



Infection Prevention and Control Education and Training:

An Environmental Scan and Recommendations for Future Action

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Acknowledgement: APIC has an interest in development of an intentional academic track toward infection prevention and control (IPC) curricula and degree programs. In March of 2021, they announced the launch of the “Infection Preventionist (IP) Academic Pathway.”

TABLE OF CONTENTS

I. Introduction	3
II. Executive Summary of the Project	4
III. Deliverables.....	6
A. Literature Search and Environmental Scan.....	6
B. Instruments Created and Used	7
C. Program Director Stakeholders Survey	7
D. Infection Preventionist Stakeholders Survey	9
E. Stakeholder Interviews	11
IV. Recommended Action Plan for Moving Forward	14



I. Introduction

The increasing demand for experienced infection preventionists (IPs) is an on-going issue that has been further enhanced by recent epidemics and a global pandemic (i.e., Zika, Ebola, and COVID-19). Many healthcare organizations are struggling to find practitioners with the foundational knowledge needed for this diverse role. The Centers for Disease Control and Prevention (CDC) and the National Network of Public Health Institutes (NNPHI) seek to impact infection prevention and control (IPC) capacity within the public health workforce through the creation of IPC curriculum within existing public health academic programs. As part of this goal, funding was provided to the Association for Professionals in Infection Control and Epidemiology (APIC) by NNPHI, to complete the following scope of work: 1) conduct an environmental scan that would define the landscape of IPC educational coursework, degrees, and/or certification programs within U.S. academic institutions, and 2) provide any recommendations for potential IPC program development based on the environmental scan results.

II. Executive Summary of the Project

In April 2021, APIC convened a four-person subject matter expert (SME) Task Force with expertise in research and academia, and a five person IP Expert Advisory Panel (hereafter referred to as IP Expert Panel) to actively support the work of the SME Task Force and liaise with other key APIC stakeholders through the APIC Education, Professional Development, Research, and Practice Guidance committees.

The following activities were carried out during the months of April through July by the Task Force with guidance from the IP Expert Panel:

- a. conducted a literature search of both white and grey literature,
- b. designed and distributed survey instruments to assess the need for IPC curriculum development,
- c. conducted an environmental scan of educational trainings and academic programs, and
- d. conducted stakeholder interviews with identified IP leaders, academic program directors/faculty, and IP graduates of IPC-focused educational programs.



Key Findings from the project included:

- There is an ongoing need for trained and experienced IPs, which has been made worse by the COVID-19 pandemic. The pandemic has highlighted the critical role IPs play in healthcare and has expanded the need for more IPs.
- The demand for IPs is also increasing due to the need for IPs in non-acute care settings, such as long-term care and ambulatory care settings.
- Approximately half of all existing training for new IPs occurs within the healthcare organization itself rather than a formal academic program.
- Nursing continues to be the predominant profession from which vacant IP positions are filled, with those with a microbiology education/background also being a common pathway to IPC.
 - Graduates of MPH programs are increasingly being considered for IP positions, but a culture shift is required, so that hiring individuals recognize those with a public health background are strong candidates for IP positions.

- IPC-specific curricula exist in a few programs, but there is a lack of awareness of these programs and no standardization of curricula.
- Most existing IPC-related programs are either graduate-level certificates or programs
- There were no identified academic programs at the Associate's degree level
- Many IPs and stakeholders in this project expressed strong support for standardized academic pathways for IPC.
 - The strongest support was for a baccalaureate degree program
 - All academic-based IPC programs should include an agency-based experiential learning experience (e.g., internship or practicum).
 - Formal incentive programs will be required to increase the number of academic institutions who provide IPC-specific curricula within both undergraduate and graduate degrees/ programs
 - The curricula for these programs should be standardized, and should be developed in conjunction with infectious disease organizations, such as APIC and SHEA
- Two-thirds of existing IPs entered the field without any formal IPC-related education
- 83.3% of surveyed IPs reported that they agreed or strongly agreed that there should be an IPC academic pathway and 71.8% supported a minimum formal education level for entry into the IPC field

Working Group and Advisory Group Members

The Working Group/Task Force consisted of four subject matter expert (SME) members and five advisory group members, **listed and described in Table 1 and Table 2**. The SMEs included a group of IPC experts with experience and interest in academic program development or management. Advisory group members were APIC Committee liaisons and/or those with expertise in IPC education and training.



