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Mentoring Infection Preventionists: An Infection Prevention Practice Fellowship Program

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Mentoring Infection Preventionists: An Infection Prevention Practice Fellowship Program

Abstract

Background: The COVID-19 pandemic created enormous demands on infection preventionists (IPs)¹. It seriously taxed IPs and required hiring new IPs to support these demands. It is highly competitive to hire experienced IPs, and it can take up to two years for new IPs to demonstrate proficiency before pursuing their certification². A gap analysis revealed that current infection prevention (IP) programs did not provide formal training or mentoring.

Methods: The fellowship program will use the Association for Professionals in Infection Control and Epidemiology (APIC) competency model to train and build IP competency. The APIC accelerated training program will provide training to new IPs.

Results: The success of the fellowship program will be determined by the following four outcome measures: fellow skills and knowledge, a qualitative survey of attitudes and competence, healthcare-associated infections (HAI), and cost savings.

Conclusion: This fellowship program will feature learning through a standardized didactic curriculum, clinical application, and shadowing interdisciplinary healthcare teams. This program will serve as a template for future infection prevention training within the organization.

Keywords: Infection Prevention Practice Fellowship (IPPF) Program, infection preventionist, training, competency, infection prevention mentoring, fellowship program.

Mentoring Infection Preventionists: An Infection Prevention Practice Fellowship Program

Background

Infection prevention programs and healthcare workers rely on the expertise of infection preventionists (IPs) to deliver safe patient care and prevent the spread of healthcare-associated infections³. The IPs play an integral role in designing, leading, and implementing an infection prevention program at their medical center. Such programs impact every department, offering staff education, consultation, and investigation designed to enhance patient safety. In their rapidly changing environment, IPs must contend with pandemic surges, emerging infectious diseases, and supply chain disruptions and must constantly pivot to address day-to-day operational challenges. This is why skilled and certified IPs are crucial to the success of infection prevention programs and patient safety.

The COVID-19 pandemic exposed systemic gaps that caused regression in gains made in improving patient safety. As a result, the APIC has urged that healthcare organizations examine their existing IP workforce and additional resources, such as staffing and training to prepare for future infectious disease emergencies³. At present, hiring experienced IPs is a challenge. It may be more productive for the healthcare organization to hire non-experienced IPs and mentor them so applicants can be employed and trained more quickly. However, non-experienced IPs need prolonged onboarding and learning to acquire and master the skills required for their position. Because IPs serve an essential role in designing and implementing infection prevention programs, they must have access to infection prevention training to develop their competencies⁴. Formal training opportunities to develop IP skills are few⁵, and it takes up to 2 years to demonstrate mastery and become certified².

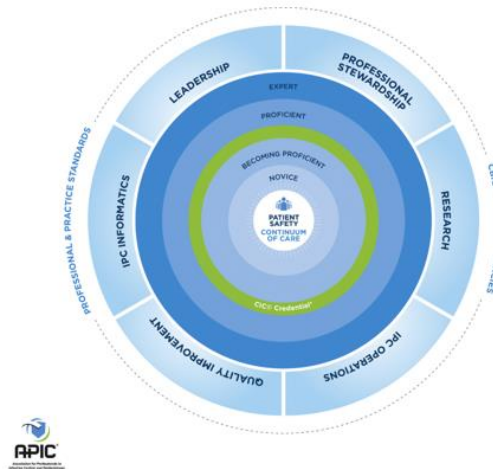
It is difficult to recruit experienced IPs. Even before the pandemic, many infection prevention programs were understaffed¹¹. A survey in 2020 revealed that 25% of the organizations surveyed reported vacant positions¹². Barriers to hiring IPs include archaic staffing regulations, the retirement of baby boomers, and specialized training to develop their skills. Many IPC programs operate at staffing levels established by the Study on the Efficiency of Nosocomial Infection Control in 1985¹³. That Study recommended one IP for every 250 beds in inpatient settings; a 2002 Delphi project recommended 0.8 to 1.0 IP for every 100 acute care beds occupied¹³. According to Wundavalli et al. (2020), there are no recent standardized recommendations and, therefore, no incentive for medical centers to hire additional IPs, despite increased duties, including the pandemic. Of great concern, 37% of the IP workforce is aged 56 to 65, and 6% are older than 66¹⁴. Finally, formal training opportunities to develop IP skills are few⁵, and it takes up to two years to demonstrate mastery and become certified².

