
Job Analysis for the CBIC CIC Exam

Conducted on behalf of



**Certification Board of Infection Control and
Epidemiology, Inc.
555 E Wells St
Suite 1100
Milwaukee, WI 53202**

September 30, 2020

Prepared by:



**Thomas Fiske, M.S.
Assessment Design**

ACKNOWLEDGEMENTS

We would like to thank the many individuals who provided invaluable assistance throughout the conduct of the CBIC CIC Job Analysis Study.

Above all, we thank the many dedicated professionals who generously contributed their time and expertise. Over 3,300 individuals participated in different phases of the job analysis including Task Force members, survey pilot test participants, survey respondents, and Test Specifications members.

At CBIC, Ashleigh Labbe, Program Manager, Lane Schwartz, Director of Administration, and Anne Krolikowski, Executive Director, provided excellent support throughout the project.

TABLE OF CONTENTS

LIST OF FIGURES.....	iii
LIST OF TABLES.....	iv
LIST OF APPENDICES.....	v
EXECUTIVE SUMMARY	vi
INTRODUCTION	1
METHOD.....	1
1. CONDUCT OF A PLANNING MEETING.....	1
2. DEVELOPMENT OF THE SURVEY	1
3. DISSEMINATION OF THE SURVEY.....	4
4. ANALYSIS OF THE SURVEY DATA.....	4
5. DEVELOPMENT OF THE TEST SPECIFICATIONS	6
RESULTS.....	7
SURVEY RESPONSES	7
DEMOGRAPHIC CHARACTERISTICS OF SURVEY RESPONDENTS	7
TASK AND KNOWLEDGE OVERALL RATINGS	21
TASKS	21
KNOWLEDGE.....	21
SUBGROUP ANALYSIS OF TASK AND KNOWLEDGE RATINGS	22
CONTENT COVERAGE RATINGS.....	23
TEST CONTENT RECOMMENDATIONS.....	24
WRITE-IN COMMENTS	25
DEVELOPMENT OF TEST SPECIFICATIONS FOR THE CIC EXAMINATION	26
PRESENTATION OF THE JOB ANALYSIS PROJECT AND RESULTS TO THE TEST SPECIFICATIONS COMMITTEE	26
IDENTIFICATION OF THE TASK, KNOWLEDGE, AND SKILL STATEMENTS TO BE INCLUDED ON THE CIC EXAM	26
TASKS RECOMMENDED FOR INCLUSION	26
KNOWLEDGE RECOMMENDED FOR INCLUSION	26
DEVELOPMENT OF TEST CONTENT WEIGHTS.....	29
LINKAGE OF TASK AND KNOWLEDGE STATEMENTS.....	29
SUMMARY AND CONCLUSIONS.....	30

LIST OF FIGURES

Figure 1. *1. How many years have you worked in Infection Prevention?.....	7
Figure 2. *2. What practice settings do you cover?.....	8
.....	8
Figure 3. 2a. What is the bed capacity of your primary practice setting?	8
Figure 4. 2b. How many annual outpatient visits?	9
Figure 5. 3. Which practice setting do you most identify with?.....	9
Figure 6. 4. How many Infection Preventionist/Infection Control Practitioner/Officer (FTEs) are employed by your facility?.....	10
Figure 7. 5. Over the past year, approximately how many hours per week have you spent performing Infection Prevention activities?	10
Figure 8. 6. If your job title has ADDITIONAL responsibilities outside of infection prevention, what is your other PRIMARY responsibility? (Select all that apply).....	11
Figure 9. 7. Is your primary facility accredited?	11
Figure 10. *8. Are you currently certified in infection control (CIC) by Certification Board of Infection Control and Epidemiology (CBIC)?.....	12
Figure 11. 8a. How long have you been certified?.....	12
Figure 12. 8b. If you are not currently certified in infection control (CIC) by Certification Board of Infection Control and Epidemiology (CBIC), do you plan on becoming certified?.....	13
Figure 13. 8c. If you are not certified, what is the primary reason you are not certified?.....	13
Figure 14. 9. Is certification in infection control (CIC) by Certification Board of Infection Control and Epidemiology (CBIC) required by your primary employer?	14
Figure 15. 10. Which of the following other certifications do you hold? (select all that apply)	14
Figure 16. 11. In what geographic area are you employed?.....	15
Figure 17. 11b. If Canada, select Province or Territory	16
Figure 18. 12. Which of the following best describes your highest level of education completed?	16
Figure 19. 13. Which of these describes your professional background?	17
Figure 20. 14. What is your primary language?	17
Figure 21. 15. What is your gender?	18
Figure 22. 16. What is your age?.....	19
Figure 23. 11a. If US, select State or Territory	20
.....	20

LIST OF TABLES

Table 1. Tasks by Pass, Borderline, and Fail categories	21
Table 2. Knowledge Importance by Pass, Borderline, and Fail categories	21
Table 3. Mean, Standard Deviation, and Frequency Distribution Percentage of Task Content Coverage	23
Table 4. Mean, Standard Deviation, and Frequency Distribution Percentage of Knowledge Content Coverage.....	24
Table 5. Survey Respondents' Test Content Recommendations by Mean Percentages and Standard Deviations.....	25
Table 6. Task Statements Modified on the Test Specifications	26
Table 7. CIC Test Content Weights Recommended by the Test Specifications Committee.....	29

LIST OF APPENDICES

Appendix A. Participants

Appendix B. Job Analysis Survey, Invitation, and Reminders

Appendix C. Background and General Information Questions including Demographic Characteristics of Respondents

Appendix D. Task Means, Standard Deviations, and Frequency Percent Distributions

Appendix E. Knowledge Means, Standard Deviations, and Frequency Percent Distributions

Appendix F. Indices of Agreement for Task and Knowledge

Appendix G. Write In Content Coverage Comments

Appendix H. Write in Comments

Appendix I. Task and Knowledge Approvals

Appendix J. Test Specifications

Appendix K. Linkage

EXECUTIVE SUMMARY

The Certification Board of Infection Control and Epidemiology, Inc (CBIC) mission is to “Provide pathways to assess and maintain infection prevention competency.”¹ CBIC requested a Job Analysis Study from Prometric for the CIC Exam.

A job analysis study is designed to obtain descriptive information about the tasks performed on a job and the knowledge needed to adequately perform those tasks. The purpose of the job analysis study was to:

- validate the tasks and knowledge important for infection control professionals; and,
- develop test specifications for the CIC Exam.

Conduct of the Job Analysis Study

The job analysis study consisted of several activities: background research, collaboration with subject matter experts to ensure representativeness of the tasks and knowledge statements; survey development; survey dissemination; compilation of survey results; and test specifications development. The successful outcome of the job analysis study depended on the excellent information provided by infection control professionals.