III. Deliverables

A. Literature Search and Environmental Scan

The task force conducted an environmental scan and literature review to identify the current state of IPC courses and offerings in vocational schools, community colleges, and universities at the undergraduate and graduate levels. The environmental scan included both a literature review of scientific publications and a search of the gray literature. The search terms used for the environmental scan are outlined in Table 3. In addition, the following three sources were used to identify possible IPC-related courses and programs: 1) Council on Education for Public Health (CEPH)-accredited public health (PH) programs: <https://ceph.org/about/org-info/who-we-accredit/accredited/#programs>, 2) National Environmental Health Science and Protection Accreditation Council (EHAC)-accredited programs: <https://www.nehspac.org/about-ehac/accredited-programs-ehac-undergraduate-programs/> and <https://www.nehspac.org/about-ehac/accredited-programs-ehac-graduate-programs/>, and 3) the National Center for Education Statistics: <https://nces.ed.gov/ipeds/>.

In total, 166 organizations/agencies were reviewed. Thirty-nine relevant programs were identified, with 27 having an IPC-specific focus and 12 others having an infectious disease focus. A full list of the organizations, program names, type of program, number of credit hours, program format, and pre-requisites are outlined in Table 4.

The environmental scan identified an issue that may have been limiting potential students' ability to find relevant IPC-related programs: IPC was not one of the 44 categories listed in the Association of Schools

and Programs in Public Health's (ASPPH) Academic Program Finder (APF) that allows individuals to find a CEPH-accredited program. During this project, ASPPH was contacted about this. IPC has since been added as an area of study in the APF.

The environmental scan also identified the APIC IP Academic Pathway Project. The IP Academic Pathway Steering Committee has been working to create a multi-tiered academic pathway and supporting curriculum that takes into consideration the various entry points into IPC: nursing, public health, and laboratory. That Committee has identified four possible academic pathways into IPC: 1) an apprenticeship program, 2) a graduate certificate program, 3) a degree specialization or focus program, and 4) a stand-alone Master's degree program. Relevant core competencies have been identified, which have been cross-walked and prioritized based on the academic program. The IP Academic Pathway Steering Committee is currently building out content for an apprenticeship program. Next, the Steering Committee will create curricular content for the other academic programs, including learning outcomes mapped to competencies, course lists, pre-requisites, and syllabi.

The literature search also identified 12 published papers that discuss an academic pathway or academic programs related to IPC. A bibliography of these sources and an annotated bibliography of the most critical sources are outlined in Table 5.

A full copy of the final report summarizing findings from the Environmental Scan & Literature Review in **Appendix A**.



B. Instruments Created and Used

Four instruments were created for this project:

- 1) a spreadsheet used to collect data as part of the environmental scan of existing IPC-related programs (**Table 6 lists the variables collected**);
- 2) a questionnaire used for the Program Directors' Survey (**Table 7**);
- 3) a questionnaire used for the Stakeholder's Survey (**Table 8**); and
- 4) a set of interview guides used to conduct the stakeholder interviews (**Table 9**).