Methods

An integrated healthcare system with 21 medical centers in Northern California successfully hires new IPs. However, the medical centers need formal training and mentoring programs. Mentoring new IPs through a fellowship program will allow this healthcare system to hire IPs and offer a comprehensive training pathway. Due to operational directives and budgetary constraints, only two IPs will be trained in the first cohort of this fellowship program. Although the IPPF Program will be based in the Northern California regional office, it will be implemented at the medical centers where IP fellows are hired and work.

The Infection Prevention Practice Fellowship (IPPF) Program will be developed to train new IPs. The standardized course will use a mentorship model to accelerate learning. Training content will be based on evidence-based knowledge and skill-acquisition tenets outlined in the APIC's competency model⁶ and Certification Board of Infection Control & Epidemiology (CBIC®) core competencies. The APIC competency model has emerged as the conceptual framework for programs on building competency (Figure 1).

Figure 1: The Updated 2019 APIC Competency Model



Association for Professionals in Infection Control and Epidemiology. (n.d.). *Infection preventionist (IP) competency model*. <https://apic.org/professional-practice/infection-preventionist-ip-competency-model/>

Initially developed in 2012 and updated in 2019, this evidence-based APIC model identifies the competencies required for an IP to progress from novice to expert in infection prevention⁷. This progression takes at least two years until the IP has demonstrated competency through the certification exam. Knowledge of CBIC's core competencies develops the IPs for certification and career advancement⁸. By the end of this fellowship training, fellows can be expected to progress from novice to competent and proficient IP staff. The advantage of a standardized approach is faster onboarding and more robust infection prevention programs⁹. A methodology that incorporates a variety of educational topics, discussions, seminars, and

mentorship can be employed to build infection prevention training programs¹⁰. This paper discusses the planned implementation of a fellowship program to train and mentor new IPs in a large integrated healthcare system.

The IPPF program's outline, criteria, training plan, and timelines will be shared with Risk Directors, Area Quality Leaders (AQL's) in the medical centers because they lead the IP teams. These medical center leaders will nominate their IPs to participate in this program. The IPs can also nominate themselves to participate in this fellowship program. Another requirement will include the willingness to commit at least ten hours per week for 21 weeks to learning activities. Additionally, the IP's leader will be required to support this commitment and grant IPs the time and resources needed to participate in this fellowship.

The Application Process

The application will begin once all the AQLs and medical center IPs are aware and on board with the plan. The leader of the IP will complete the leader nomination form as part of the nomination process (Figure 2). Interested or nominated IPs will complete the IP Interest Nomination Form (Figure 3). Both of these forms in Figure 2 and Figure 3 are denovo.

Figure 2: IPPF Leader Nomination Form

Infection Prevention Program Fellowship (IPPF) Program-Leader Nomination Form	
Purpose:	This form aims to nominate an IP to participate in the IPPF program.
About the program:	This program is designed to train new IPs to prepare them for certification and their role as new practitioners in a standardized way. It uses a mentorship model to accelerate learning. Training content is based on CBIC's core competencies, and APIC accelerated curriculum. The fellows will complete didactic, clinical, and shadowing activities in approximately 21 weeks. At the end of their fellowship, they are prepared to sit for the board certification and achieve competency in infection prevention practice. The program requires a time commitment of 10 hours per week for 21 weeks to fulfill learning activities.
	<ol style="list-style-type: none"> 1. Sponsor name: 2. IP nominee name: 3. Medical center: 4. Which eligibility criteria does the fellow nominee meet? Select all that apply <ul style="list-style-type: none"> <input type="checkbox"/> Newly hired IP < one year <input type="checkbox"/> Supports IP program full-time or part-time <input type="checkbox"/> CBIC non-certified <input type="checkbox"/> Other: _____ 5. Why do you think your employee is a strong candidate for the fellowship program? 6. Do you support the program's time commitment of at least 10 hours per week? <ul style="list-style-type: none"> <input type="checkbox"/> Yes <input type="checkbox"/> No 7. What is the benefit to your infection prevention program in having your IP participate in the fellowship program? 8. Do you anticipate any barriers to IP success in the fellowship program, and how will you address that?