Survey Development

Survey research is an effective way to identify the tasks and knowledge that are important for infection control. The task and knowledge statements 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 a variety of resources, but primarily on the previous job analysis conducted in 2014.

Survey Content

The survey, disseminated in July of 2020, consisted of five sections. CBIC distributed the survey to infection control professionals.

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

¹ <https://www.cbic.org/CBIC/About-CBIC.htm> retrieved 9/28/20.

Results

Survey Response

A total of 1,196 infection control professionals submitted completed surveys. Based on the analysis of survey responses, a representative group of infection control professionals completed the survey in sufficient numbers to meet the requirements for statistical analysis of the results. This is evidenced by review of the responses for each of the background and general information questions as well as confirmation by the Test Specifications Committee.

Survey Ratings

Participants were asked to rate the task statements by the importance for an infection control professional using a five point scale (0 = Of no importance to 4 = Very Important). Additionally, participants were asked how frequently they perform the tasks during an average week of work using a five point scale (0 = Never to 4 = Very often).

Participants were asked to rate the knowledge statements by the importance for an infection control professional using 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. If the task and knowledge statements within a domain are adequately defined, then it should be judged as being well covered. Respondents indicated that the content within each task and knowledge domain was well covered, thus supporting the comprehensiveness of the defined domains.

Test Specifications Development

In September 2020, a Test Specifications Committee convened to review the results of the job analysis 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 to the competent performance of infection control. The job analysis process allowed for input from a representative group of infection control professionals and was conducted within the guidelines of professionally sound practice. The results of the job analysis can be used by CBIC to develop the CIC Exam.

RESULTS AT A GLANCE

WHO COMPLETED THE SURVEY

A total of 1,196 responses were used for analysis. The majority worked in both in-patient and out-patient care, and work in community hospitals

TASK IMPORTANCE RATINGS

A total of 102 of the 102 tasks achieved high importance ratings for the overall group.

KNOWLEDGE IMPORTANCE RATINGS

A total of 80 of the 80 knowledge statements achieved high importance ratings for the overall group.

INTRODUCTION

The Certification Board of Infection Control and Epidemiology, Inc (CBIC) mission is to “Provide pathways to assess and maintain infection prevention competency.” CBIC requested a Job Analysis Study from Prometric for the CIC Exam.

This report describes the job analysis study including the:

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

Job Analysis Study and Adherence to Professional Standards

A job 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 job analysis study is determined by the purpose for which the information will be used.

For purposes of developing credentialing examinations, a job analysis study should identify important tasks, knowledge, skills, or abilities deemed important by infection control professionals.

The use of a job analysis study (also known as practice analysis, role and function study, or role delineation) 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 task and knowledge of a job (tasks, knowledge, skills, or abilities).

A well-designed job analysis study should include the participation of a representative group of subject matter experts 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 subject matter experts. The process is enhanced by the inclusion of large numbers of experts who represent the diversity of the relevant areas of expertise.

*The Standards for Educational and Psychological Testing*² (2014) (*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 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 11.13,

² American Educational Research Association, American Psychological Association, National Council on Measurement in Education. (2014). *The Standards for Educational and Psychological Testing*. Washington, DC: American Psychological Association.

“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 and evidence should be provided to support the claim that the knowledge or skills being assessed are required for credential-worthy performance in that occupation and are consistent with the purpose for which the credentialing program was instituted.... Typically, some form of job or practice analysis provides the primary basis for defining the content domain...” (pp 181-182)

The job analysis study for the CIC Exam was designed to follow the guidelines presented in *The Standards* and to adhere to accepted professional practice.

METHOD

The job analysis study for infection control professionals involved a multi-method approach that included meetings with subject-matter experts and a survey. This section of the report describes the activities conducted for the job analysis study.

First, experts identified the tasks and knowledge they believed were important to the practice of infection control professionals. Then, a survey was developed and disseminated to infection control professionals. The purpose of the survey was to obtain verification (or refutation) that the tasks and knowledge identified by the experts are important to the work of infection control professionals.

Survey research functions as a “check and balance” on the judgments of the experts 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 experts and makes it possible for analysis of ratings 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.

The steps of the job analysis study are described in detail below:

1. Conduct of a Planning Meeting

In January 2020, CBIC representatives and the Prometric staff responsible for the conduct of the job analysis held a planning meeting via webconference. During the planning meeting, the selection of the Task Force Committee members and Test Specifications Committee members, meeting dates and logistics, and survey delivery were topics of discussion.

2. Development of the Survey

Conduct of the Job Analysis Study Task Force Meeting

The Task Force Committee was comprised of a representative group of infection control professionals. In total, twelve infection control professionals comprised the committee. A list of the Task Force Committee members appears in Appendix A. The Task Force meeting was conducted on February 28-29 in Chicago, IL. The purpose of the meeting was to develop the survey content. Prometric staff facilitated the meeting.

Prometric staff sent a pre-meeting mailing to the Task Force that included a document consisting of the meeting agenda and what to expect during the meeting. This document is included in Appendix A.

STEPS OF THE JOB 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

Activities conducted during the meeting included reviewing and, as needed, revising the major domains, task and knowledge that are necessary for the competent performance of infection control professionals. The draft list presented to the Task Force was developed using the results of the 2015 Job Analysis. Survey rating scales and background and general information questions were 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 covered the following task and knowledge domains:

Tasks:

1. Processes to Identify Infectious Diseases
2. Surveillance and Epidemiologic Investigation
3. Preventing/Controlling the Transmission of Infectious Agents
4. Employee/Occupational Health
5. Management and Communication of the Infection Prevention Program
6. Education and Research
7. Environment of Care
8. Cleaning, Disinfection, Sterilization of medical devices and equipment

Knowledge:

1. Processes to Identify Infectious Diseases
2. Surveillance and Epidemiologic Investigation
3. Preventing/Controlling the Transmission of Infectious Agents
4. Employee/Occupational Health
5. Management and Communication of the Infection Prevention Program
6. Education and Research
7. Environment of Care
8. Cleaning, Disinfection, Sterilization of medical devices and equipment

Survey Review by Task Force Committee

Each Task Force member received a copy of the draft survey. The purpose of the review was to provide the Committee with an opportunity to view their work and recommend any revisions.

Comments provided by the Task Force Committee for the online survey were compiled by Prometric staff and reviewed via web conference on March 23rd, with the Task Force members. Refinements, as recommended by the Task Force, were incorporated into the online survey in preparation for a pilot test.

Survey Pilot Test

The purpose of the small-scale pilot test was to have professionals in the field who had no previous involvement in the development of the survey, review and offer suggestions to improve the instrument. 25 participants received the survey link, 15 of whom completed the survey.

