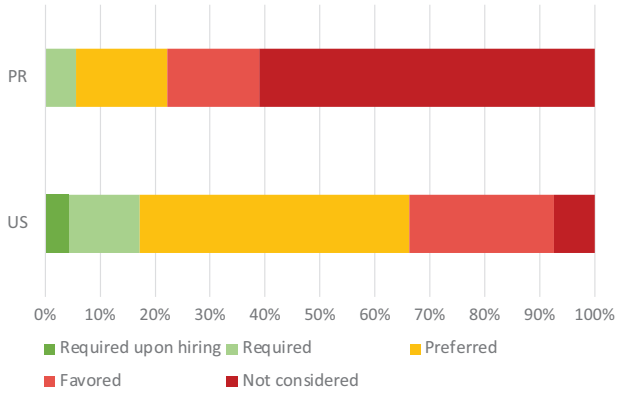
$P < 0.0001$

Recommendation B5. Pharmacists should participate in organization-based credentialing and privileging processes to ensure competency within their scope of practice.



$P = 0.0784$

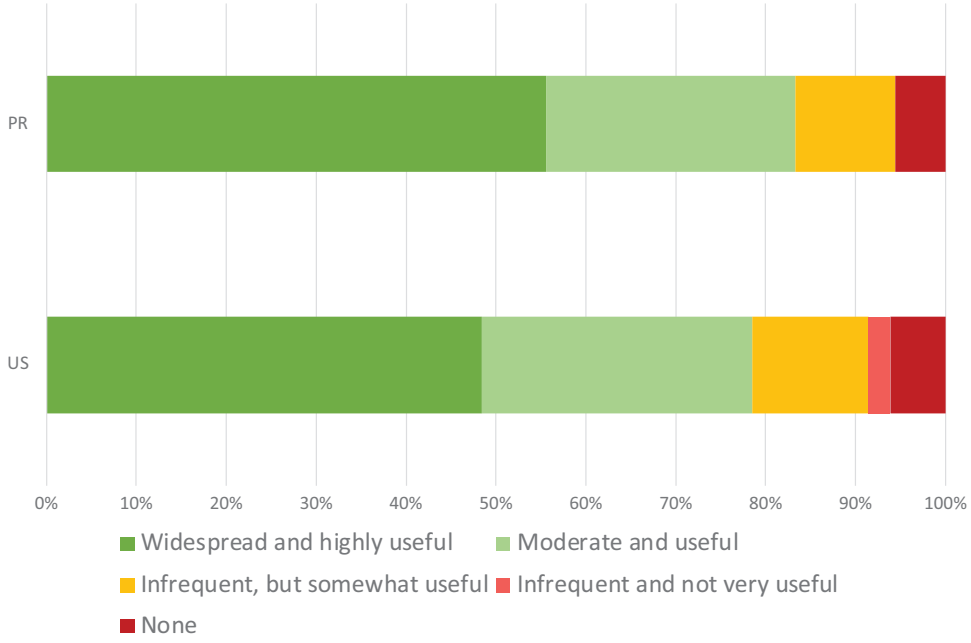
Recommendation B7. Pharmacists practicing in specialty areas should be board certified through the Board of Pharmacy Specialties or other appropriate body.