Figure 3: IPPF IP Interest Nomination Form

Infection Prevention Program Fellowship (IPPF) Program- IP Interest Nomination	
Purpose:	This form aims to communicate your interest in participating as a fellow in the Infection Prevention Practice Fellowship Program.
About the program:	The Infection Prevention Program Fellowship Program is designed to train new IPs to prepare them for certification and their role as a new practitioner in a standardized way. It uses a mentorship model to accelerate learning. Training content is based on CBIC's core competencies, and APIC accelerated curriculum. The IP fellows will complete didactic, clinical, and shadowing activities in approximately 21 weeks. At the end of their fellowship, they are prepared to take the board certification and achieve competency in infection prevention practice. The program requires a time commitment of 10 hours per week for 21 weeks to fulfill learning activities.
	<ol style="list-style-type: none"> 1. Applicant name: 2. Medical center: 3. What is your role at the medical center? 4. Who is your manager/director and AQL? 5. Briefly list any infection prevention experiences prior to this role. 6. Briefly describe your statement of purpose or the reason why you are applying for this fellowship. 7. Describe the areas you have the most substantial competencies in infection prevention. 8. Describe the areas you would like to develop or strengthen competency in from participating in this program 9. Are you willing to commit at least 10 hours a week for learning activities to complete this program in about 21 weeks? <ul style="list-style-type: none"> <input type="checkbox"/> Yes <input type="checkbox"/> No 10. Do you have the support from your manager/director and AQL to participate in this fellowship program? <ul style="list-style-type: none"> <input type="checkbox"/> Yes <input type="checkbox"/> No

The Selection Process

After carefully reviewing the leader nomination and IP interest forms, the IP fellows will be selected. A multidisciplinary team of medical center AQLs and a regional infection prevention team comprising three infection prevention consultants, a regional infection prevention director, and a regional epidemiologist will form the selection committee. AQLs from medical centers nominating IP applicants will be excluded from the selection process to prevent bias. Applicants will be rated according to the following criteria:

1. The applicant meets eligibility criteria, including being newly hired with a year or less in experience, not yet CBIC board certified, and being full-time or part-time in the Clinical Quality and Infection Prevention department
2. Strength of statement of purpose by the IP applicant
3. Strength of recommendation by the IP leader
4. Medical center HAI outcomes do not meet their established Safety Priority Index (SPI) targets. The SPI is an internal organizational safety outcome metric expressed as a ratio of actual HAI events to predicted events. This is aligned with the external NHSN SIR definition. For example, the target SPI for Central Line-Associated Bloodstream Infection (CLABSI) is 0.45, Catheter-Associated Urinary Tract Infection (CAUTI) is 0.70, and Clostridioides difficile (CDI) is 0.55.
5. The urgency of medical centers needs to meet regulatory program oversight requirements such as Title 22 (which must be reflected in the application).

In addition, the strength of the IP's statement of purpose and the IP leader's strength of recommendation will be determined after a careful review by the selection committee members.

The IP fellows and their leaders will be notified of the result at least two weeks before the start of the cohort or earlier. The IP fellows that do not get selected in the first cohort will automatically be considered for selection in subsequent cohorts using the same application and criteria for selection unless the applicant is no longer interested.

The Fellowship Curriculum

The curriculum combines three fundamental components: an accelerated APIC curriculum¹⁵ based on the CBIC competencies (Table 1), clinical application through actual life application and clinical scenarios, and interdisciplinary shadowing. The clinical application and shadowing activities will be weaved into the accelerated curriculum to be completed alongside bi-weekly reading activities. All fellows will be oriented to basic theoretical concepts in the curriculum and the foundational knowledge required of all IPs. The program's clinical application components, such as rounding, surveillance and HAI investigation, and survey readiness, will prepare the fellows to risk-assess and prioritize their daily tasks necessary to manage an infection prevention program.