Pilot participants reviewed 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 June 2nd with the Task Force members. The Task Force revised and finalized the survey based on the review of the pilot test comments.

Final Version of the Survey

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

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

In Section 2: Tasks, survey participants rated the statements using the importance scale shown below. Additionally, participants were asked to rate the frequency of the task.

Tasks
Importance: How important is this task to be a competent infection preventionist?
0 = Of no importance
1 = Of little importance
2 = Of moderate importance
3 = Important
4 = Very important

Tasks
Frequency: How frequently do you perform or manage this task based on an average week of work?
0 = Never
1 = Seldom
2 = Occasionally
3 = Often
4 = Very Often

In Section 3: Knowledge, survey participants rated the statements using the importance scale shown below.

Knowledge
Importance: How important is this knowledge for a competent 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 knowledge and task domain. Respondents made their judgments using the five-point rating scale shown below.

Content Coverage

How well do the statements in Domain (#) cover important aspects of (the domain)?

1 = Very Poorly

2 = Poorly

3 = Adequately

4 = Well

5 = Very Well

Respondents could note any topics that were not covered within a specific domain in an open response field.

In Section 4: Recommendation for Test Content, survey participants indicated the content weights that the task areas below should receive on the exam:

1. Processes to Identify Infectious Diseases
2. Surveillance and Epidemiologic Investigation
3. Preventing/Controlling the Transmission of Infectious Agents
4. Employee/Occupational Health
5. Management and Communication of the Infection Prevention Program
6. Education and Research
7. Environment of Care
8. Cleaning, Disinfection, Sterilization of medical devices and equipment

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

In Section 5: Write In 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

Prometric provided the survey link to CBIC on June 8th for dissemination to infection control professionals. The invited survey participants received two reminder emails prior to the survey’s close.

Appendix B contains the online survey, invitation, and reminders.

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 control professionals judged to be relevant (verified as important) to their work. This objective was accomplished through an analysis of the mean importance ratings for task and knowledge statements. The derivation of test specifications from those statements verified as important by the surveyed infection control 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 task and content coverage ratings
- Medians, modes, and frequency (percentage) distributions for task frequency ratings
- Means, standard deviations, and frequency (percentage) distributions for knowledge statements and content coverage ratings
- Means and standard deviations for test content recommendations
- Index of agreement values for designated subgroups
- Crosstabs for selected demographic questions

Criterion for Interpretation of Mean Importance Ratings

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

A criterion 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.

This criterion is consistent with the intent of content validity. Therefore, for this job analysis, Prometric recommended the value of this criterion should be set at 2.50. Accordingly, the task and knowledge statements were grouped into one of three categories: Pass, Borderline, or Fail as determined by their mean importance ratings. The skill criticality ratings used the same criterion.

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

- The Pass Category contains those statements whose mean ratings are at or above 2.50, and are 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

Prometric staff facilitated a remote meeting to develop the test specifications based on the job analysis results on September 18-20. The meetings focused on:

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

These percentage test weights guide examination development activities.

RESULTS

Survey Responses

A total of 3,251 participants completed the survey. 1,196 responses were used for analysis. Because the survey link was distributed to an unknown number of participants, a response rate cannot be calculated.

Based on the analysis of survey responses, a representative group of infection control professionals completed the survey in sufficient numbers to meet the requirements to conduct statistical analysis. This was evidenced by the distribution of responses for each of the background information questions and was confirmed through discussion with the Committee.

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. Write in responses to “Other, please specify” options are provided in Appendices C2. The results in the figures below reflect the sample size used for analysis of 1,196 responses.

Figure 1. *1. How many years have you worked in Infection Prevention?

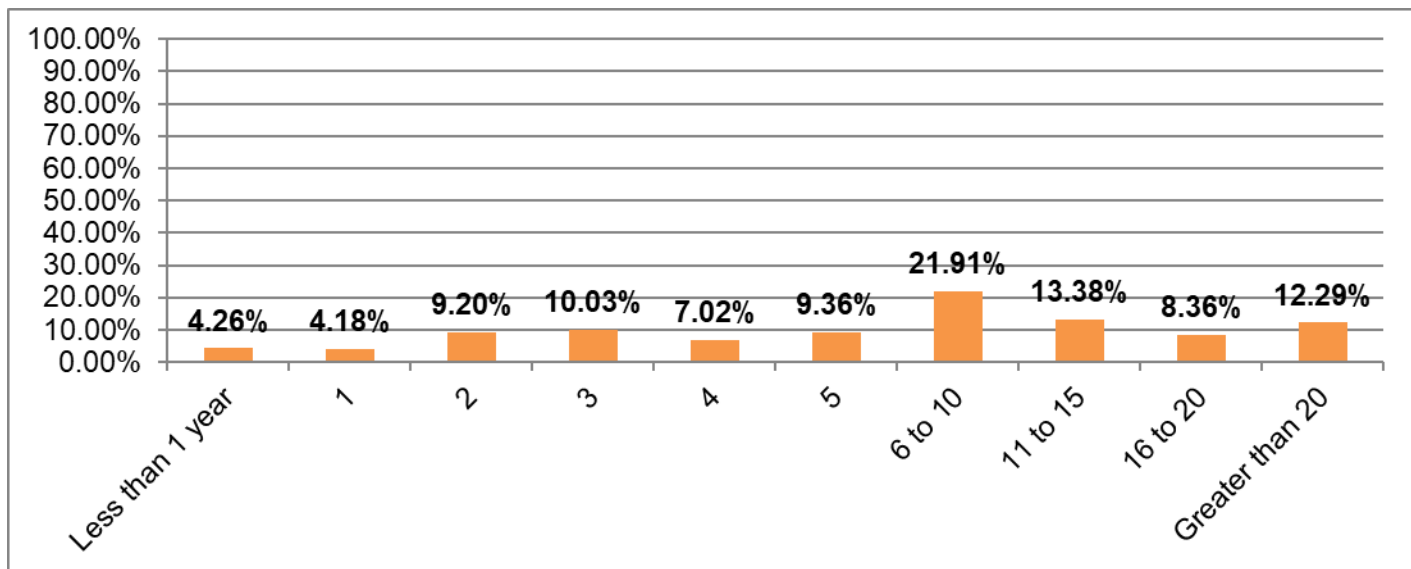


Figure 2. *2. What practice settings do you cover?