$P < 0.0001$

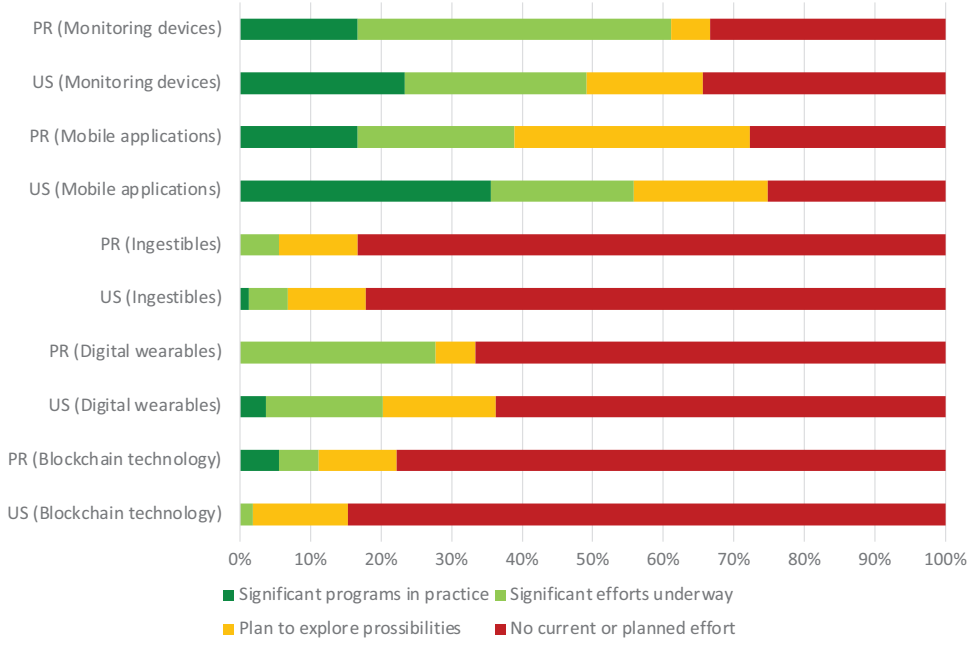
Domain C: Technology and Data Science

Recommendation C1. Pharmacists should use health information technologies to advance their role in patient care and population health.



$P = 0.5412$

Recommendation C3. Pharmacy practice leaders should be engaged in assessing emerging patient care technologies (eg, mobile applications, monitoring devices, digital wearables or ingestibles, blockchain technology) to support optimal medication use outcomes.



Monitoring devices, $P = 0.8668$.

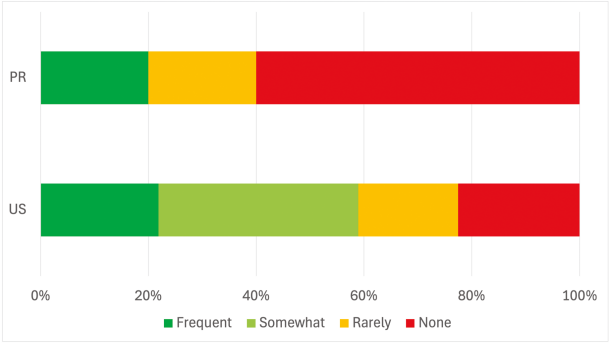
Mobile applications, $P = 0.1856$

Ingestibles, $P = 0.8921$

Digital wearables, $P = 0.9645$

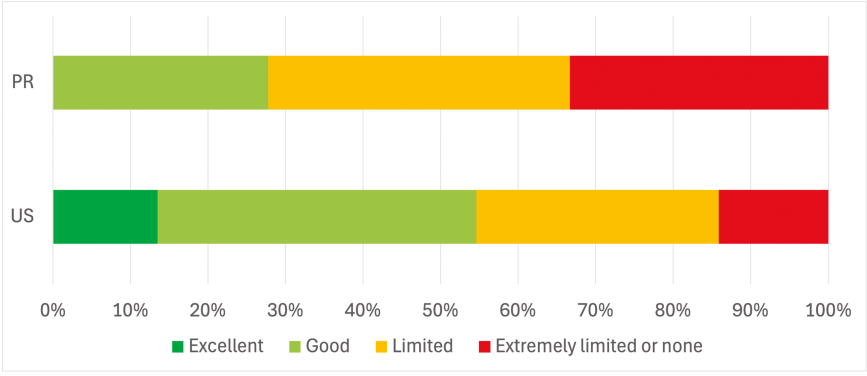
Blockchain technology, $P = 0.3677$

Recommendation C5. Virtual pharmacy services (eg, telepharmacy) should be deployed to optimize operational and clinical services that extend patient care services and enhance continuity of care.