C. Program Director Stakeholders Survey

Project Description

The Program Director Stakeholders Survey consisted of 32 questions which solicited information regarding the extent to which the program director's academic institution had a program with content focused on IPC and/or that prepares students to work in the IPC field. The survey requested a description of characteristics of the program such as the type of program (e.g., minor, certificate, specialty), level of instruction (e.g., undergraduate versus graduate), number of credit hours, and accreditation status. The survey also included attitude and belief questions related to the program director's awareness of and interest in IPC-related academic programs, and the extent to which they believe their university would support and have the capacity to develop or implement an IPC-related academic program. In total, 166 program directors of academic programs who were identified through the literature search/environmental scan as having programs focused on infection prevention, infectious diseases, infectious disease epidemiology, environmental health, and/or occupational or employee health were

invited to participate in the survey. Included were program directors of Council on Education for Public Health (CEPH)-accredited schools of public health; program directors of National Environmental Health Science and Protection Accreditation Council (EHAC) accredited schools; and two community colleges with known public health programs. The survey was open from May 26 – June 12, 2021. In total, 15 individuals completed a survey (response rate = 8.3%). All but one of whom reported having an academic program with content focused on infection prevention, infectious diseases, infectious disease epidemiology, environmental health, occupational or employee health, public health, or global health.





Key Findings

Note: The key findings from this part of the project should be interpreted with caution due to the low response rate (~ 8%). It is safe to assume there is a participation bias, with those most interested in IPC-related academic programs or those whose university has such a program more likely to have participated.

No program directors identified having an Associate's degree level IPC-related academic program. More program directors identified having a graduate level IPC-related academic program compared to undergraduate programs.

Undergraduate programs tended to have a large number of credits in the program (43 or more), but only 7–12 credits on average that covered the IPC-related content. Most undergraduate programs were offered in a hybrid format, with a combination of traditional face-to-face instruction and online courses. The credit size of graduate programs depended on the type of program offered, with certificates and minors having far fewer credits than degree programs. However, there was not a large difference in the number of IPC-related credits in minors or concentrations versus degree programs, on average. Most graduate programs were offered in a completely distance-based/online format, with a smaller number being offered in a hybrid format, with a combination of traditional face-to-face instruction and online courses.

Approximately half of the IPC-related academic programs (45.5%, n=5) have a required internship, but it does not have to be in the IPC field. A little more than a quarter (27.3%, n=3) require an IPC-related internship.

About half (54.5%, n=6) of existing programs are accredited by CEPH, and another quarter (27.3%, n=3) are accredited by EHAC.

All of the program directors reported being familiar with IPC as a field, and almost all (93.3%, n=14) have qualified faculty who could teach IPC-related coursework. A little more than half (57.1%, n=8) reported being interested in starting an IPC-related program at their university. However, only about a third reported believing that their university would support or have the capacity to start such a program.

A full copy of the final report summarizing findings from the Program Directors' Survey is included as **Appendix B**.



D. Infection Preventionist Stakeholders Survey

Project Description

The Infection Preventionist Stakeholders survey consisted of 58 questions plus demographic variables. The categories of questions focused on experiences and perceptions regarding IPC-related education and training. The survey was distributed via electronic survey software (Qualtrics, www.qualtrics.com) to 5,174 APIC members, with an initial invitation plus two reminders. In total, 679 IPs responded (13% response rate). Over 96% of respondents were practicing or former practicing IPs and approximately 42% hired IPs or were in a position to decide entry requirements for hiring IPs.



Key Findings

The key findings of the survey included:

One third (~ 33%) had received formal IPC education before starting in the IPC field.

- Sixty-seven percent had not received formal academic education in IPC; 19% and 13.9% had received education prior to or during their IPC careers, respectively.
- Types and percentage of formal academic programs received included Master's degree (including MPH) with infectious disease, IPC or epidemiology focus (44.3%), Master of Science in nursing with an IPC focus (7.3%), baccalaureate degree with IPC focus/concentration (2.4%), academic certificate program (10.6%), PhD/DNP/DrPH (5.7%), MD/DO (2%), and Other (27.6%), consisting of Master's degree in microbiology or other laboratory-based academic programs

The largest/most common self-identified knowledge gap upon hire among the survey participants was construction/Infection Control Risk Assessment (ICRA); 74.7% reported knowing almost nothing about this topic when they entered the IPC field. This is most likely due to this topic not being covered by program curricula, but this would need to be assessed in future studies. The highest self-reported knowledge areas upon entering the field

were infectious disease processes (42.8% reported knowing a fair amount about that topic) and clinical knowledge (38.7% reported having good knowledge of this topic).