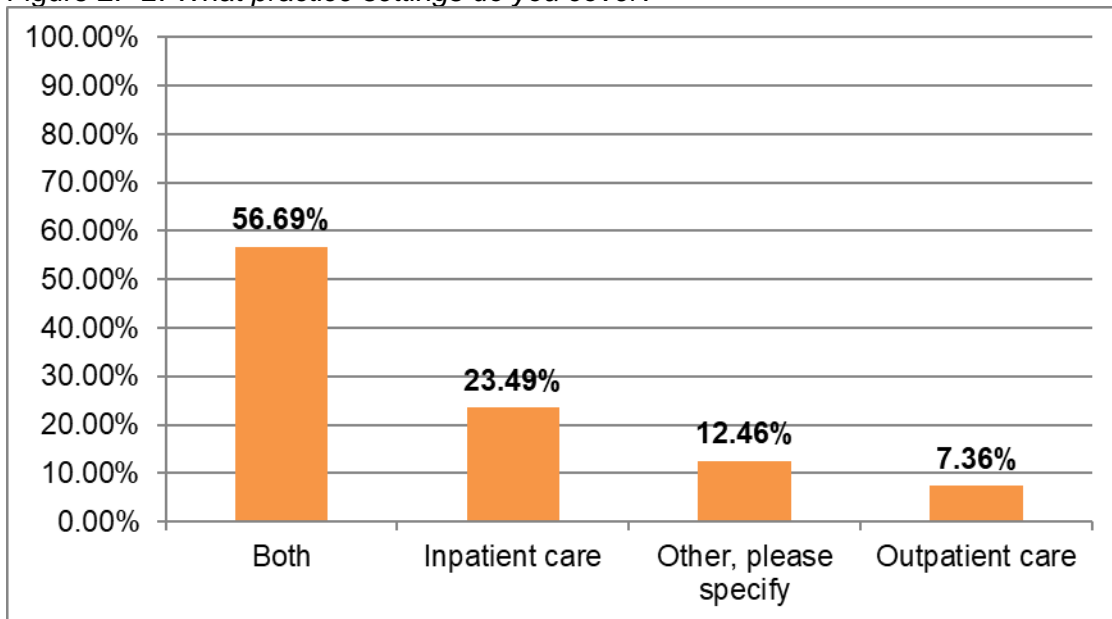


Figure 3. 2a. What is the bed capacity of your primary practice setting?

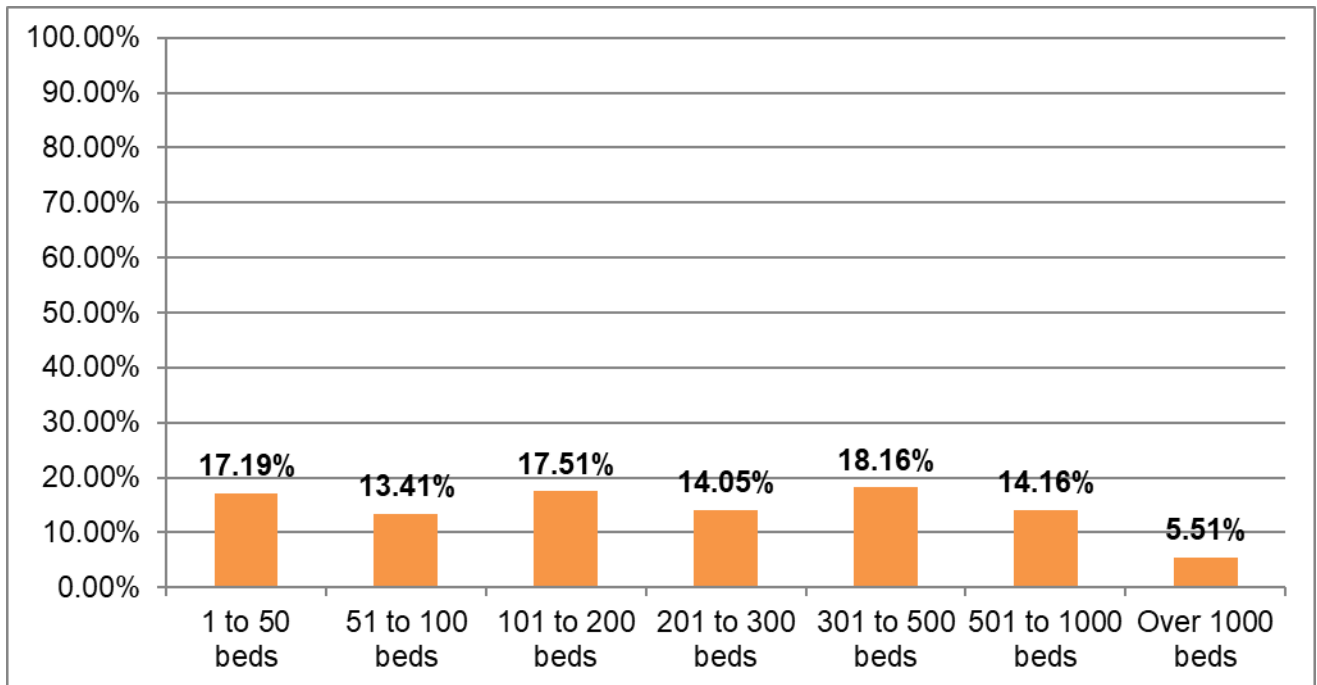


Figure 4. 2b. How many annual outpatient visits?

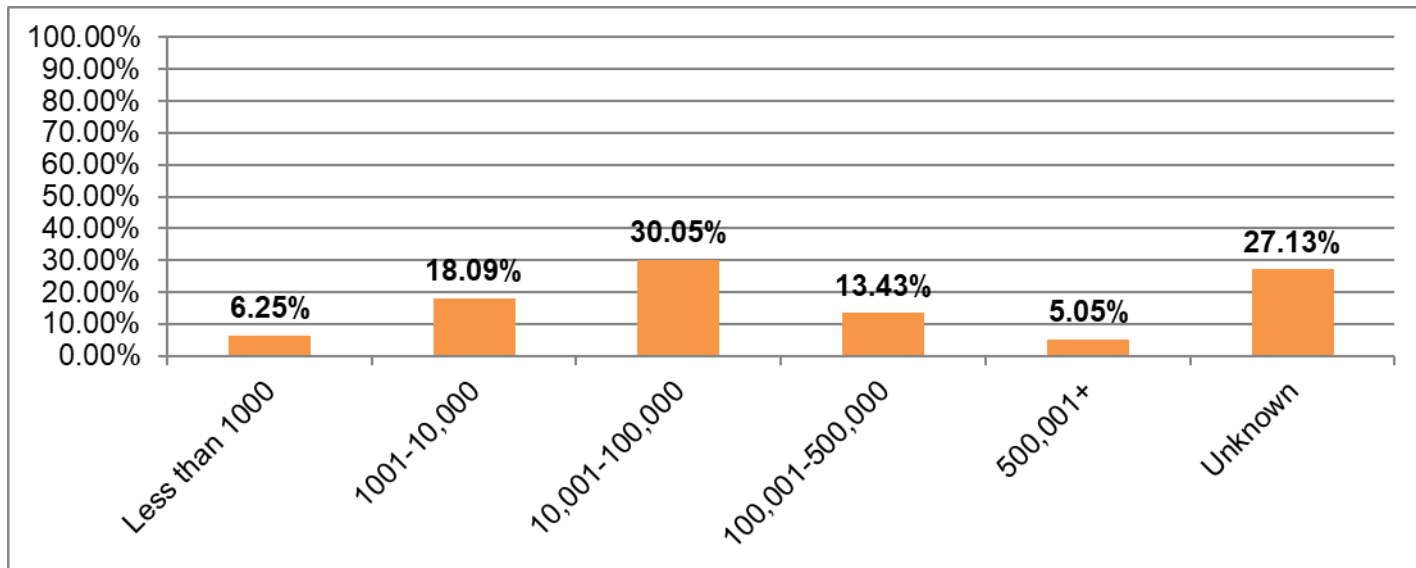


Figure 5. 3. Which practice setting do you most identify with?