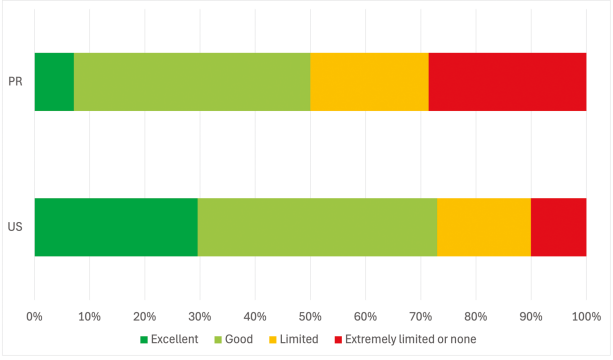
$P = 0.0364$

Recommendation C7. Pharmacy departments should have access to an analytics resource, such as a data scientist, to collect, aggregate, measure, visualize, and disseminate data related to the financial and clinical performance of pharmacists.



$P = 0.0092$

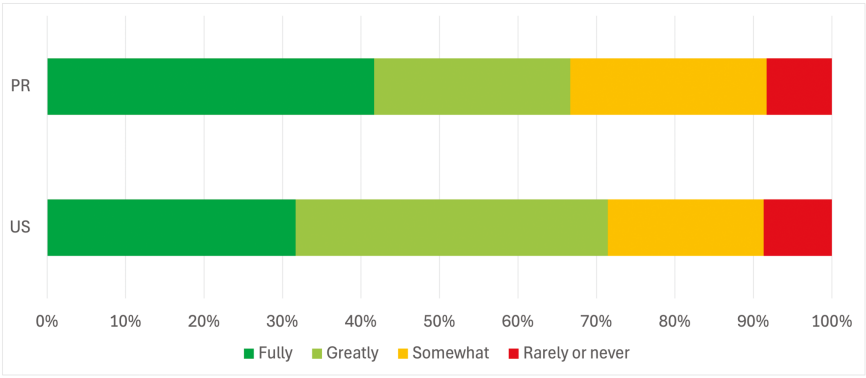
Recommendation C8. Pharmacy departments should use technology to ensure the safe compounding of sterile products.



$P = 0.0209$

Domain D: Pharmacy Technician Role, Education, and Training

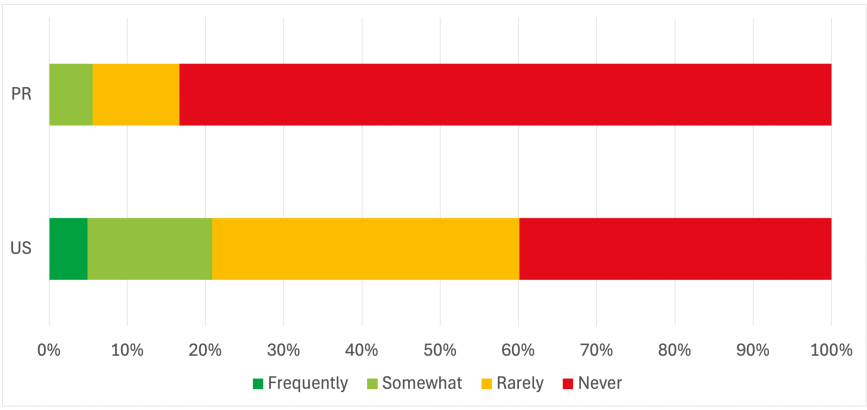
Recommendation D1. Pharmacy technicians should participate in advanced roles in all practice settings to promote efficiency and improve access to patient care (inpatient setting).



$P = 0.7913$

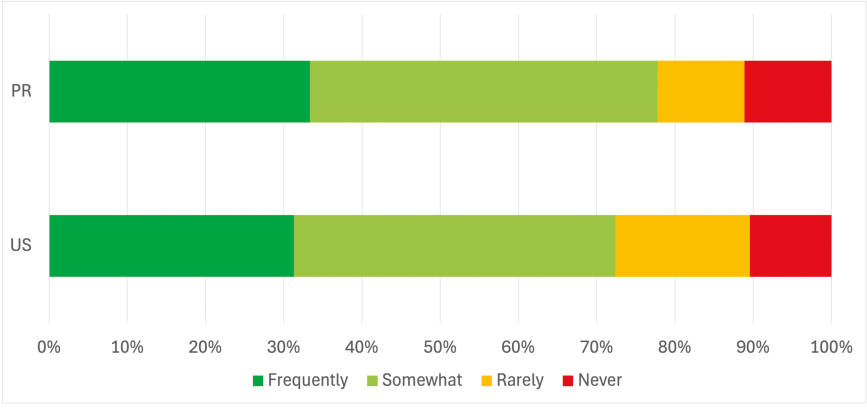
Domain E: Leadership in Medication Use and Safety

Recommendation E1. Pharmacists should advance the use of pharmacogenomic information for personalized medication treatment.



