
Practice Analysis for Infection Preventionist/Infection Control Practitioners

Conducted on behalf of



**Certification Board of Infection Control and
Epidemiology**

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Prepared by:



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Test Development Solutions



CBIC Practice Analysis for Infection Preventionist/Infection Control Practitioners

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EXECUTIVE SUMMARY

The Certification Board of Infection Control and Epidemiology (CBIC), whose mission is “to protect the public through the development, administration, and promotion of an accredited certification in infection prevention and control,”¹ requested a practice analysis study from Prometric for the Certification in Infection Control (CIC) examination.

A practice analysis study is designed to obtain descriptive information about the tasks performed for a particular role and the knowledge needed to adequately perform those tasks. The purpose of this practice analysis study was to:

- Identify and re-evaluate the role definition of the Infection Preventionist/Infection Control Practitioner
- Validate the inventory of the tasks and knowledge related to work performed by Infection Preventionist/Infection Control Practitioners;
- Ensure that the tasks and knowledge statements identified were congruent with the objective of certifying Infection Preventionist/Infection Control Practitioners; and,
- Develop the test specifications for the Certification in Infection Control (CIC) examination.

Conduct of the Practice Analysis Study

The practice analysis study consisted of several activities: collaboration with subject matter experts (SMEs) to ensure representativeness of the task and knowledge statement inventory; survey development; survey dissemination; compilation of survey results; and test specifications development. The successful outcome of the practice analysis study depended on the excellent information provided by the Infection Preventionist/Infection Control Practitioners.

Survey Development

Survey research is an effective way to identify the tasks and knowledge that are important for Infection Preventionist/Infection Control Practitioners. The tasks included on the survey covered eight domains of practice. The development of the survey was based on a draft of task and knowledge statements developed from the previous practice analysis study (2010).

Survey Content

The survey, disseminated in May 2014, consisted of five sections. The URL for the survey was sent by Prometric to 17,946 medical professionals.

Survey Sections
Section 1: Background & General Information
Section 2: Tasks
Section 3: Knowledge
Section 4: Test Content Recommendations
Section 5: Comments

¹ <http://www.cbic.org/about-cbic> Retrieved July 9, 2014.

Results

Survey Response

A total of 2,819 medical professionals completed the survey. If a survey respondent indicated that they were not practicing as an Infection Preventionist/Infection Control Practitioner, then they were exited from the survey (N=325). Analysis of the survey results was conducted on 2,494 respondents who indicated that they were practicing as Infection Preventionist/Infection Control Practitioners.

Survey Ratings

Participants were asked to rate the following:

Task Statements – the importance for competent performance of an Infection Preventionist/Infection Control Practitioner on a five point scale (0 = Of no importance to 4 = Very important). Respondents were also asked to respond to a frequency rating scale for the task statements (0 = Never to 4 = Very often).

Knowledge statements – the importance for competent performance of an Infection Preventionist/Infection Control Practitioner on a five point scale (0 = Of no importance to 4 = Very important).

Content Coverage

Evidence was provided for the comprehensiveness of the content coverage within the domains. That is, if the content within a domain is adequately defined, then it should be judged as being well covered. Respondents indicated that the content within each task domain was adequately to well covered, thus supporting the comprehensiveness of the defined domains.

Test Specifications Development

The Test Specifications Committee convened on June 27 and June 28, 2014 to review the results of the practice analysis study and to create the test content outline that will guide the development of the CIC examination.

Summary

In summary, this study used a multi-method approach to identify the tasks and knowledge that are important for the competent performance of Infection Preventionist/Infection Control Practitioners. The practice analysis process allowed for input from a representative group of Infection Preventionist/Infection Control Practitioners and was conducted within the guidelines of professionally sound practice. The results of the practice analysis will serve as the foundation for the Certification Board of Infection Control and Epidemiology to develop the CIC examination.

RESULTS AT A GLANCE

WHO COMPLETED THE SURVEY

A total of 2,494 responses were used for analysis. About half of respondents hold the CIC credential, work in community acute care hospitals, and hold a Bachelor's degree.

TASK IMPORTANCE RATINGS

All of the 80 tasks achieved high importance ratings. Respondents indicated that the survey covered the important professional activities adequately to well.

KNOWLEDGE IMPORTANCE RATINGS

All of the 40 knowledge achieved high importance ratings. Respondents indicated that the survey covered the important knowledge adequately to well.

INTRODUCTION

The purpose of the Infection Preventionist/Infection Control Practitioner Practice Analysis Study was to identify the tasks and knowledge statements that are important for competent performance by Infection Preventionist/Infection Control Practitioners. The development of a content valid examination is based on validated tasks and knowledge identified through the practice analysis study process.

This report describes the practice analysis study including the:

- rationale for conducting the practice analysis study;
- methods used to define job-related tasks and knowledge;
- types of data analyses conducted and their results; and
- conduct of the test specifications meeting.

Practice Analysis Study and Adherence to Professional Standards

A Practice Analysis Study refers to procedures designed to obtain descriptive information about the tasks performed on a job and the knowledge, skills, or abilities requisite to the performance of those tasks. The specific type of information collected during a practice analysis study is determined by the purpose for which the information will be used.

For purposes of developing certification examinations, a practice analysis study should identify important tasks, knowledge, skills, or abilities deemed important by Infection Preventionist/Infection Control Practitioners.

The use of a practice analysis study (also known as role delineation, role and function study, or job analysis) to define the content domain(s) is a critical component in establishing the content validity of the certification. Content validity refers to the extent to which the content covered by an examination is representative of the tasks and knowledge of a job (tasks, knowledge, skills, or abilities).

A well-designed Practice Analysis Study should include the participation of a representative group of subject matter experts (SMEs) who reflect the diversity within the profession. Diversity refers to regional or job context factors and to factors such as experience, gender, and race/ethnicity. Demonstration of content validity is accomplished through the judgments of SMEs. The process is enhanced by the inclusion of large numbers of SMEs who represent the diversity of the relevant areas of expertise.

*The Standards for Educational and Psychological Testing*² (1999) (*The Standards*) is a comprehensive technical guide that provides criteria for the evaluation of tests, testing practices, and the effects of test use. It was developed jointly by the American Psychological Association (APA), the American Educational Research Association (AERA), and the National Council on Measurement in Education (NCME). The guidelines presented in *The Standards*, by professional consensus, have

² American Educational Research Association, American Psychological Association, National Council on Measurement in Education. (1999). *The Standards for Educational and Psychological Testing*. Washington, DC: American Psychological Association.

come to define the necessary components of quality testing. As a consequence, a testing program that adheres to *The Standards* is more likely to be judged to be valid and defensible than one that does not.

As stated in Standard 14.14,

“The content domain to be covered by a credentialing test should be defined clearly and justified in terms of the importance of the content for credential-worthy performance in an occupation or profession. A rationale should be provided to support a claim that the knowledge or skills being assessed are required for credential-worthy performance in an occupation and are consistent with the purpose for which the licensing or licensure program was instituted...Some form of job or job analysis provides the primary basis for defining the content domain...” (p.161)

The practice analysis study for the Infection Preventionist/Infection Control Practitioner examination was designed to follow the guidelines presented in *The Standards* and to adhere to accepted professional practice.

METHOD

The practice analysis study for the CIC examination involved a multi-method approach that included meetings with subject matter experts (SMEs) and a survey. This section of the report describes the activities conducted for the practice analysis study.

First, SMEs identified the task and knowledge statements they believed were important to the work performed by Infection Preventionist/Infection Control Practitioners. Then, a survey was developed and disseminated to Infection Preventionist/Infection Control Practitioners. The purpose of the survey was to obtain verification (or refutation) that the tasks and the requisite knowledge to perform those tasks identified by the SMEs are important to the work of Infection Preventionist/Infection Control Practitioners.

STEPS OF THE PRACTICE ANALYSIS STUDY

1. Conduct of a planning meeting
2. Development of the survey instrument
3. Dissemination of the survey
4. Analysis of the survey data
5. Development of the test specifications

Survey research functions as a “check and balance” on the judgments of the SMEs and reduces the likelihood that unimportant areas will be considered in the development of the test specifications. The use of a survey is also an efficient and cost-effective method of obtaining input from large numbers of SMEs and makes it possible for ratings to be analyzed separately by appropriate subgroups of respondents.

The survey results provide information to guide the development of test specifications and content-valid examinations. What matters most is that a certification examination covers the important knowledge needed to perform job activities.

1. Conduct of Planning Meeting

A project-planning meeting was held on December 13, 2013, via web conference. Meeting participants included CBIC staff and the Prometric staff responsible for the conduct of the practice analysis study.

During the planning meeting, several issues were discussed including selection of the Task Force Committee members and Test Specifications Committee members, meeting dates and logistics, and survey delivery.

2. Development of the Survey

Conduct of the Practice Analysis Study Task Force Meeting

The Task Force Committee was comprised of a representative group of Infection Preventionist/Infection Control practitioners. In total, twelve Infection Preventionist/Infection Control Practitioners comprised the committee. A list of the Task Force Committee members appears in Appendix A1. The Task Force meeting was conducted March 14-15, 2014 in Chicago, Illinois. The purpose of the meeting was to develop the survey content. Prometric staff facilitated the meeting.

Prometric staff sent pre-meeting information to the Task Force committee members. The pre-meeting information document is available in Appendix A2.

Activities conducted during the meeting included reviewing the existing information, and, as needed, revising the major domains, tasks, and knowledge that are necessary for the competent performance of Infection Preventionist/Infection Control Practitioners. Survey rating scales and background and general information questions were also presented, discussed, and revised as needed.

Survey Construction and Review Activities

Survey Construction

Upon the completion of the Task Force Meeting, Prometric staff constructed the draft survey. The survey included the following tasks and knowledge domains.

- Domain 1: Identification of Infectious Disease Processes
- Domain 2: Surveillance and Epidemiologic Investigation
- Domain 3: Preventing/Controlling the Transmission of Infectious Agents
- Domain 4: Employee/Occupational Health
- Domain 5: Management and Communication
- Domain 6: Education and Research
- Domain 7: Environment of Care
- Domain 8: Cleaning, Sterilization, Disinfection, Asepsis

The draft survey contained 79 total task statements and 38 total knowledge statements.

Survey Pilot Test

The purpose of the small-scale pilot test was to have professionals in the field who developed the survey and those who had no previous involvement in the development of the survey, review and offer suggestions to improve the instrument. A total of seven survey respondents completed the pilot survey.