3. Which practice setting do you most identify with?	Percent
Ambulatory care	5.26%
Ambulatory surgery center	3.57%
Community Hospital	32.73%
Consultant	2.30%
Correctional facility	0.54%
Dental facility	1.81%
Dialysis facility	1.57%
EMS/Public safety	0.97%
Federally qualified health care centers	1.03%
Healthcare system (corporate office)	4.36%
Home care	1.39%
Long Term Acute Care Hospital	4.30%
Long term care	7.32%
Mental/Behavioral Health	2.60%
Military Hospitals	1.75%
Other	3.81%
Public health	4.78%
Rehabilitation	2.36%
Specialty Hospital	7.56%
University Hospital	8.71%
Veterans Administration	1.27%
Grand Total	100%

Figure 6. 4. How many Infection Preventionist/Infection Control Practitioner/Officer (FTEs) are employed by your facility?

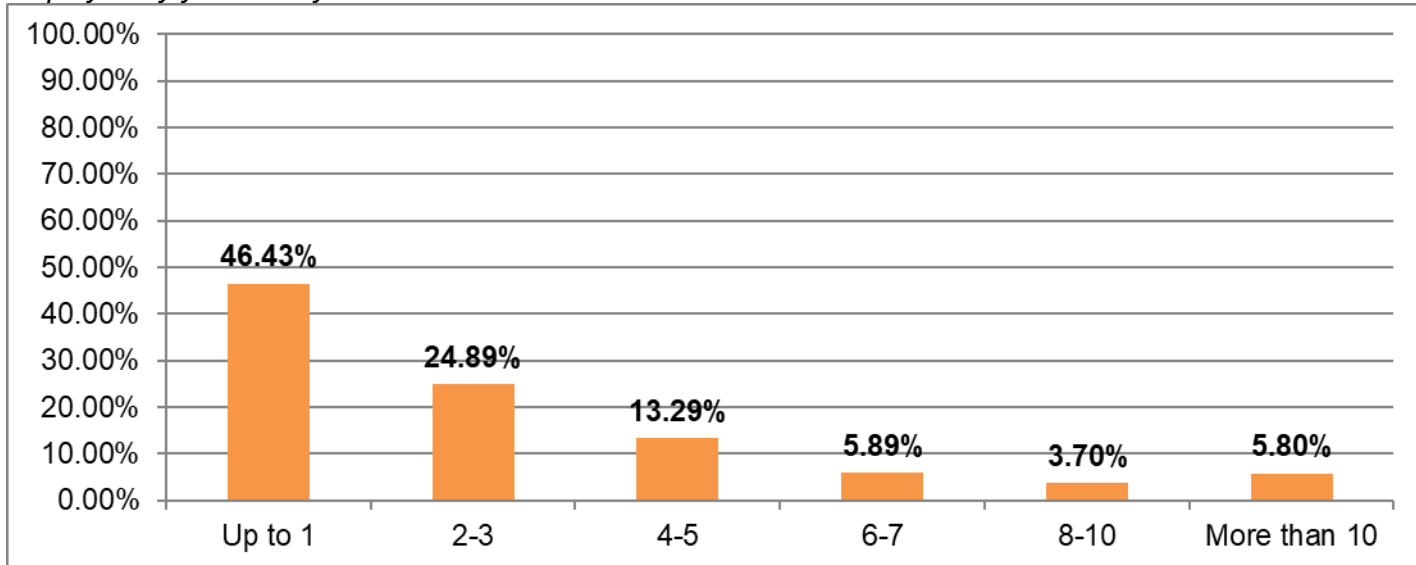


Figure 7. 5. Over the past year, approximately how many hours per week have you spent performing Infection Prevention activities?

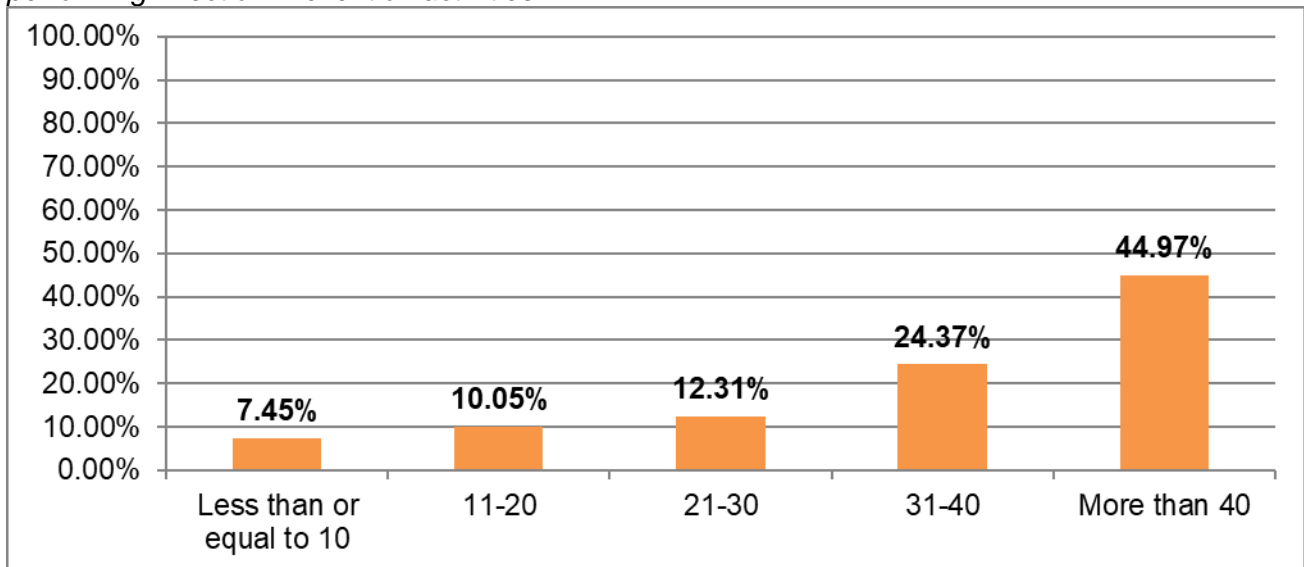


Figure 8. 6. If your job title has ADDITIONAL responsibilities outside of infection prevention, what is your other PRIMARY responsibility? (Select all that apply)