IPC-related education received was most often tied to a personal goal (40.1%) or career advancement (30.3%), with additional factors including being a condition of employment (13.7%), employment incentives (9.2%) or other reasons (6.6%).

The strongest support was for a baccalaureate degree as the entry level for new IPs in terms of education (46.5%); 19.4% believed an Associate's degree was adequate. Very few thought it should be an academic certificate (0.7%), Master's degree (1.4%), or other (1.8%)

About a third of facilities (35%) currently require a new IP to be a nurse.

Ideal qualifications for an IP included having both experience in the field and either nursing or public health education/training (51%), CIC or the a-IPC credential (31%), or positive applicant traits (26%).

There was not strong personal interest expressed in a formal academic program for IP preparation among survey participants for themselves. Only 19.9% reported interest, 44.6% reported maybe and 35.6% were not interested. There was more interest in a certificate (57.6% supported this) than in a degree program (42.4%). More than half of respondents (55.4%) would be willing to stop working to complete a formal IPC-related academic program if their employer paid them, while 41.5% would want to continue working while pursuing a formal IPC educational program.

Despite the lack of personal interest in a formal IPC academic program for themselves, the majority of survey participants agreed or strongly agreed that there should be an IPC academic pathway (83.3%) and a minimum formal education level for entry into the IPC field (71.8%). The majority of IPs indicated an internship should be an available but should be an optional component of a formal IPC-related academic program.

Many practicing IPs and/or their facilities are not serving as preceptors to IP interns. Only about a quarter (24%) reported that they or someone at their facility had been an IP preceptor or hosted an IP intern in the past 3 years, and 12% were not sure. However, 38% would be willing to serve as a preceptor. The reasons selected for being unsure or unwilling to serve as a preceptor included a lack of time, resources, funding, or interest, belief that their facility might not/would not approve it, and not feeling qualified.

The most commonly-reported barriers to hiring new IPs included applicants with a lack of experience, knowledge, and training (46.5%) and a general lack of applicants regardless of qualifications (22.3%). Additional barriers included no interest in IPC, low pay/salary, and lack of certification.

A full copy of the final report summarizing findings from the Stakeholders' Survey is included as **Appendix C**.



E. Stakeholder Interviews

Project Description

Individual interviews were conducted to gain insights into participants' experiences and opinions about IPC-related educational programs. The stakeholder interviews aimed to provide detailed information about attitudes, beliefs, experiences, and perceptions of key stakeholders in the IPC field about IPC-related educational programs.

Stakeholders interviewed were identified through the environmental scan, surveys and target list of groups provided by the funder. The diverse group of key stakeholders included: academic program directors, experienced and practicing IPs, including alumni of IPC-related programs, and individuals in positions to hire IPs.



Key Findings

About two-thirds (67.6%, n=23) of the stakeholders approached for the individual interviews agreed to participate. Out of the 23 participants, more than half (56.5%, n=13) were program directors of an IPC-related or MPH program, about a quarter (21.7%, n=5) were IP stakeholders and the remaining approximate quarter (21.7%, n=5) were individuals in positions to hire IPs.

The stakeholders interviewed expressed support for academic pathways to the IPC field. Individuals in positions to hire IPs noted that they would prioritize candidates with formal education in IPC. The stakeholders also discussed recommendations for the IPC academic pathway, highlighting data analysis, hand hygiene, leadership, critical thinking, communication, and collaboration as key components to include in an IPC academic pathway program. The stakeholders recommended that the IPC academic pathway be based on the APIC competency model and the Certification Board of Infection Control and Epidemiology (CBIC) core competencies.