Pilot participants were asked to review the survey for clarity of wording, ease of use, and comprehensiveness of content coverage. Comments were compiled by Prometric staff and reviewed via web conference on April 23, 2014 with the Task Force members. The survey was revised and finalized based on the review of the pilot test comments.

Final Version of the Survey

The final version of the online survey consisted of five sections: Section 1: Background and General Information; Section 2: Tasks; Section 3: Knowledge; Section 4: Test Content Recommendations; and Section 5: Comments.

In Section 1: Background and General Information, survey participants were asked to provide general and background information about themselves and their professional activities.

In Section 2: Tasks, survey participants were asked to rate the statements using the importance scale shown below. Respondents were also asked how frequently they perform each task. The final survey contained 80 task statements.

Tasks	
Importance: How important is the task for competent performance of an infection preventionist?	Frequency: How frequently do you perform this task based on an average week of work?
0=Of no importance	0 = Never
1=Of little importance	1 = Seldom
2=Of moderate importance	2 = Occasionally
3=Important	3 = Often
4=Very important	4 = Very Often

In Section 3: Knowledge, survey participants were asked to rate the statements using the importance scale shown below. The final survey contained 40 knowledge statements.

Knowledge
Importance: How important is the knowledge for an infection preventionist?
0=Of no importance
1=Of little importance
2=Of moderate importance
3=Important
4=Very important

Survey participants were asked to provide a rating measuring the representativeness of each task and knowledge domain. Respondents made their judgments using a five-point rating scale shown below.

Content Coverage
How well do the task/knowledge statements in Domain X cover the important aspects of X?
1 = Very Poorly
2 = Poorly
3 = Adequately
4 = Well
5 = Very Well

A write-in area was provided for respondents to note any areas that were not covered within a specific domain.

In Section 4: Test Content Recommendations, survey participants were asked to indicate the content weights for the eight content domains (Identification of Infectious Disease Processes; Surveillance and Epidemiologic Investigation; Preventing/Controlling the Transmission of Infectious Agents; Employee/Occupational Health; Management and Communication; Education and Research, Environment of Care; Cleaning, Sterilization, Disinfection, Asepsis).

This was accomplished by distributing 100 percentage points across the eight knowledge areas. These distributions represented the allocation of examination items survey participants believed should be devoted to each area.

In Section 5: Comments, survey respondents were given the opportunity to answer open-ended questions: “What additional professional development and/or continuing education could you use to improve your performance in your current work role?” and “How do you expect your work role to change over the next few years? What tasks will be performed and what knowledge will be needed to meet changing job demands?”

3. Dissemination of the Survey

CBIC provided six e-mail distribution lists to Prometric to send the survey link to 17,946 medical professionals. Survey participants were given the opportunity to participate in a random drawing where they could win one of three prizes (Amazon gift card, Kindle Fire, or Visa gift card). Winners were selected in June 2014.

The final survey appears in Appendix B.

4. Analysis of the Survey Data

As previously noted, the purpose of the survey was to validate the tasks and knowledge that relatively large numbers of Infection Preventionist/Infection Control Practitioners judged to be relevant (verified as important) to their work. This objective was accomplished through an analysis of the mean importance ratings for tasks and knowledge statements. The derivation of test specifications from those statements verified as important by the surveyed medical professionals provides a substantial evidential basis for the content validity of credentialing examinations.

Based on information obtained from the survey, data analyses by respondent subgroups (e.g., practice setting) are possible when sample size permits. A subgroup category is required to have at least 30 respondents to be included in the mean analyses. This is a necessary condition to ensure that the mean value based upon the sample of respondents is an accurate estimate of the corresponding population mean value.

The following quantitative data analyses were produced:

- Means, standard deviations, and frequency (percentage) distributions for tasks statements and content coverage ratings
- Means, standard deviations, and frequency distributions (percentage) for knowledge statements and content coverage ratings
- Medians and modes for task frequency ratings
- Means and standard deviations for test content recommendations
- Index of agreement values for designated subgroups

Criterion for Interpretation of Mean Importance Ratings

Since a major purpose of the survey is to ensure that only validated tasks and knowledge statements are included in the development of test specifications, a criterion (cut point) for inclusion needs to be established.

A criterion that has been used in similar studies is a mean importance rating that represents the midpoint between moderately important and important. For the importance rating scale used across many studies, the value of this criterion is 2.50.

Definition of Pass, Borderline and Fail Categories for Task and Knowledge Importance Mean Ratings

	<u>Means</u>
Pass:	At or above 2.50
Borderline:	2.40 to 2.49
Fail:	Less than 2.40

It is believed that this criterion is consistent with the intent of content validity. Therefore, for this practice analysis, Prometric recommended the value of this criterion should be set at 2.50. Accordingly, the task and knowledge statements were placed into one of three categories: Pass, Borderline, or Fail as determined by their mean importance ratings.

- The Pass Category contains those statements with mean ratings at or above 2.50, and are considered eligible for inclusion in the development of test specifications.
- The Borderline Category contains those statements whose mean ratings are between 2.40 and 2.49. The Borderline Category is included to provide a point of discussion for the Task Force to determine if the statement(s) warrant(s) inclusion in the test specifications.
- The Fail Category contains those statements whose mean ratings are less than 2.40. It is recommended that statements in the Fail Category be excluded from consideration in the test specifications.

5. Development of the Test Specifications

A meeting was facilitated by Prometric staff to develop the test specifications based on the practice analysis study results. The meeting was conducted between June 27-28, 2014, at the Prometric headquarters in Baltimore, Maryland.

The meeting focused on:

- finalizing the tasks that are important for inclusion based on the survey results;
- finalizing the knowledge statements for inclusion based on the survey results;
- establishing the percentage test content weights for each area on the examination, and
- linking the task and knowledge statements.

These percentage test weights are used to guide examination development activities.

RESULTS

Survey Responses

The survey link was distributed to 17,946 medical professionals. A total of 2,819 viable surveys were submitted, resulting in a response rate of 15.71%. If the survey respondents answered “No” to “Are you an Infection Preventionist/Infection Control Practitioner?” then they were exited from the survey (N=325). Therefore, 2,494 responses were used for analysis.

For purposes of this study, it was determined that a viable survey would meet the following criteria: (1) respondent must be an Infection Preventionist/Infection Control Practitioner; (2) respondent must complete over 55% of the rating scales. Based on the analysis of survey responses, a representative group of Infection Prevention/Infection Control Practitioners completed the survey in sufficient numbers to meet the requirements to conduct statistical analysis. This is evidenced by the distribution of responses for each of the background information questions and was confirmed through discussion with the Committee and CBIC representatives.

Demographic Characteristics of Survey Respondents

The profile of survey respondents is below. All responses to the background and general information section of the survey are provided in Appendix C1. The results in the figures below reflect the sample size of 2,494 used for analysis. Write in responses for questions “Other, please specify” as options are provided in Appendices C2 through C8.

Figure 1. Demographic Question *Are you an Infection Preventionist/Infection Control Practitioner?

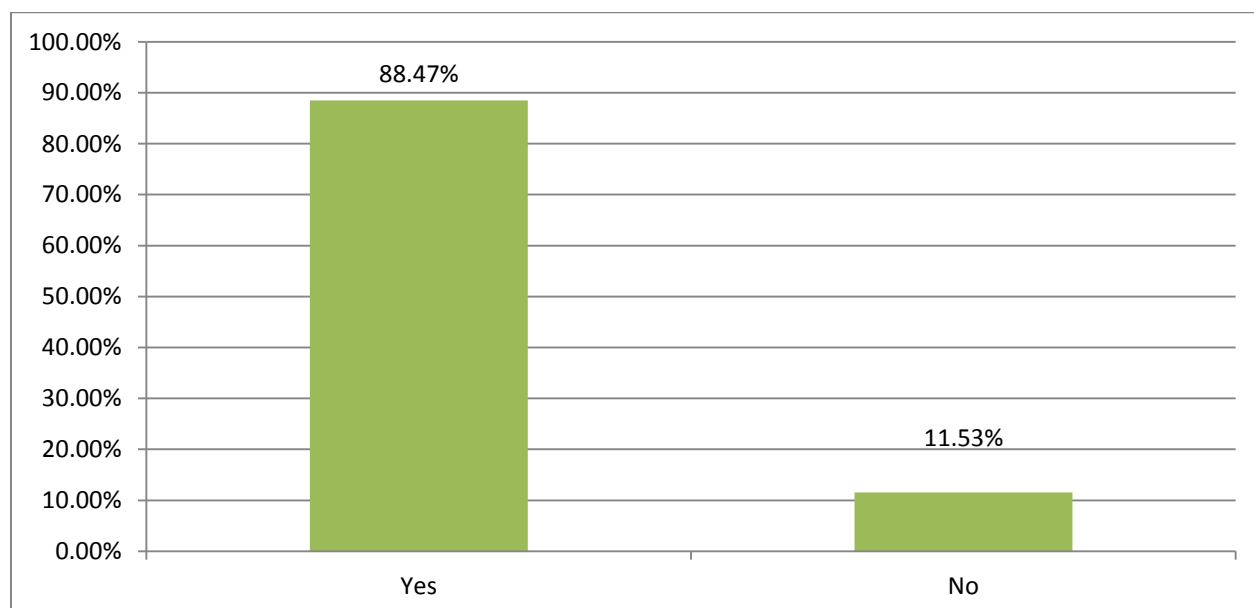


Figure 2. Demographic Question *1. How many years have you worked in infection prevention and control?