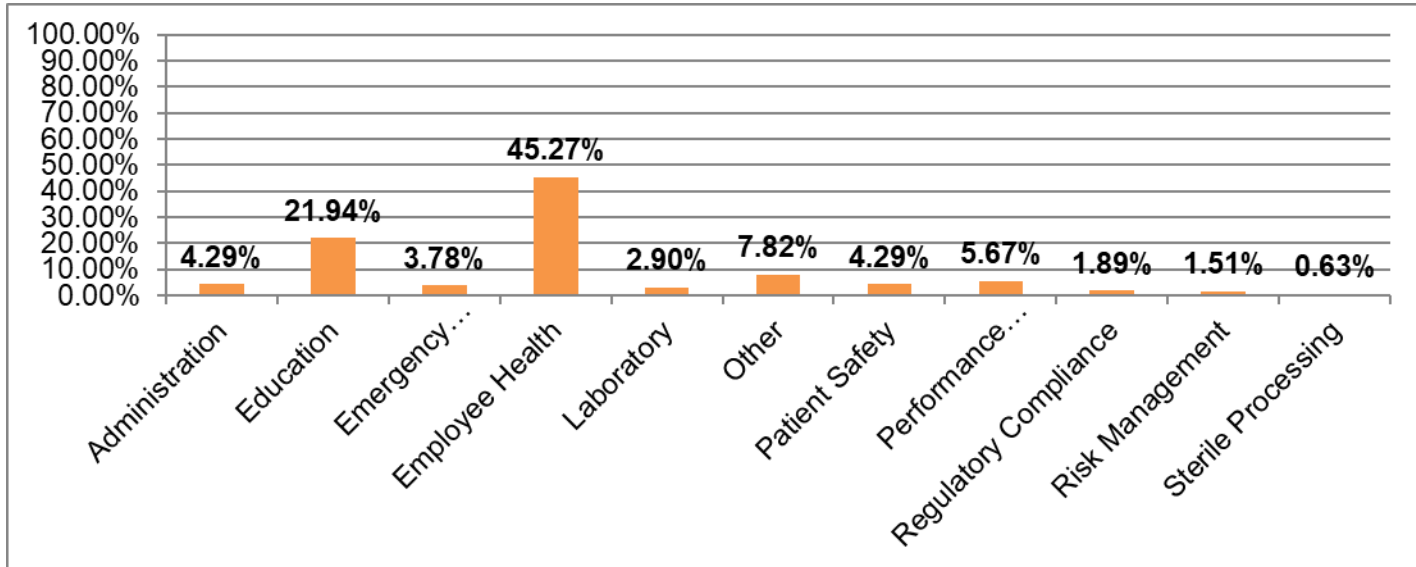


Figure 9. 7. Is your primary facility accredited?

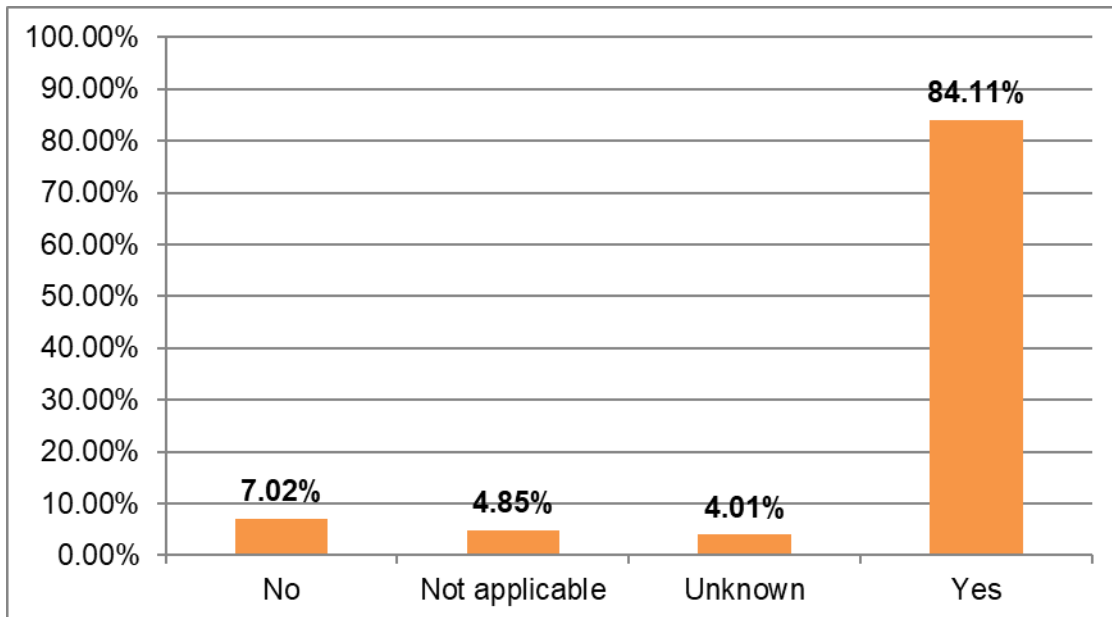


Figure 10. *8. Are you currently certified in infection control (CIC) by Certification Board of Infection Control and Epidemiology (CBIC)?

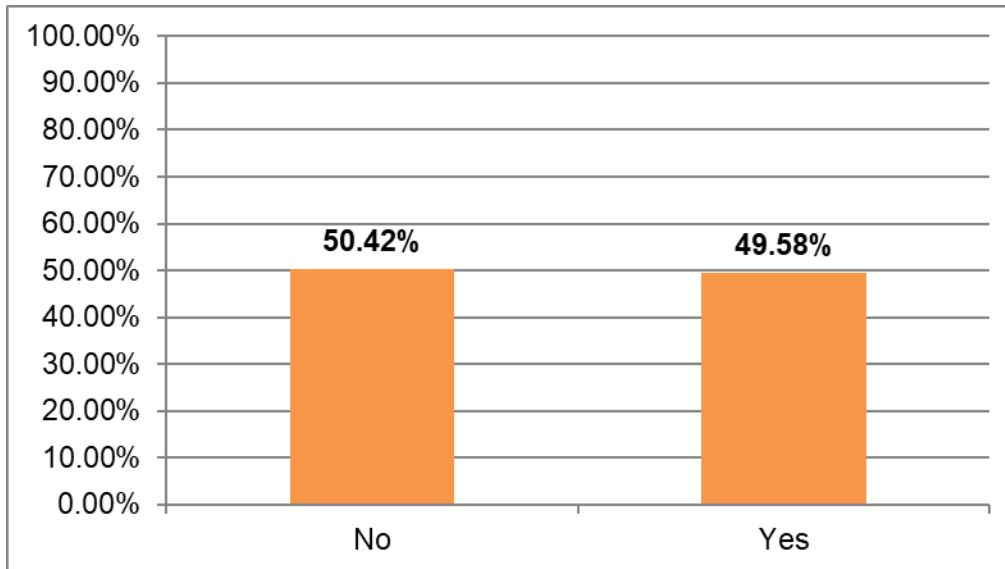


Figure 11. 8a. How long have you been certified?