The stakeholders interviewed were divided about entry level requirements for new IPs. Some were in support of an entry level requirement that considers the type of IP position, educational background, experience, and certifications held by the applicant. Of the stakeholders who did not support the idea of an entry level requirements for new IPs, many highlighted the limiting effect this may have on the applicant pool to fill IP positions. There is currently a shortage of experienced IPs or IPs with a preferred or specific educational background needed for IP positions, such as nursing or microbiology.

Some stakeholders emphasized that the burden of training new IPs falls on the employer, and, in some instances, it takes up to two years to train a new IP. New hires with IPC educational background would make transitioning to the IP role easier given the foundational knowledge in IPC.

Academic program directors described what they perceive as challenges to developing a new IPC-focused educational program. One common theme was difficulty recruiting students into the program due to a lack of awareness

about the IPC field. They also highlighted the lack of incentives for graduates, such as offering an increased pay scale, which can negatively impact enrollment. There is also limited funding to start new programs in academic institutions. Other challenges included availability of knowledgeable faculty to develop and teach in IPC programs, and a lack of standardized competencies and content for IPC-focused programs.

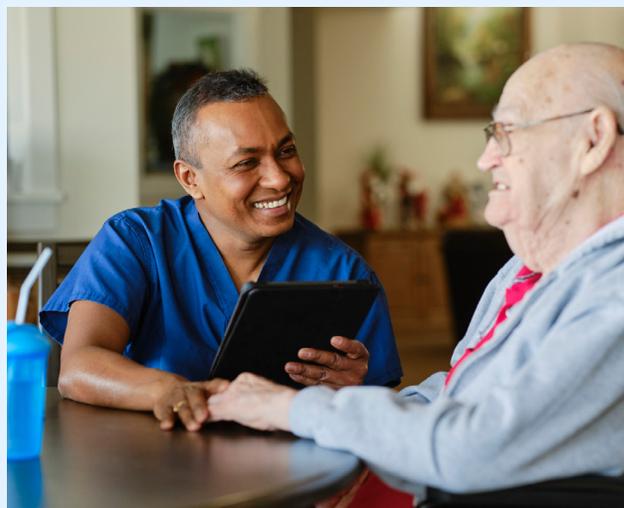
For existing IPC-related educational programs and one university that previously had an IPC-related program that was eliminated, the challenges **were categorized into four themes: 1) financial, 2) recruitment, 3) internship requirement, and 4) curriculum development.** Enrollment remains a consistent challenge that can impact financial sustenance of these IPC-related programs. Student placement for internship/practicum requirements can be difficult. Some programs find it difficult to identify facilities willing to host interns or IPs to precept students. A mentoring program for IPs to learn to serve as preceptors may help address this need.

Stakeholders discussed multiple opportunities for developing new IPC-focused educational programs. Over the last 5 years, more organizations are hiring applicants into the IP role from outside the traditional pool of candidates who stem from a clinical or laboratory background. Graduates of MPH programs are increasingly being considered for IP positions. In addition, the IPC field is growing rapidly due to new attention and focus on the value of the IPC profession from the SARS-CoV-2 pandemic and the growing need for professionals with IPC expertise in non-acute care settings, such as long-term care and ambulatory care settings.

Many stakeholders recommended that competencies covered in IPC education be standardized. They further recommended utilizing the existing competency models and frameworks outlined by APIC and CBIC as the basis of standardization. Stakeholders also emphasized the critical need to incorporate real-world IPC scenarios and data analysis into educational programs, so that graduates would be ready to work independently soon after graduation without the typical long on-the-job orientation and training period.

Almost all stakeholders indicated that an internship/practicum should be a required component for IPC educational programs, though they discussed the potential challenges to meeting this requirement. Identifying willing IP preceptors for interns has been difficult due to IPs' already overloaded schedules.

Many stakeholders noted that there are very few existing paid internships in the IPC field, though they believe paid internships would benefit both students and the host facilities. The alumni of IPC-focused educational programs believed the internship/practicum was very valuable in cementing their knowledge and application of concepts in real-world situations.