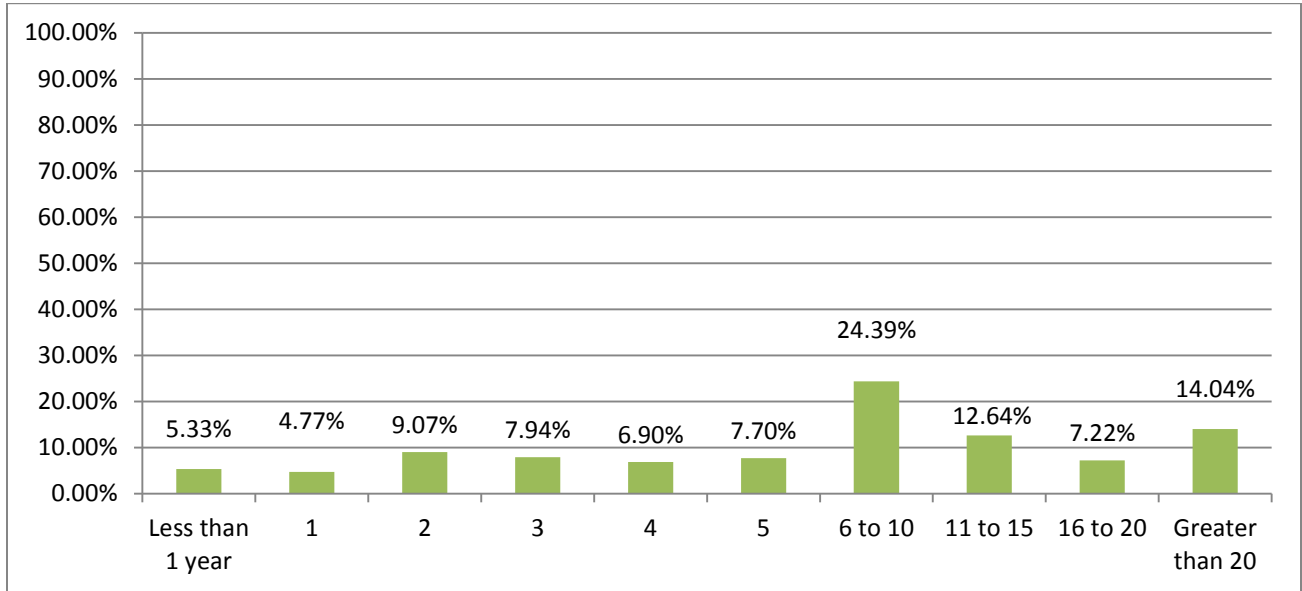


Figure 3. Demographic Question *2. Which practice setting do you most identify with?

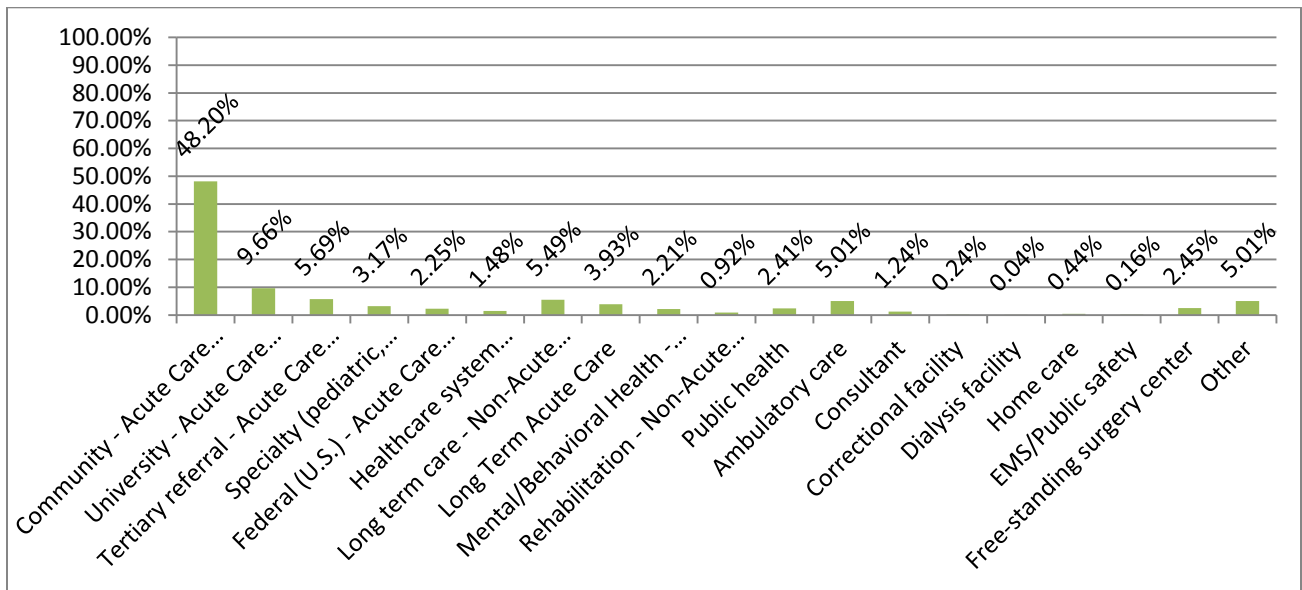


Figure 4. Demographic Question *3. What is the bed capacity of your primary practice setting?

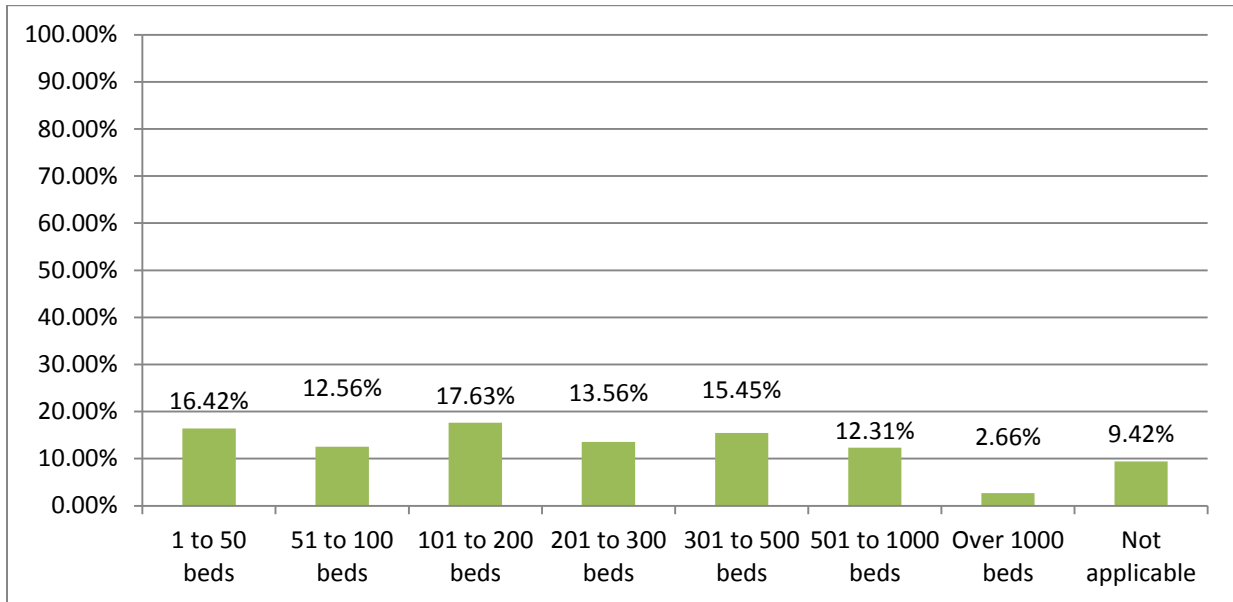


Figure 5. Demographic Question *4. How many Infection Preventionist/Infection Control Practitioners (FTEs) are assigned to your primary practice setting?

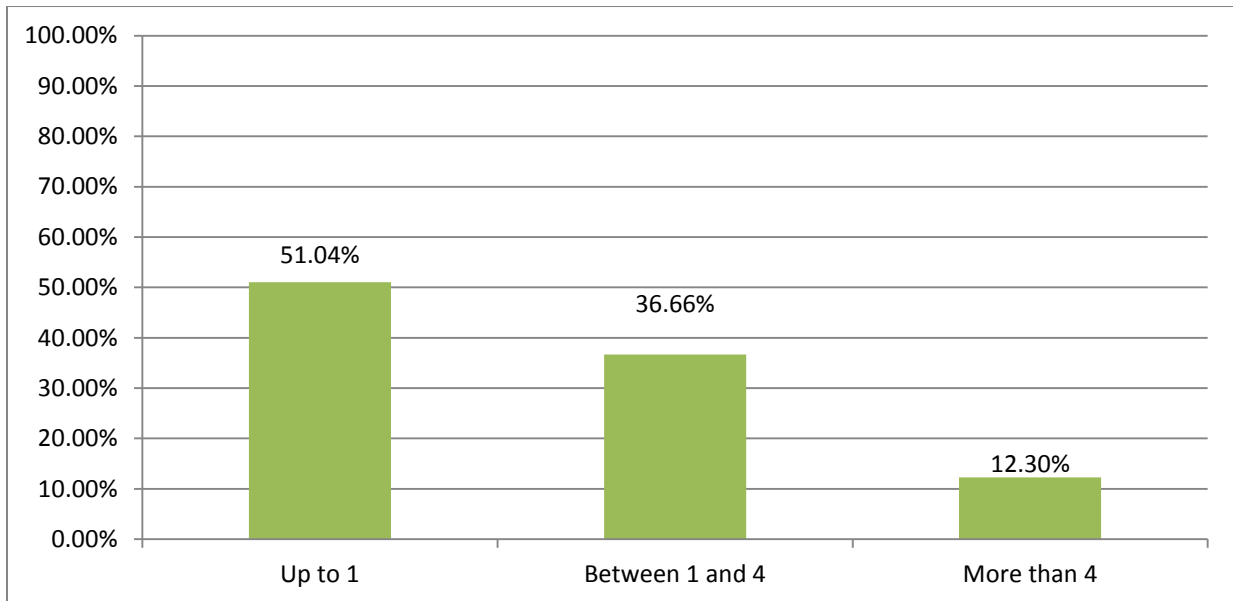


Figure 6. Demographic Question *5. Over the past year, approximately how many hours per week have you spent in infection control activities?