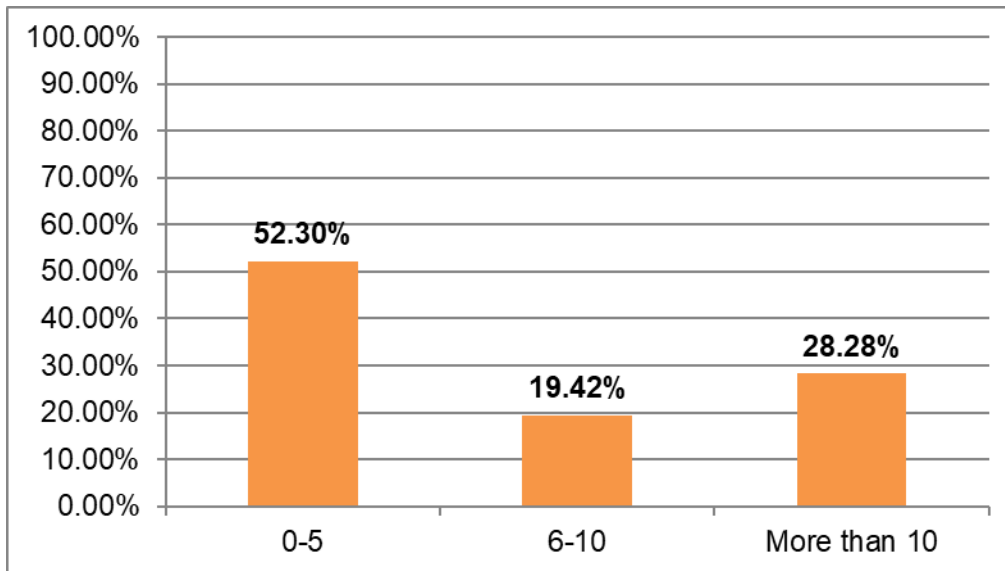


Figure 12. 8b. If you are not currently certified in infection control (CIC) by Certification Board of Infection Control and Epidemiology (CBIC), do you plan on becoming certified?

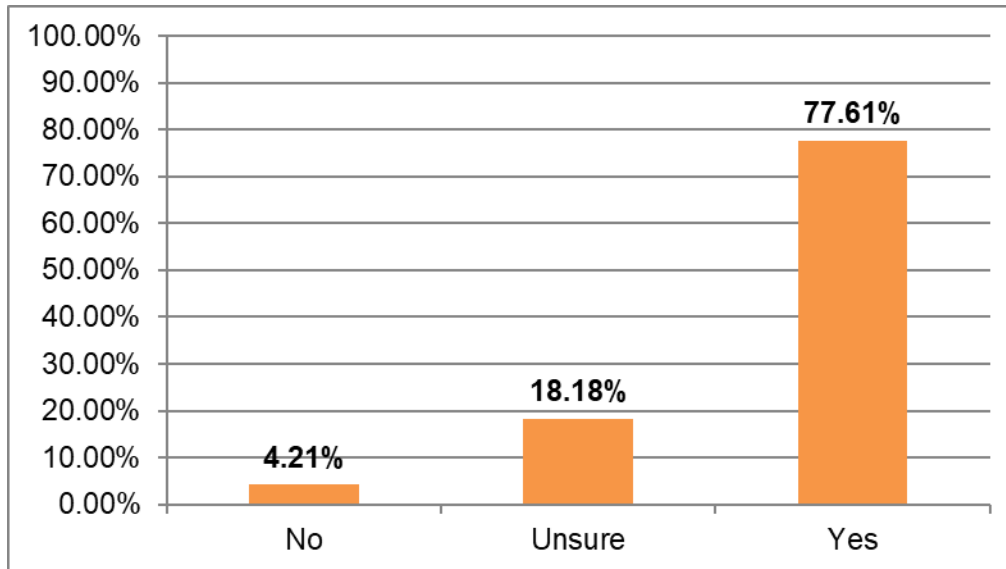


Figure 13. 8c. If you are not certified, what is the primary reason you are not certified?