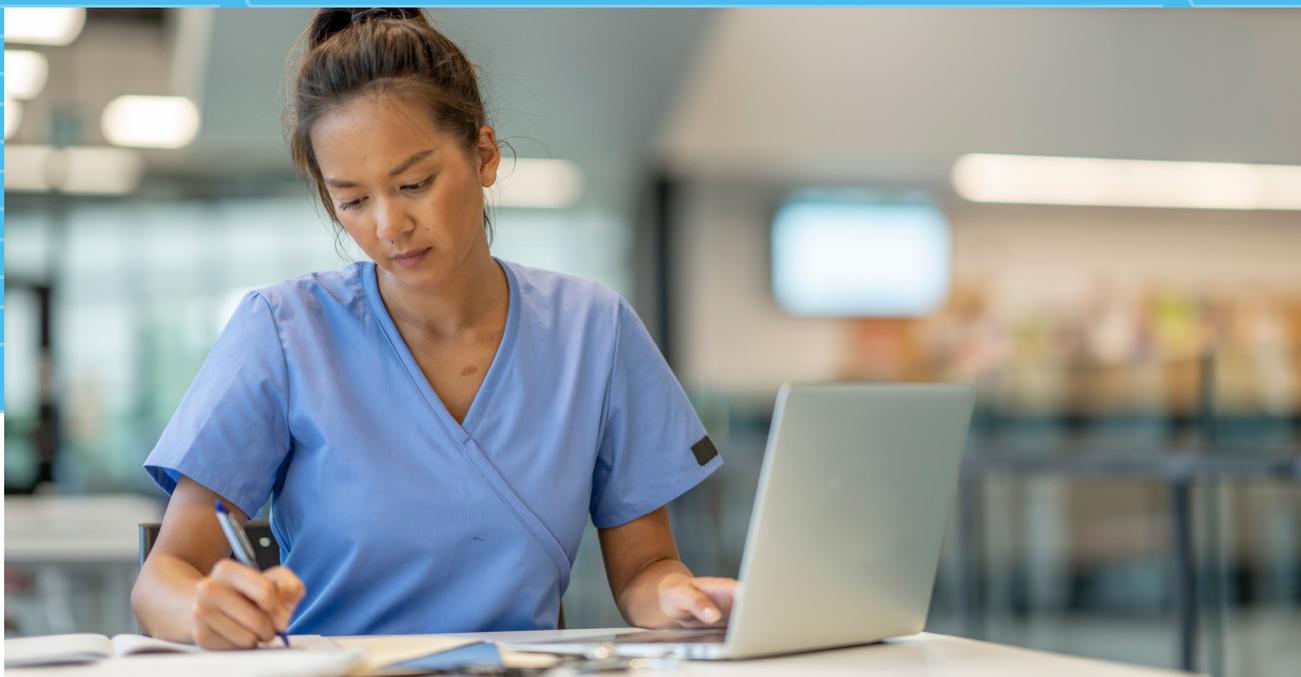
Stakeholders who were alumni of IPC academic programs described their experiences as positive and valuable to their IPC career. It is important to note that all three alumni stakeholders interviewed were working professionals with backgrounds in nursing and epidemiology who later obtained graduate degrees or a certificate in IPC.

The stakeholders described the learning outcomes and competencies as being aligned with the CBIC core competencies. This is especially important as it not only prepares the student to be an agile IP, but ensures the student is also prepared to pass the CIC exam upon graduation.

Key factors that influenced their experience include:

- 1) flexibility,
- 2) competencies and learning outcomes, and
- 3) excellent preparation.

A full copy of the final report summarizing findings from the Stakeholders' Survey is included as **Appendix C**.



IV. Recommended Action Plan for Moving Forward

Based on this project, there seems to be a strong belief among many IP stakeholders that an ideal entry level IPC applicant should have, at a minimum, a bachelor's degree. This is because oral and written communication skills, and critical thinking ability are foundational for this position. However, this could impact the availability of candidates, especially in non-acute care settings. Currently, many IPs in non-acute care settings are nurses who lack a bachelor's degree.