Table 1: The IPPF Accelerated Program Curriculum

Week	Date	Must complete both didactic and practical elements to take credit	Topic
	Virtual	Initial regional orientation (if not completed at time of hire)	<ul style="list-style-type: none"> Regional Program orientation Hand Hygiene Module CST Orientation Medmined Orientation Didactic components of each module Orientation to data management Baseline self-assessment
1-2	1/9/2023	Module 1	Introduction to Infection Prevention and Control
3-4	1/23/2023	Module 2	Prevention and Control of HAIs
5-6	2/6/2023	Module 3	Surveillance and Reporting
7-8	2/20/2023	Module 4	Regulatory and Accreditation Requirements, Reputational Programs
9-10	3/6/2023	Module 5	Microbiology
11-12	3/20/2023	Module 6	Disinfection and Sterilization
13-14	4/3/2023	Module 7	Surgery and Other Invasive Procedure Areas (Main OR, Ambulatory Surgery Centers, Cardiac Cath Lab/CVIL/Electro Physiology (EP), Interventional Radiology, C-section OR, Endoscopy/ Bronchoscopy)
15-16	4/17/2023	Module 8	Environment of Care
17-18	5/1/2023	Module 9	Outbreak Response and Exposure Management
19-20	5/15/2023	Module 10	Specialty Care Populations and Settings
21	5/22/2023	Module 11	Post-program self-assessment, program assessment and capstone presentation Schedule CIC exam date, as appropriate
Association for Professionals in Infection Control and Epidemiology. (n.d.). Accelerated Internship. https://apic.org/academic-pathways-internship/			

The program will commence with an in-person regional orientation and a baseline competency self-assessment, followed by completing one module every two weeks. There will be ten learning modules in the accelerated curriculum that will last for 21 weeks. Learning objectives may be tailored to the fellow’s desired and demonstrated/needed growth areas. Fellows and the mentor will meet virtually for an hour every two weeks. The fellows and mentor will meet for an hour every two weeks to review didactic questions and concerns. Fellows must complete their assigned readings before this meeting to facilitate robust discussions. The mentor will provide at least two days of in-person mentoring at each fellow's facility at a mutually

agreeable date and time over the 21 weeks of the program. The mentor and fellows will maintain ongoing communication via email and phone consultations.

The IPPF Program will also allow fellows to shadow healthcare workers with different professional backgrounds. For example, a fellow will shadow a nurse, respiratory therapist, laboratory technician, and environmental services partner. This strategy will allow fellows to understand better and appreciate diverse workflows when they are called upon to identify gaps and redesign. Fellows will participate in high-risk investigations, such as significant exposures and outbreaks, and attend one national infection prevention conference or a certification exam preparatory course.


The program will end with a capstone presentation in the final week, week 21. The capstone presentation summarizes their learnings, accomplishments, and plan. The audience for this capstone presentation will include the fellow's immediate leaders such as the AQL's and Risk Directors, program sponsors, the infection prevention peer group comprising of IPs at each of the twenty-one medical centers, and the regional infection prevention team.

Results

There will be four outcome measures. 1. Fellow skills and knowledge, 2. A qualitative survey of attitudes and competence, 3. HAI, 4. Cost savings.

The first survey will be a pre-program self-assessment of the fellow's skills and knowledge using the CBIC® competency tool¹⁶ (Figure 4). The same survey will be administered again at the end of the fellowship program to measure post-program self-assessment. This pre-post comparison will serve as the first outcome measure, and survey scores will be analyzed using an excel spreadsheet.

Figure 4: Competency Self-Assessment Activity for Novice or Becoming Proficient IPs


Name: _____
Date: _____

Competency Self-Assessment Activity for Novice or Becoming Proficient IPs
 CBIC Core Competencies – APIC Competency Model Future-Oriented Competency Domains
 Self-Assessed Rating Scale and Comfort Level (Knowledge/Skills/Experience/Confidence):
 1. No idea 2. Unsure 3. Some knowledge 4. Know it