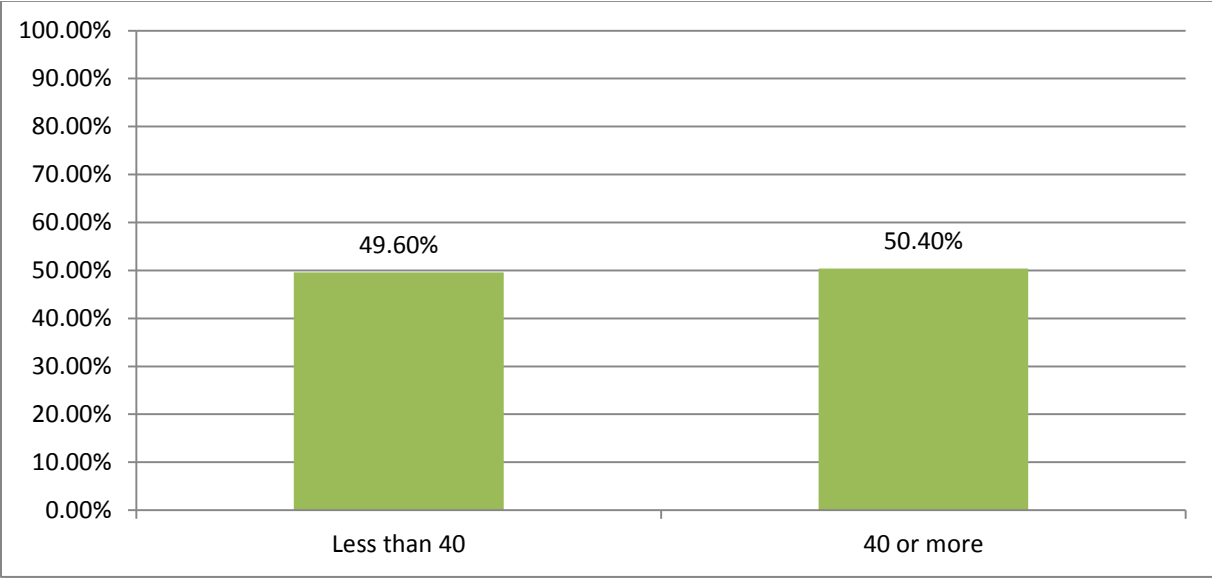


Figure 7. Demographic Question *6. If your job has additional responsibilities outside of infection prevention and control, what is your other main responsibility?

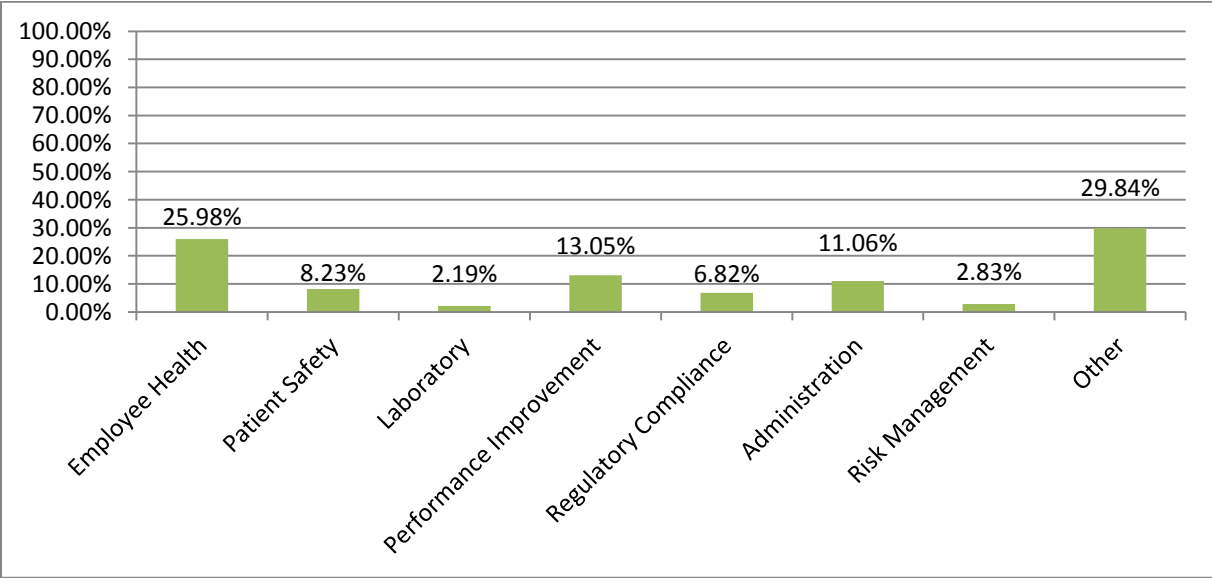


Figure 8. Demographic Question * 7. Is your primary facility accredited (e.g., DNV, Joint Commission, etc.)?

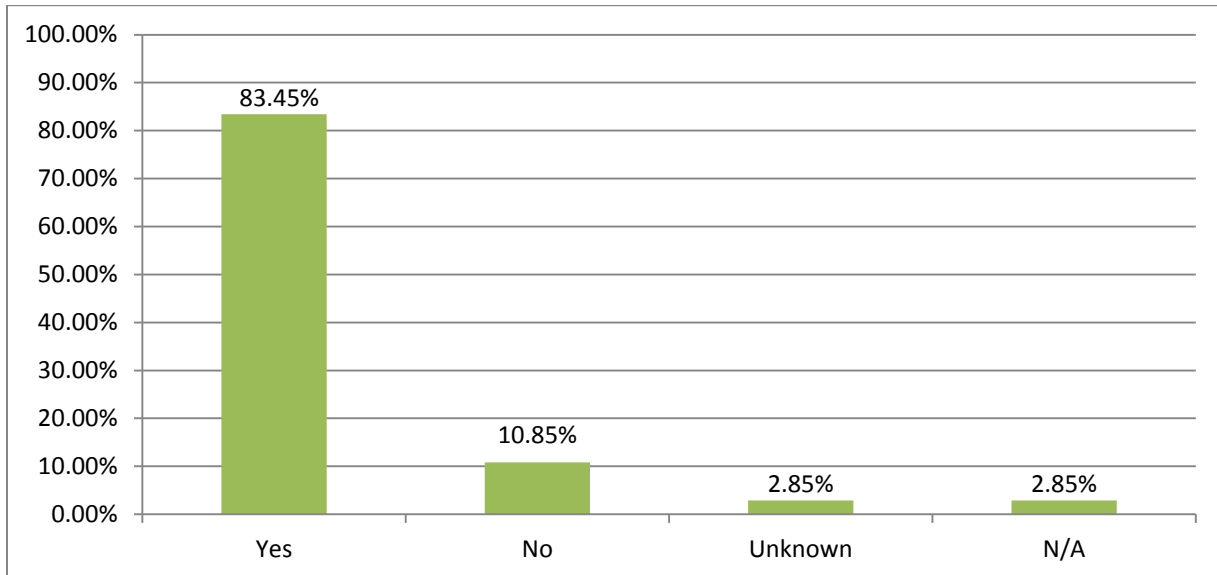


Figure 9. Demographic Question * 8. Are you currently certified by CBIC in infection prevention and control?

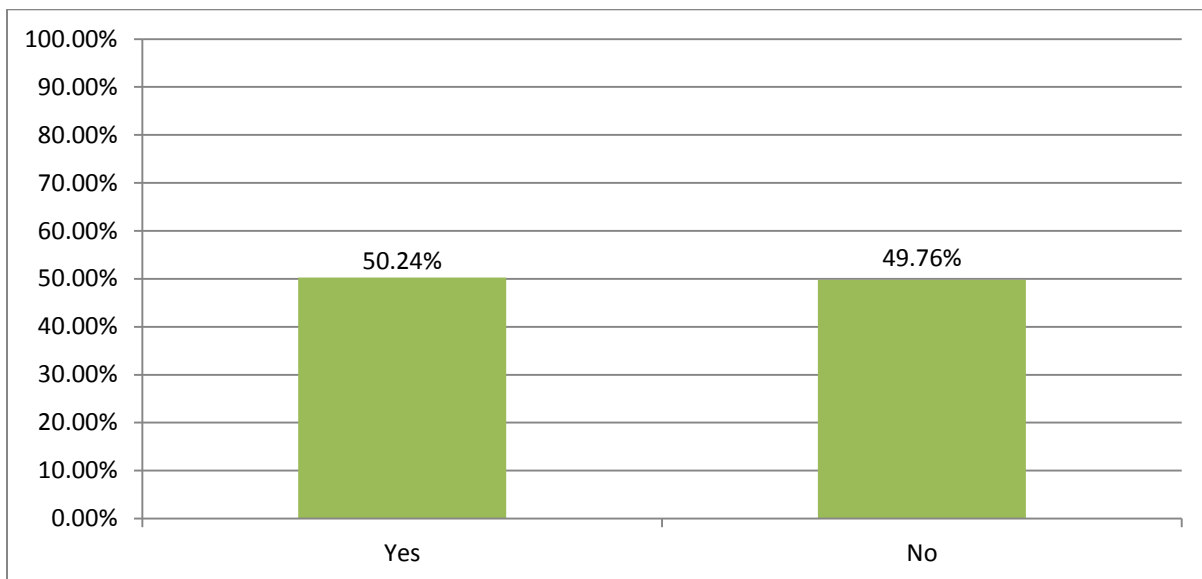


Figure 10. Demographic Question * 8a. If you are not currently certified by CBIC in infection prevention and control, do you plan on becoming certified?

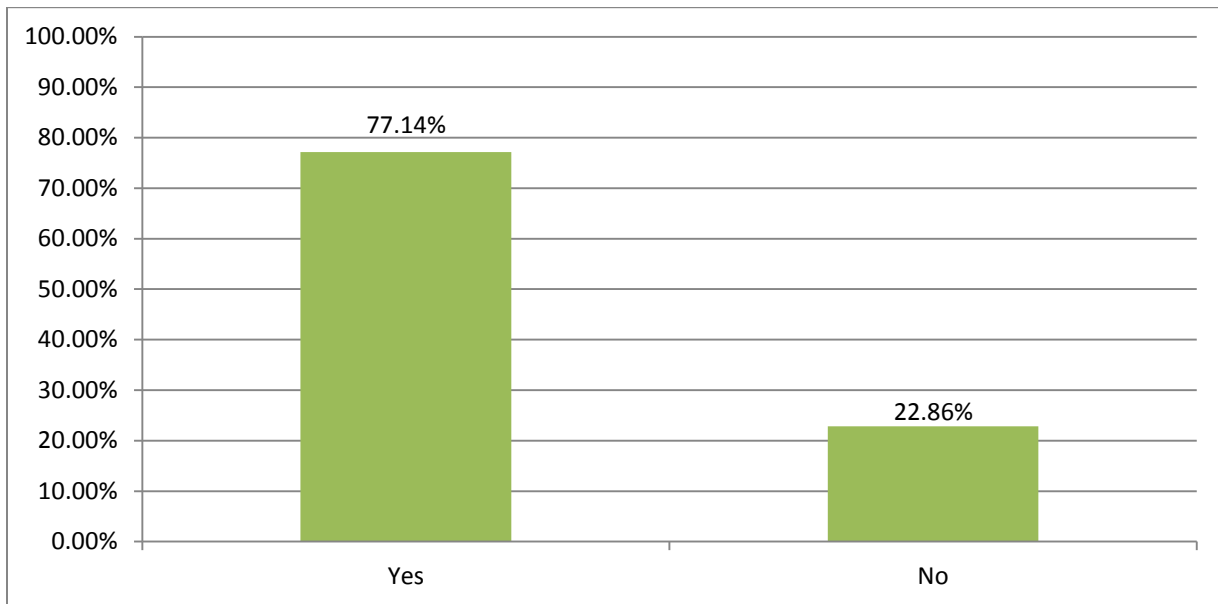


Figure 11. Demographic Question * 9. Is certification in Infection prevention and control required by your primary employer?