Further recommendations for a specific IPC "academic" preparation or pathway before entering an IP position vary among stakeholders. All stakeholders agreed that a candidate with some level of IP training or experience is preferred. However, when there is great demand to fill open positions, this may not be realistic in every institution (programs with multiple IP positions vs. programs with only one position), geographical location (urban vs. rural) or level of care (i.e., acute vs. non-acute). This must be considered moving forward, as a one-size-fits-all approach may not fulfill all IPC needs.

People traditionally have entered the IP field from two primary background areas: nursing and microbiology/laboratory sciences. More recently, we have seen public health graduates enter the field. IP stakeholders we interviewed who have hired public health graduates agree that they were very pleased with the educational knowledge, training, and fit of public health graduates within their IPC program. Whether an IP candidate is from nursing, microbiology/laboratory or a public health academic program, there are strengths, as well as gaps, in meeting the extensive competencies an IP needs. Therefore, creating, expanding, or refining an academic pathway to develop academically prepared candidates should help fill the current gaps in the field. Such an academic pathway should consist of a standardized IPC-specific curricula, in an undergraduate or graduate program.

The following are the recommendations from this project's SME Task Force and IP Expert Group.

- Entry level IP applicants should have a bachelor's degree in a related field (nursing, infectious disease, microbiology/laboratory sciences, or public health).
- An educational campaign aimed at healthcare agencies should be developed to raise awareness about expanding IP applicant pool beyond nursing so as not to limit IP applicants to those with a nursing background, and to provide financial incentives for IPC education.
- Support should be provided for the development of IPC-specific curricula based on established professional competencies.
- Incentives and marketing should be provided to increase the number of academic institutions that provide IPC-specific curricula within both undergraduate and graduate degrees/programs, once developed by APIC.

- All academic-based IPC programs should include an agency-based experiential learning experience (e.g., internship or practicum).
- Advocacy for federal tuition funding/reimbursement for individuals who wish to obtain IPC specific academic degrees should continue
- IPC-related organizations, such as APIC and SHEA, should partner with academic institutions to help develop curricula for the IPC academic pathway.
- A targeted marketing campaign needs to be implemented to increase awareness about IPC as a career.
- An IPC mentorship program needs to be developed, implemented, and assessed.
- Incentives or support should be provided to healthcare facilities to make mentors available for IPC students or interns.
- Additional support should be offered for existing Certificate programs for continuing education for IPs working in the field or to assist with those wishing to transition into IPC.
- New IPC-related programs situated within a School or College of Public Health are more likely to be successful than those in a School of Nursing. Such positioning broadens the available student pool and better reflects current hiring trends for IPC, because Schools of Nursing usually only recruit those with a nursing background into their academic programs whereas public health programs draw students from many different backgrounds.

Strengths

- Several well-established IPC-related academic programs
- Strong interest in developing a standardized IPC-related academic pathway
- Motivated field of professionals in IPC
- Growing market for individuals with IPC expertise



Weaknesses

- Lack of awareness of IPC-related academic programs among IPs
- Lack of funding and support to develop new IPC programs
- Current shortage of IPs
- Lack of awareness of IPC as a career option

Opportunities

- Can elevate the field with an entry level requirement
- The APIC Academic Pathway group is currently developing a competency-based curricula
- Existing IPC-related programs could be further explored for use as a foundation for a standardized curriculum
- Advocacy already underway to support incentives for IPC education

Threats

- Lack of awareness about IPC as a field results in IPs being left out of workforce- building/curricula development funding opportunities and decision-making at their facility or with local, state, and federal partners
- No financial incentives for IPC program development
- No financial reimbursement for agencies to host internships
- No compensation for IPs to serve as preceptors
- Some individuals involved in developing IPC curricula lack experience in academic program management
- Imposing entry level requirements may limit a potential pool of IPs
- COVID-19 funding is not going to IPC departments/ programs and/or IPs