Competency categories, CBIC domains	IP practice areas as identified in CBIC practice analysis	Assessment of personal competency in each practice area	For each category list one specific question you have and/or learning goal (something you would like to learn more about!)
For more details on the CBIC exam content categories visit https://www.cbic.org/CBIC/Exam-Prep-Resources.htm			
Identification of infectious disease processes (CBIC) *22 exam items	a. Interpret the relevance of diagnostic and laboratory reports	1 2 3 4	• Specific IPC question you have (could be related to your own facility) and/or learning goal (area you want to learn more about).
	b. Identify appropriate practices for specimen collection, transportation, handling, and storage	1 2 3 4	
	c. Correlate clinical signs and symptoms with infectious disease process	1 2 3 4	
	d. Differentiate between colonization, infection and contamination	1 2 3 4	
	e. Differentiate between prophylactic, empiric and therapeutic uses of antimicrobials	1 2 3 4	
Surveillance and epidemiologic investigation (CBIC) *24 exam items	a. Design of surveillance systems	1 2 3 4	• Specific IPC question you have (could be related to your own facility) and/or learning goal (area you want to learn more about).
	b. Collection and compilation of surveillance data	1 2 3 4	
	c. Interpretation of Surveillance Data	1 2 3 4	
	d. Outbreak investigation	1 2 3 4	
Preventing /controlling the transmission of infectious agents (CBIC) *25 items	a. Develop evidence-based/informed infection prevention and control policies and procedures	1 2 3 4	• Specific IPC question you have (could be related to your own facility) and/or learning goal (area you want to learn more about).
	b. Collaborate with relevant groups in planning community/facility responses to biologic threats and disasters (e.g., public health, anthrax, influenza)	1 2 3 4	
	c. Identify and implement infection prevention and control strategies related to <ul style="list-style-type: none"> • Hand hygiene • Cleaning, disinfection and sterilization 	1 2 3 4	
	• Wherever healthcare is provided (e.g. patient care units, operating rooms, ambulatory care center, home health, pre-hospital care)	1 2 3 4	

Association for Professionals in Infection Control and Epidemiology. (2019). *Competency self-assessment activity for novice or becoming proficient IPs*. <https://apic.org/wp->

The student project lead will develop a second outcome measure, a denovo qualitative survey (Figure 5). This survey will focus on the fellow’s attitudes and experiences. Questions on this survey will address the program’s usefulness and assess the fellow’s confidence in leadership engagement, consultation skills, job satisfaction, and perception of growth. The attitudes survey will rate responses on a 5-point Likert scale and will reveal subjective experiences, which will be analyzed to conclude the fellows’ experiences.

Figure 5: Fellow Attitudes and Experience

Infection Prevention Program Fellowship (IPPF) Program- Fellow Attitude and Experience

Purpose: The purpose of this form is to provide your feedback about the fellowship program

1. Applicant name:
2. Medical center:
3. How long have you worked at the medical center?

To what extent do you agree or disagree with this statement

4. The IPPF program helped me strengthen my competency in the following areas
 1. Management of infection prevention program
 Strongly Disagree Disagree Neutral Agree Strongly Agree
 2. Surveillance and epidemiologic investigation, including exposure, outbreak
 Strongly Disagree Disagree Neutral Agree Strongly Agree
 3. Identification, prevention, and control of HAIs
 Strongly Disagree Disagree Neutral Agree Strongly Agree
 4. Prevent transmission of infectious agents, including multi-drug resistant organisms
 Strongly Disagree Disagree Neutral Agree Strongly Agree
 5. Surveillance and reporting
 Strongly Disagree Disagree Neutral Agree Strongly Agree
 6. Regulatory
 Strongly Disagree Disagree Neutral Agree Strongly Agree
 7. Interpretation of laboratory results
 Strongly Disagree Disagree Neutral Agree Strongly Agree
 8. Environment of care
 Strongly Disagree Disagree Neutral Agree Strongly Agree
 9. Survey preparedness
 Strongly Disagree Disagree Neutral Agree Strongly Agree
 10. Disinfection and Sterilization
 Strongly Disagree Disagree Neutral Agree Strongly Agree

5. The program has enhanced my ability to apply clinical skills related to the following
 1. Management of infection prevention program
 Strongly Disagree Disagree Neutral Agree Strongly Agree
 2. Surveillance and epidemiologic investigation, including exposure, outbreak
 Strongly Disagree Disagree Neutral Agree Strongly Agree
 3. Identification, prevention, and control of HAIs
 Strongly Disagree Disagree Neutral Agree Strongly Agree
 4. Prevent transmission of infectious agents, including multi-drug resistant organisms
 Strongly Disagree Disagree Neutral Agree Strongly Agree
 5. Surveillance and reporting
 Strongly Disagree Disagree Neutral Agree Strongly Agree
 6. Regulatory
 Strongly Disagree Disagree Neutral Agree Strongly Agree
 7. Interpretation of laboratory results
 Strongly Disagree Disagree Neutral Agree Strongly Agree