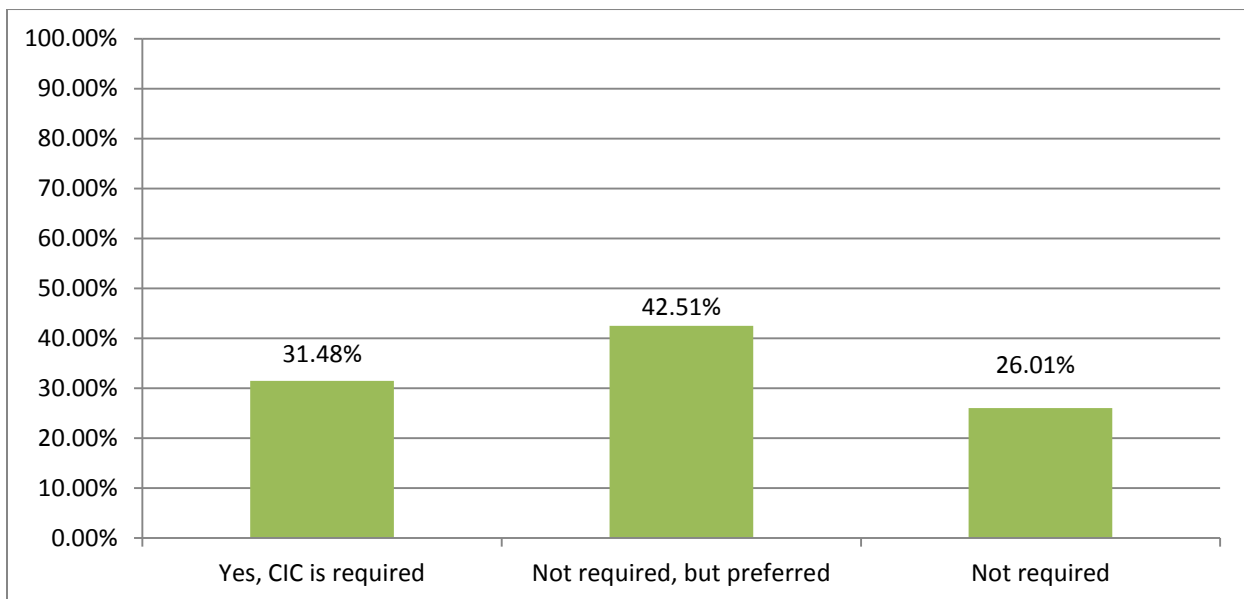


Figure 12. Demographic Question * 10. Which of the following other certifications do you hold? (select all that apply)

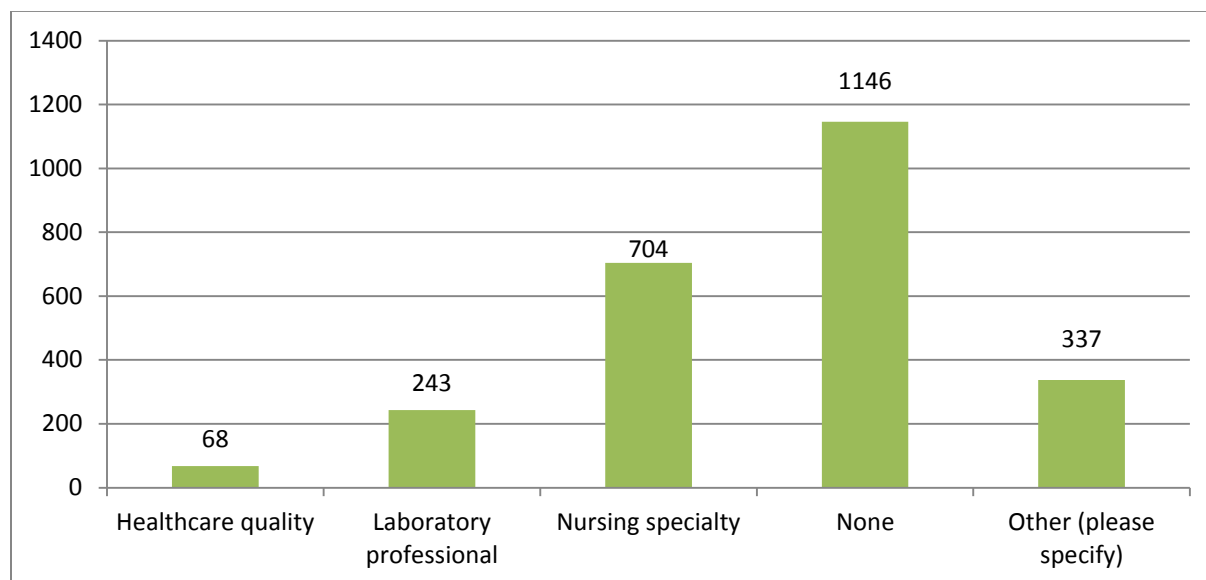


Figure 13. Demographic Question * 11. In what geographic area are you employed?

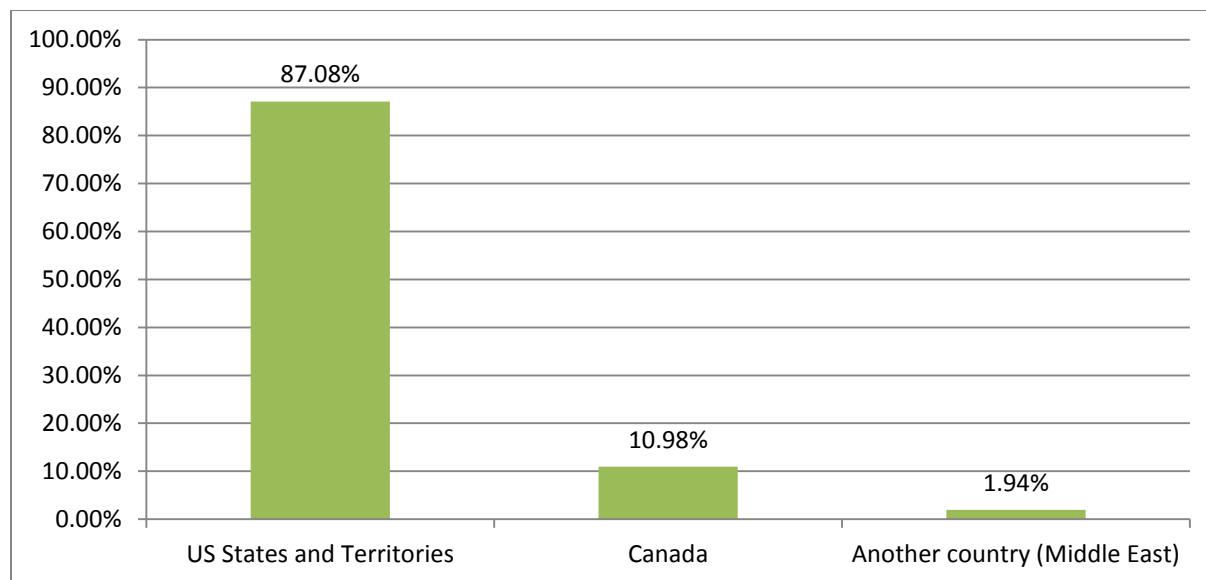


Figure 14. Demographic Question 11a. if US, select State (broken into geographic area)

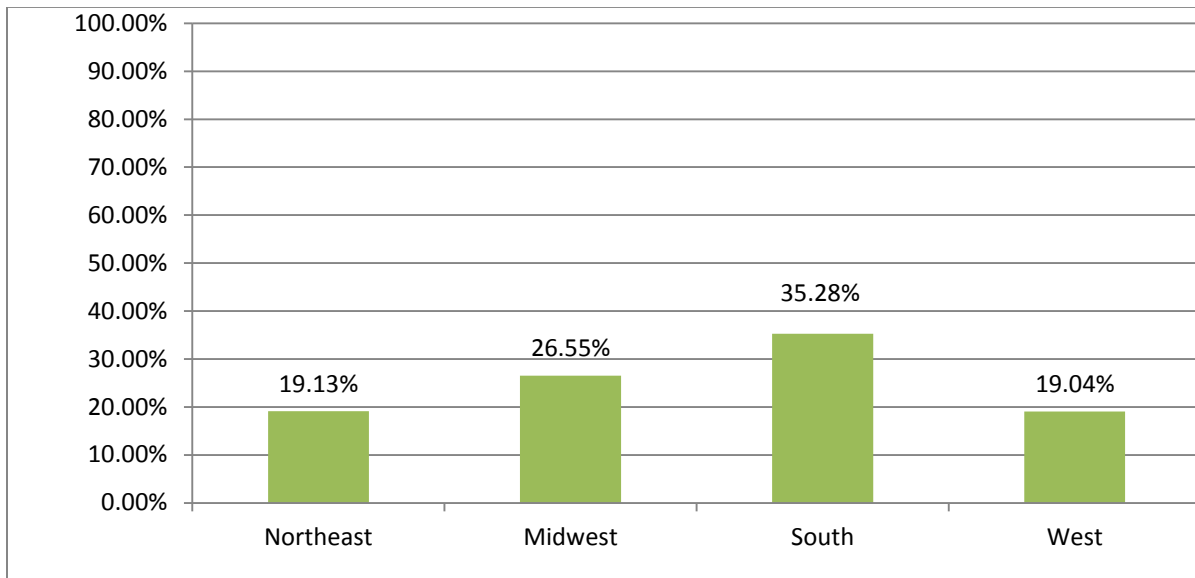


Figure 15. Demographic Question * 11a. if Canada, select Province (broken into geographic area)