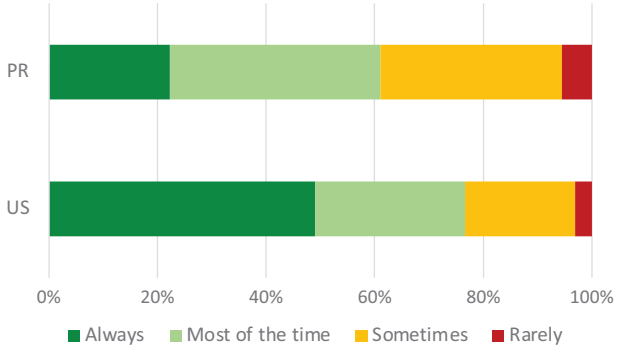
$P = 0.0010$

Recommendation E2. Pharmacists should assume leadership roles in medication stewardship activities at the local, state, and national levels.



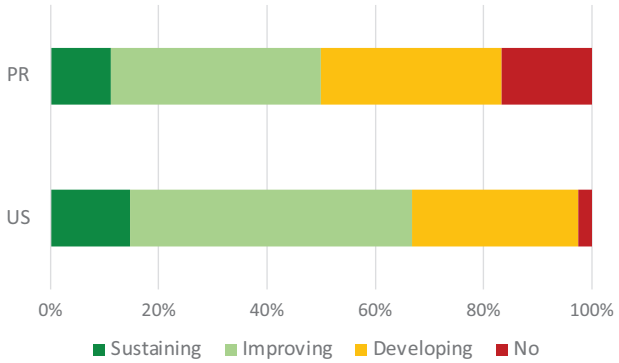
$P = 0.7461$

Recommendation E4. Pharmacy practice leaders should ensure evidence-based medication use by continually analyzing and reporting use patterns and outcomes.



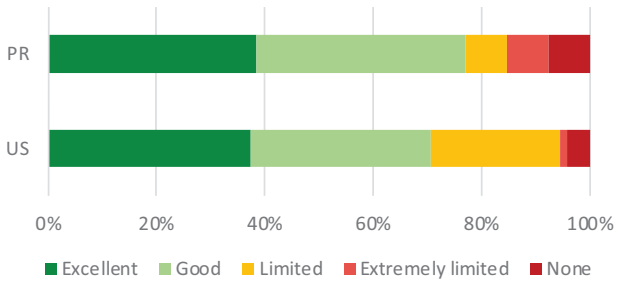
$P = 0.0326$

Recommendation E6. Health systems should support the well-being and resiliency of their staffs.



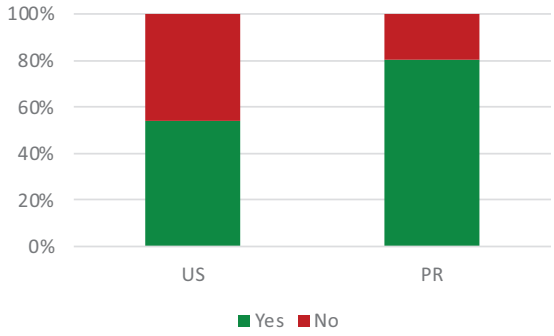
$P = 0.1092$

Recommendation E7. Pharmacy departments should strive to achieve equity, diversity, and inclusion in all technical, clinical, and leadership roles.



$P = 0.9168$

Recommendation E9. Health systems should have a pharmacist executive leader, with a reporting structure consistent with that for other executive leaders, to oversee and influence enterprise-wide decision-making related to medication use and technology.



$P = 0.0364$