 8. Environment of care
 Strongly Disagree Disagree Neutral Agree Strongly Agree
 9. Survey preparedness
 Strongly Disagree Disagree Neutral Agree Strongly Agree
 10. Disinfection and Sterilization
 Strongly Disagree Disagree Neutral Agree Strongly Agree

6. The program has enhanced my ability to communicate confidently with stakeholders

<input type="checkbox"/> Strongly Disagree <input type="checkbox"/> Disagree <input type="checkbox"/> Neutral <input type="checkbox"/> Agree <input type="checkbox"/> Strongly Agree 7. The program has helped me with easy identification and access to IP templates and resources I need to do my job <input type="checkbox"/> Strongly Disagree <input type="checkbox"/> Disagree <input type="checkbox"/> Neutral <input type="checkbox"/> Agree <input type="checkbox"/> Strongly Agree 8. The level of mentor interaction and support was helpful <input type="checkbox"/> Strongly Disagree <input type="checkbox"/> Disagree <input type="checkbox"/> Neutral <input type="checkbox"/> Agree <input type="checkbox"/> Strongly Agree 9. Overall, I am satisfied with the IPPF program <input type="checkbox"/> Strongly Disagree <input type="checkbox"/> Disagree <input type="checkbox"/> Neutral <input type="checkbox"/> Agree <input type="checkbox"/> Strongly Agree 10. Overall, I am satisfied with the mentorship model <input type="checkbox"/> Strongly Disagree <input type="checkbox"/> Disagree <input type="checkbox"/> Neutral <input type="checkbox"/> Agree <input type="checkbox"/> Strongly Agree
Suggestions for improvement

A third outcome measure will review the medical center's HAI outcomes. Baseline HAI outcomes will be compared with HAI outcomes at the end of 6 months from the start of the program. The National Healthcare Safety Network will download medical center data as outcomes; outcomes will be reported using the standardized infection ratio (SIR). The SIR represents the total events divided by the number of expected events. A decrease in SIR indicates a reduction in infections; an increase in SIR indicates an increase in infections. An average SIR 6 months pre-implementation (Q3-4 2022) will be calculated and compared with a 6-month SIR post-implementation (Q1-Q2 2023).

Cost savings from HAI avoidance will be measured and compared with the previous year's performance as the fourth outcome measure. Cost analysis before and after will be compared on an excel sheet to demonstrate savings.

Discussion

Fellowship models have been successfully applied in health care to train nurses and other disciplines. However, high-volume studies in infection prevention training and mentorship are limited. Most medical centers hire per the regulated requirement of one IP for every 250 beds in

the inpatient setting. Any large-volume studies require the joint effort of multiple hospitals or a system. A highly effective fellowship program also requires tracking the outcomes over time. Infection Preventionists are deemed competent upon passing the CBIC certification exam, usually achieved within two years of hire. Hence, studies may likely be at most two years.

Another limitation is the element of subjectivity involved in competency self-assessment. Responses depend on the fellow's honest responses and understanding in evaluating their competencies. Due to budgetary constraints, the sample size will be small and consist of two fellows. As a result, it will be improbable to calculate statistical validity. Finally, the program relies on the fellow's actual investment of time in completing assigned readings and tasks.

The mentor will guide the fellows to stay on track with their modules but completing them is ultimately the IP's responsibility. The total impact of this program may not be evident immediately after the 21-week program has concluded. HAI improvement takes consistent prevention effort, and the positive outcomes, as demonstrated by a reduction in infection, may be visible after a period of time.

Conclusion

The pandemic surfaced systemic gaps that behoove us to re-evaluate patient safety and implement measures to build a resilient delivery system¹⁷. As we emerge from the pandemic and lose our workforce to exhaustion, burnout, and retirement, we also must bring in and train a new generation of IPs to replace the workforce. Not doing so eventually places patients and healthcare workers at increased risk from a lack of infection prevention guidance and leadership. The APIC's call to action urges policymakers to allocate funds to build IP surge capacity to ensure safe patient care³.

Mentoring IPs is our healthcare organization's response to addressing the challenges outlined in this paper by creating a robust and resilient workforce to stay ahead and prepared to address the next wave of healthcare emergencies. This program will allow the system to hire IPs and offer them a training pathway, address staffing challenges and ensure a steady pipeline of trained, confident IPs available to healthcare workers to deliver safe patient care.

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