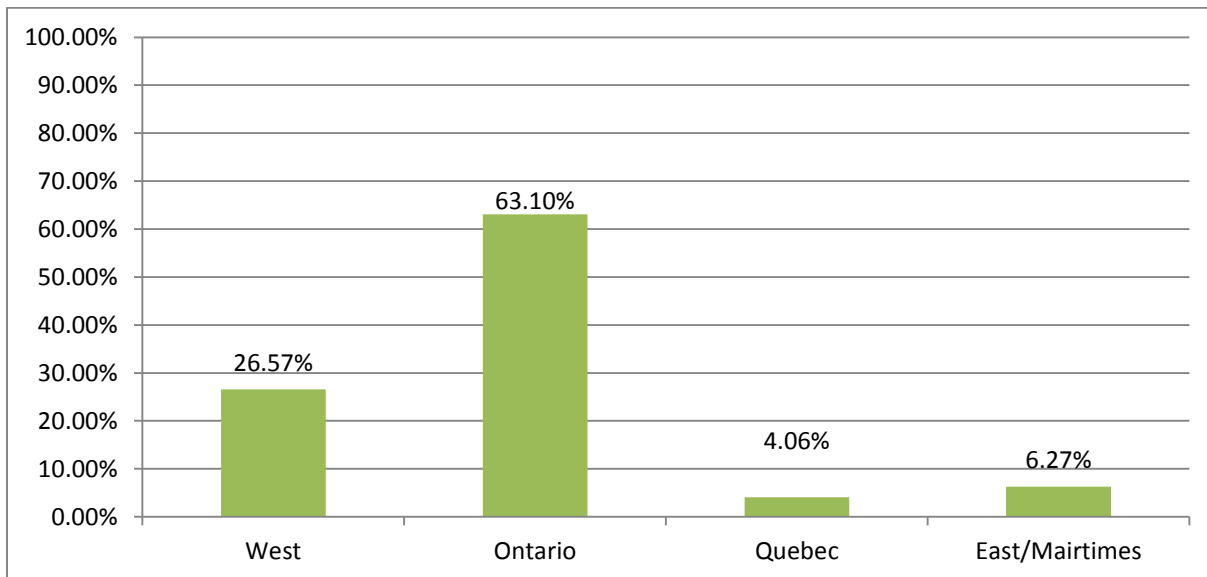


Figure 16. Demographic Question * 11a. if Other country, select or specify country

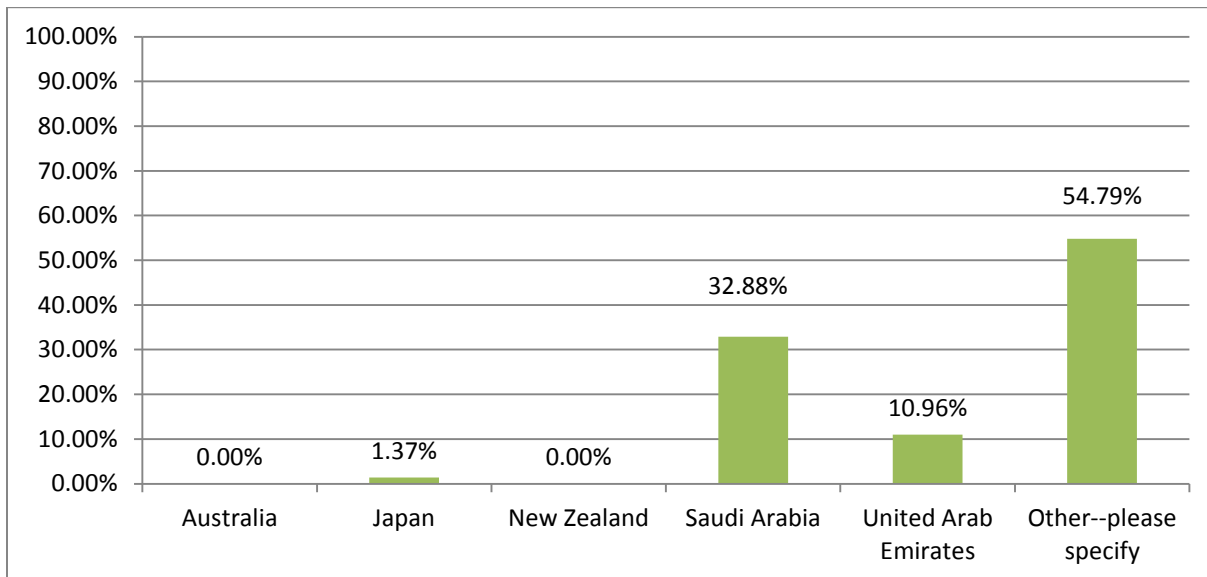


Figure 17. Demographic Question *12. Which of the following best describes your highest level of education?

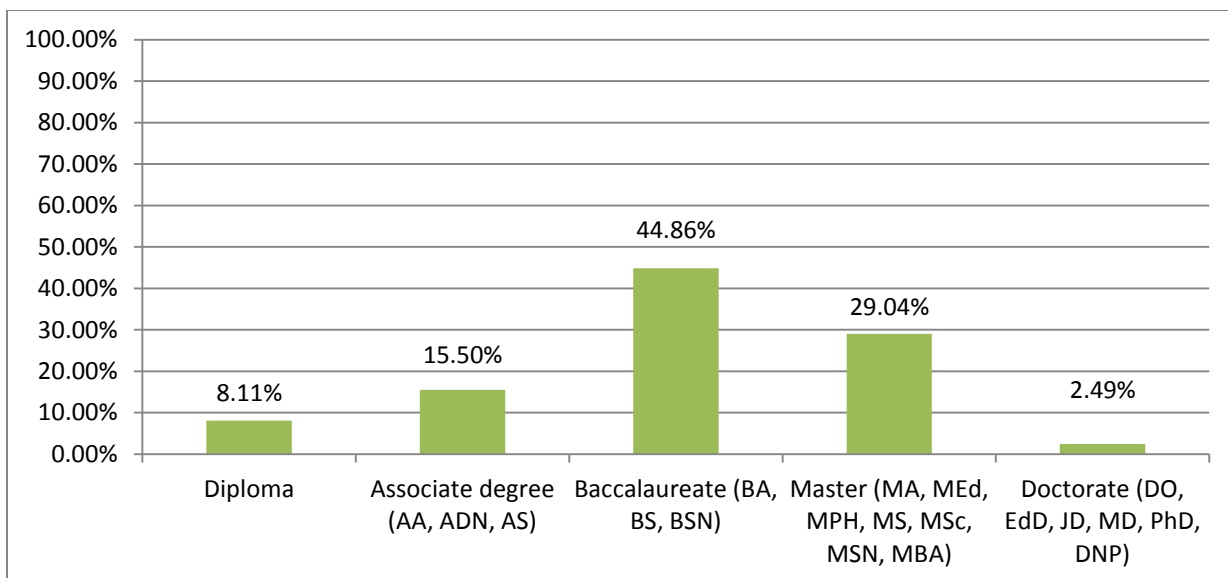


Figure 18. Demographic Question *13. Which of these describes your professional background?

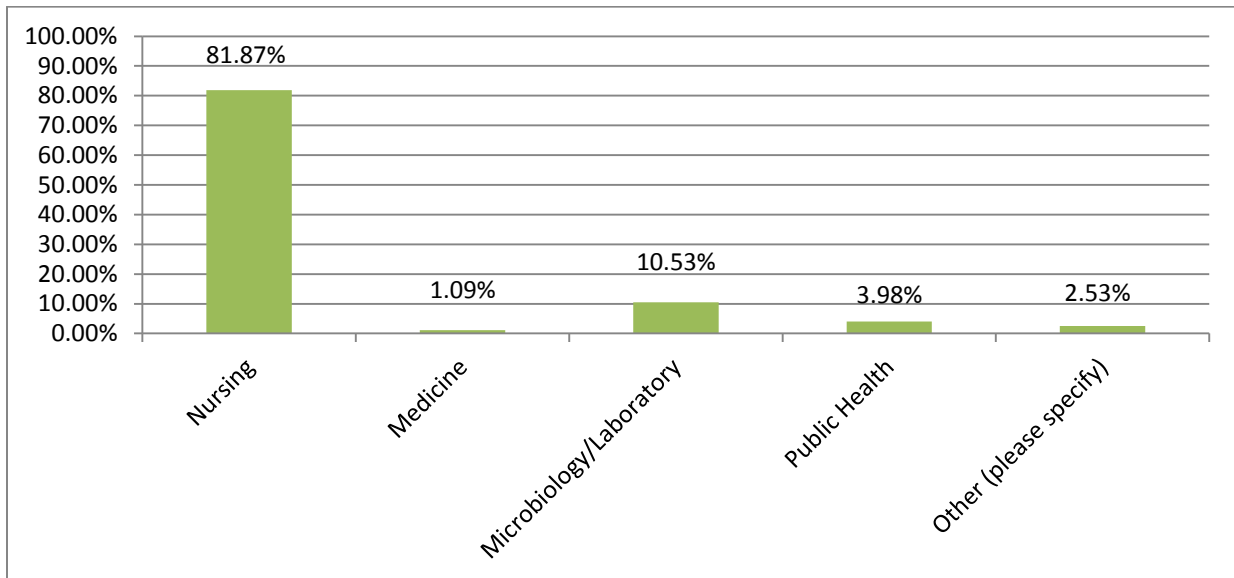


Figure 19. Demographic Question *14. What is your preferred language?

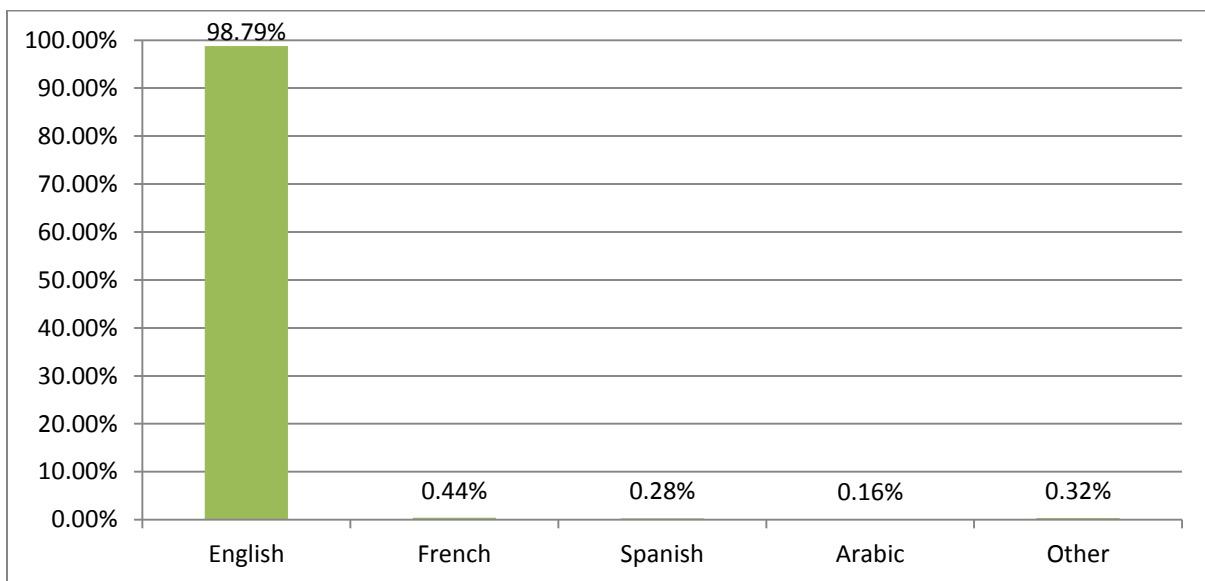


Figure 20. Demographic Question *15. What is your gender?

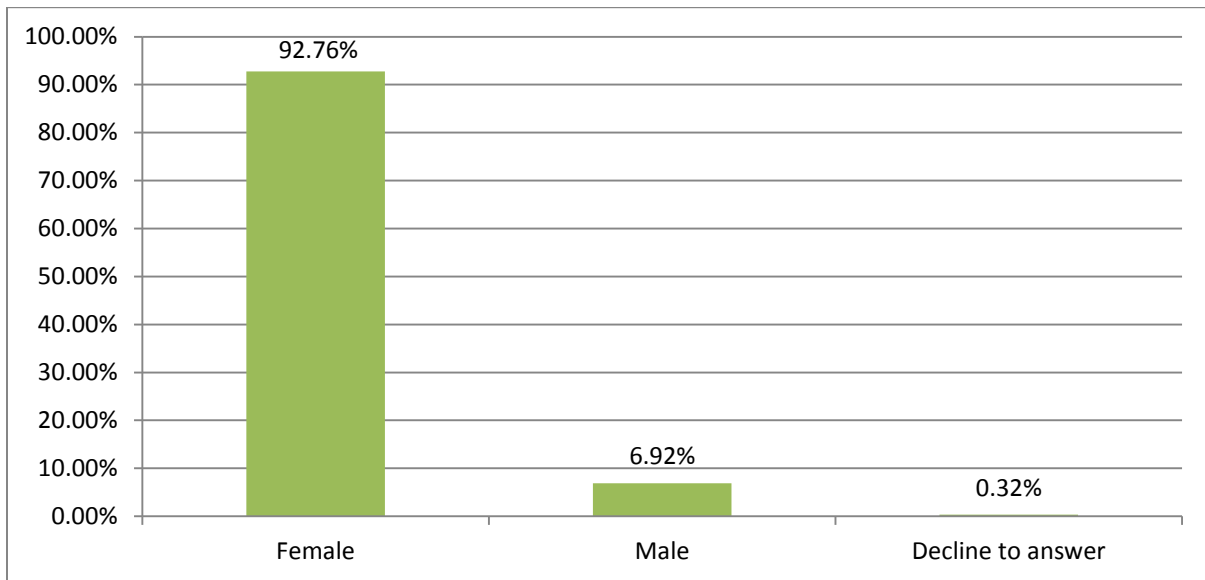
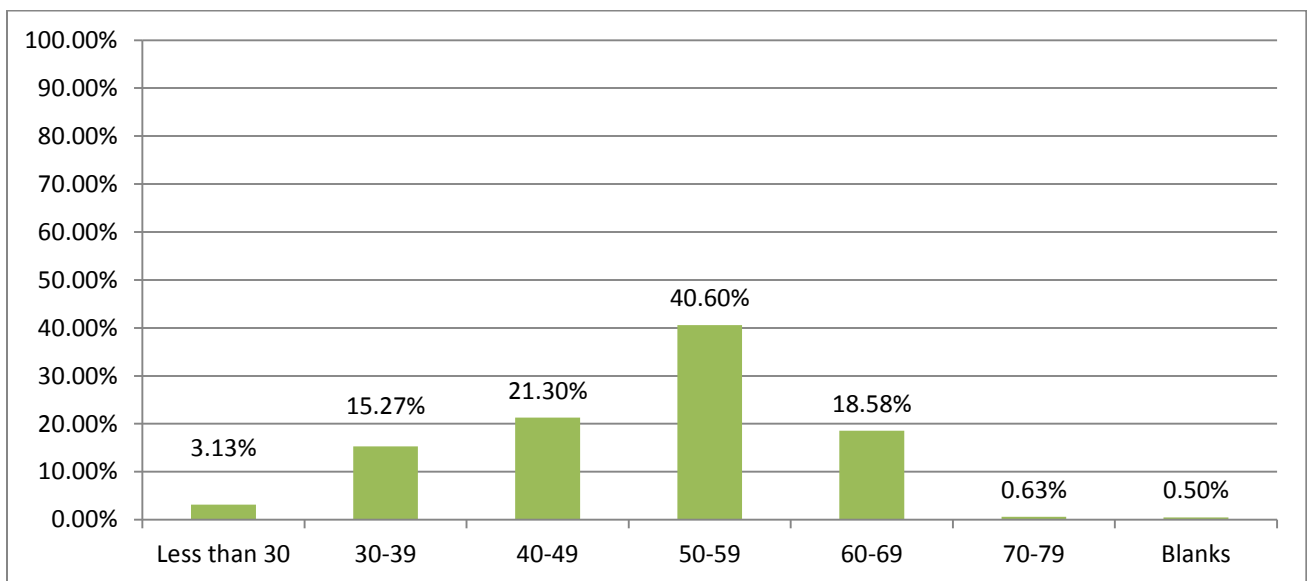


Figure 21. Demographic Question *16. What is your age?



Tasks and Knowledge Overall Ratings

For the purposes of the Practice Analysis study, only practicing Infection Preventionist/Infection Control Practitioners were included for analysis. The following provides a summary of survey respondents' ratings of the tasks and knowledge. All of the 120 tasks and knowledge (100.00%) achieved high means (at or above 2.50), thereby validating their importance to competent performance for Infection Preventionist/Infection Control Practitioners.

Tasks

Means and standard deviations for the task importance and frequency ratings, included on the survey, are provided in Appendix D1; medians and modes for the frequency ratings are included in Appendix D2. All of the 80 tasks achieved high importance means. Table 1 shows the tasks that were placed in Pass, Borderline, and Fail categories by domain.

Table 1. *Tasks by Pass, Borderline, and Fail categories*

Tasks Domains	No. of Tasks	Pass (Mean 2.50 or Above)	Borderline (Mean 2.40 to 2.49)	Fail (Mean Less than 2.40)
1. Identification of Infectious Disease Processes	3	3	0	0
2. Surveillance and Epidemiologic Investigation	24	24	0	0
3. Preventing/Controlling the Transmission of Infectious Agents	17	17	0	0
4. Employee/Occupational Health	5	5	0	0
5. Management and Communication	14	14	0	0
6. Education and Research	9	9	0	0
7. Environment of Care	5	5	0	0
8. Cleaning, Sterilization, Disinfection, Asepsis	3	3	0	0
Total	80	80	0	0
Percentage		100.00%	0.00%	0.00%

Knowledge

Means and standard deviations for the knowledge included on the survey are presented in Appendix E. All of the 40 knowledge (100%) achieved high importance means. Table 2 shows the knowledge that were placed in Pass, Borderline, and Fail categories.

Table 2. Knowledge Statements by Pass, Borderline, and Fail categories

Knowledge Domains	No. of Knowledge Statements	Pass (Mean 2.50 or Above)	Borderline (Mean 2.40 to 2.49)	Fail (Mean Less than 2.40)
1. Identification of Infectious Disease Processes	5	5	0	0
2. Surveillance and Epidemiologic Investigation	15	15	0	0
3. Preventing/Controlling the Transmission of Infectious Agents	4	4	0	0
4. Employee/Occupational Health	1	1	0	0
5. Management and Communication	5	5	0	0
6. Education and Research	4	4	0	0
7. Environment of Care	4	4	0	0
8. Cleaning, Sterilization, Disinfection, Asepsis	2	2	0	0
Total	40	40	0	0
Percentage		100.00%	0.00%	0.00%

Subgroup Analysis of Tasks and Knowledge Ratings

The index of agreement (IOA) is a measure of the extent to which subgroups of respondents agree on which tasks and knowledge are important. Using the mean importance ratings for tasks and knowledge, indices of agreement were computed:

- If the subgroup means are above the critical importance value (mean ratings at or above 2.50), then they agree that the content is important.
- If the subgroup means are below the critical importance value (mean ratings less than 2.50), then the subgroups agree that the content is considered less important.
- By contrast, if one subgroup's (for example, female) mean ratings are above the critical importance value and another subgroup's (for example, male) means are below the critical importance value then the subgroups are in disagreement as to whether the content is important.

The index of agreement provides a method of computing the similarity in judgments between groups that is more tailored to the purpose of a practice analysis study than the correlation coefficient. Although the correlation coefficient measures the tendency toward agreement along the full range of possible ratings, the agreement index focuses on whether two groups agree that the content should (or should not) be included in an examination.

As one of the major purposes of this practice analysis study is to identify appropriate test content, the agreement index provides a statistical method to address this question at the subgroup level. Furthermore,

the agreement index requires only 30 respondents per subgroup for computation, whereas the correlation coefficient requires at least 100 respondents per subgroup to provide a reliable measure of agreement.

An illustrative example for two groups on a survey with 100 knowledge shows how the index is computed. If two groups passed the same 96 knowledge and failed the same 2 knowledge areas (out of the 100 total knowledge groups in the survey), the agreement index would be computed as $Agreement = (96 + 2)/100 = 0.98$. Values of 0.80 or less are considered as *Disagreement* and therefore additional mean analysis is required. If required, the additional analysis will be considered by the Test Specifications Committee about whether to include the statements identified as having differences in the final test specifications.

The index of agreement coefficients for tasks and knowledge are provided in Appendix F. Agreement coefficients were produced on the following background questions:

- How many years have you worked in infection prevention and control?
- Which practice setting do you most identify with?
- What is the bed capacity of your primary practice setting?
- How many Infection Preventionist/Infection Control Practitioners (FTEs) are assigned to your primary practice setting?
- Over the past year, approximately how many hours per week have you spent in infection control activities?
- Is your primary facility accredited (e.g., DNV, Joint Commission, etc.)?
- Are you currently certified by CBIC in infection prevention and control?
- In what geographic area are you employed? (split into US, Canada, Middle East)
- If US, select State (split into Northeast, Midwest, South, West)
- If Canada, select Province (split into West, Ontario, Quebec, East/Maritimes)
- Which of the following best describes your highest level of education?
- Which of these describes your professional background?

The agreement coefficients ranged from 0.99 to 1.00 for tasks and 0.95 to 1.00 for the knowledge statements. All of the subgroups achieved strong agreement (coefficients of 0.80 or higher).

Content Coverage Ratings

The survey participants were asked to indicate how well the statements within each of the task and knowledge domains covered important aspects of that area. These responses provide an indication of the comprehensiveness of the survey content.

The five-point rating scale included 1=Very Poorly, 2=Poorly, 3=Adequately, 4=Well, and 5=Very Well. The means and standard deviations for the task ratings are provided in Tables 3 and 4. The means ranged from 3.03 to 3.23. This provides evidence that the content areas were adequately to very well covered on the survey.

Table 3. Mean, Standard Deviation, and Frequency Distribution Percentage of Tasks Content Coverage

Task Domain	Content Coverage						
	Mean	SD	Frequency Percentage				
			1=Very poorly	2=Poorly	3=Adequately	4=Well	5=Very well
1. Identification of Infectious Disease Processes	3.10	0.76	0.04%	0.73%	21.48%	44.33%	33.43%
2. Surveillance and Epidemiologic Investigation	3.20	0.77	0.04%	0.69%	19.47%	39.23%	40.57%
3. Preventing/Controlling the Transmission of Infectious Agents	3.23	0.75	0.08%	0.37%	17.35%	41.06%	41.14%
4. Employee/Occupational Health	3.13	0.77	0.16%	0.82%	20.89%	42.36%	35.76%
5. Management and Communication	3.07	0.78	0.17%	0.87%	23.61%	42.96%	32.39%
6. Education and Research	3.07	0.78	0.08%	0.84%	24.29%	41.57%	33.21%
7. Environment of Care	3.13	0.77	0.00%	1.02%	20.82%	42.70%	35.46%
8. Cleaning, Sterilization, Disinfection, Asepsis	3.11	0.78	0.04%	1.13%	21.38%	42.32%	35.13%

Table 4. Mean, Standard Deviation, and Frequency Distribution Percentage of Knowledge Content Coverage

Knowledge Domain	Content Coverage						
	Mean	SD	Frequency Percentage				
			1=Very poorly	2=Poorly	3=Adequately	4=Well	5=Very well
1. Identification of Infectious Disease Processes	3.21	0.75	0.04%	0.47%	18.49%	40.91%	40.09%
2. Surveillance and Epidemiologic Investigation	3.21	0.76	0.04%	0.52%	18.29%	40.27%	40.88%
3. Preventing/Controlling the Transmission of Infectious Agents	3.19	0.75	0.04%	0.44%	18.93%	41.68%	38.91%
4. Employee/Occupational Health	3.03	0.83	0.18%	2.24%	25.12%	39.83%	32.63%
5. Management and Communication	3.03	0.77	0.13%	1.13%	24.01%	44.57%	30.16%
6. Education and Research	3.05	0.78	0.09%	0.85%	25.07%	42.39%	31.61%
7. Environment of Care	3.10	0.77	0.13%	0.58%	22.56%	42.15%	34.58%
8. Cleaning, Sterilization, Disinfection, Asepsis	3.17	0.80	0.13%	1.30%	20.13%	38.64%	39.80%

Write in comments

Survey respondents were also asked to write in tasks or knowledge that they believe should be included in the listing of important tasks and knowledge. See Appendix G1(Task) and Appendix G2 (Knowledge) for the content coverage write-in comments. The Test Specifications Committee reviewed the comments to determine whether there were important statements not covered on the survey that should be included in the test specifications.

Test Content Recommendations

In survey Section 4: Test Content Recommendations, participants were asked to assign a percentage weight to each task domain. The sum of percentage weights was required to be equal to 100. This information was used by the Test Specifications Committee as an aid in making decisions about how much emphasis the domains should receive on the test content outline (see Appendix I). The mean weights across all survey respondents are presented in Table 5.

Table 5. Survey Respondents' Test Content Recommendations by Mean Percentages and Standard Deviations

Domain	Mean (%)	SD (%)	Range	
			Minimum	Maximum
1. Identification of Infectious Disease Processes	16.12	6.32	0	60
2. Surveillance and Epidemiologic Investigation	17.38	7.03	0	70
3. Preventing/Controlling the Transmission of Infectious Agents	18.48	6.47	0	90
4. Employee/Occupational Health	8.20	4.30	0	50
5. Management and Communication	8.25	3.97	0	30
6. Education and Research	7.89	3.82	0	30
7. Environment of Care	10.61	4.47	0	30
8. Cleaning, Sterilization, Disinfection, Asepsis	12.81	5.86	0	80

Write-In Comments

Many survey respondents provided responses to the open-ended questions in Section 5: Comments about expected changes in their job role over the next few years and professional development/continuing education needs. See Appendix H1 and H2 for write-in comments.

DEVELOPMENT OF TEST SPECIFICATIONS FOR THE CERTIFICATION IN INFECTION CONTROL EXAMINATION

A test specifications meeting for the Certification in Infection Control examination was conducted June 27-28, 2014, in Baltimore, Maryland. The steps involved in the development of test specifications included the following:

- presentation of the practice analysis study and results to the Test Specifications Committee;
- identification of the task and knowledge statements to be included on the CIC test specifications;
- development of the test content weights for the CIC examination; and,
- linkage of task and knowledge statements.

Presentation of the Practice Analysis Study and Results to the Test Specifications Committee

The first activity involved in the test specification development was to provide the Test Specifications Committee with an overview of the practice analysis activities that were conducted and to present the results of the study.

Identification of the Task and Knowledge Statements to be Included on the Certification in Infection Control Test Specifications

The Test Specifications Committee reviewed the task and knowledge statement results to make final recommendations about the areas that should be included on the CIC examination (see Appendix J).

The survey results served as the primary source of information used by the Test Specification Committee members to make test content decisions. Recommendations were based on the following criteria:

- the mean task and knowledge ratings for all respondents;
- the frequency distribution of ratings for all respondents; and,
- the appropriateness of the content for the examination.

The Test Specifications Committee recommended the inclusion of 80 tasks and 40 knowledge statements on the CIC examination.

Tasks Recommended for Inclusion

- All of the 80 tasks achieved mean ratings at or above 2.50 (Pass category) and were included on the CIC test specifications.

Knowledge Statements Recommended for Inclusion

- All of the 40 knowledge statements achieved mean ratings at or above 2.50 (Pass category) and were included on the CIC test specifications.

Development of Test Content Weights

The Test Specifications Committee participated in an exercise that required each member individually to assign a percentage weight to each of the knowledge domains. Weights were then entered into a spreadsheet and shown to the committee. The committee members were able to compare the test content weights derived from the survey responses to their own estimates. This resulted in a productive discussion among the committee members regarding the optimal percentages for the CIC examination.

Table 6 presents the test specifications recommendations including the percentage content weights by domain and the target number of questions for the CIC examination. The complete test specifications are presented in Appendix J.

Table 6. *Test Content Weights Recommended by the Test Specifications Committee*

Content Areas	Number of Task Statements	Number of Test Items	Domain Percentage
1. Identification of Infectious Disease Processes	3	22	16%
2. Surveillance and Epidemiologic Investigation	24	24	18%
3. Preventing/Controlling the Transmission of Infectious Agents	17	25	19%
4. Employee/Occupational Health	5	11	8%
5. Management and Communication	14	13	10%
6. Education and Research	9	11	8%
7. Environment of Care	5	14	10%
8. Cleaning, Sterilization, Disinfection, Asepsis	3	15	11%
Total	80	135	100%

Linkage of Task and Knowledge/Skill Statements

Task and knowledge linking verifies that each knowledge area included on an examination is related to the competent performance of important tasks. As such, linking documents the content validity of the tasks included in the test specifications.

Linking does not require the production of an exhaustive listing; rather, task-knowledge links are developed to ensure that each task is identified as being related to at least three, or in most cases several, important knowledge statements.

Linking also provides guidance for item-writing activities. When item writers develop questions for specific content areas, they have this listing of knowledge statements that relate to the tasks available in a supplemental document. This provides context for developing examination questions, and assists the item writers in question design. This linking of tasks and knowledge is included in Appendix K.

SUMMARY AND CONCLUSIONS

The practice analysis study for the Certification in Infection Control (CIC) examination was conducted to identify tasks and knowledge statements that are important to the work performed by Infection Preventionist/Infection Control Practitioners. Further, the data collected was used to guide the development of the test specifications which will be used to develop the examination.

The tasks and knowledge statements were developed through an iterative process involving the combined efforts of the CBIC, subject matter experts, and Prometric staff. These statements were then entered into a survey format and subjected to verification/refutation through the dissemination of a survey to Infection Preventionist/Infection Control Practitioners. The survey participants were asked to rate the importance of tasks and knowledge statements for competence as an Infection Preventionist/Infection Control Practitioner.

The results of the study support the following:

- All of the tasks and knowledge statements that were verified as important through the survey provide the foundation of empirically derived information from which to develop test specifications for the Certification in Infection Control (CIC) examination.
- Evidence was provided in this study that the comprehensiveness of the content within the task and knowledge domains was adequately to very well covered.
- The process utilized and all of the information that resulted from the analysis supported the development of the test specifications.

In summary, the study used a multi-method approach to identify the tasks and requisite knowledge needed to perform those tasks that are important to the work performed by Infection Preventionist/Infection Control Practitioners. The results of the study were used to develop the test specifications for the Certification in Infection Control (CIC) examination.