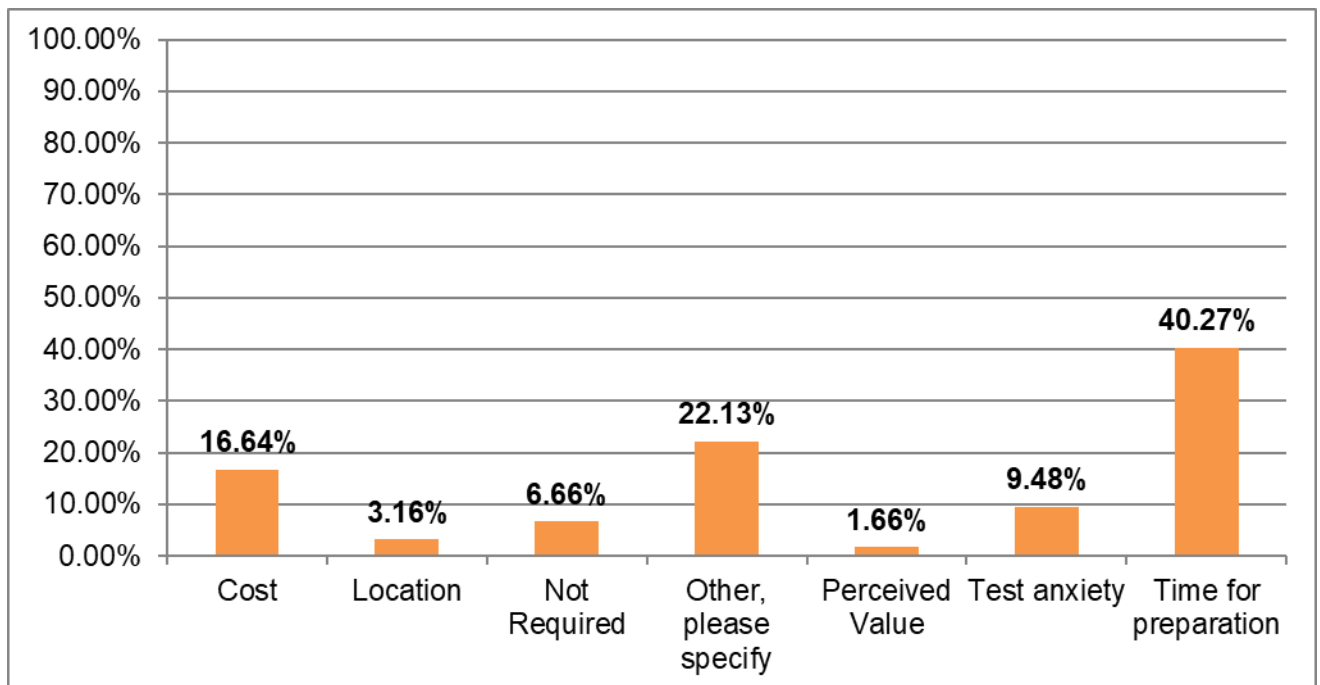


Figure 14. 9. Is certification in infection control (CIC) by Certification Board of Infection Control and Epidemiology (CBIC) required by your primary employer?

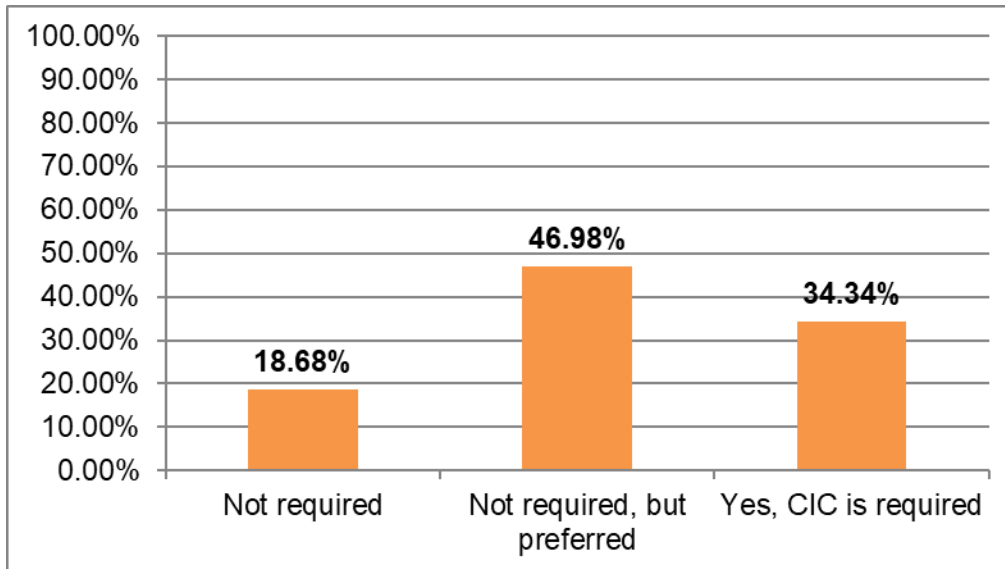


Figure 15. 10. Which of the following other certifications do you hold? (select all that apply)

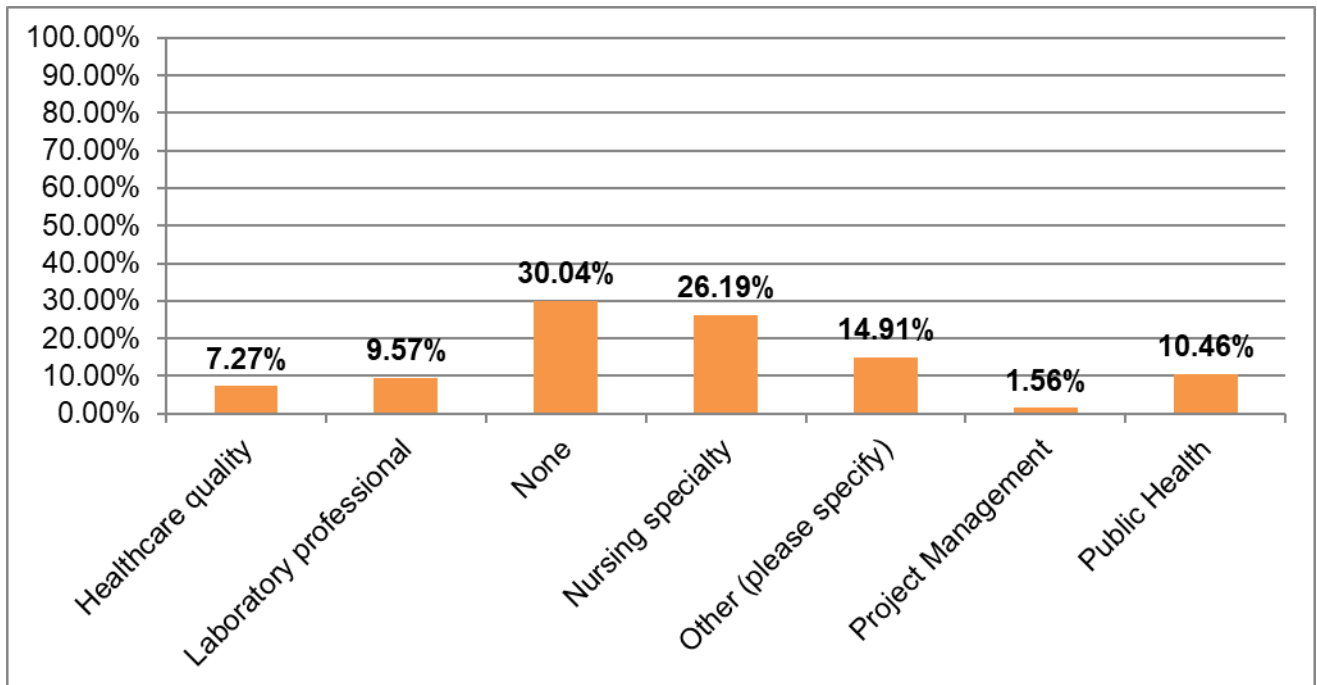


Figure 16. 11. *In what geographic area are you employed?*

11. In what geographic area are you employed?	Percent
Angola	0.09%
Bahrain	0.17%
Bangladesh	0.09%
Brazil	0.17%
Canada	8.09%
Cote d'Ivoire	0.09%
Ecuador	0.09%
Egypt	0.68%
Ghana	0.17%
India	1.87%
Ireland	0.09%
Jamaica	0.09%
Japan	0.26%
Jordan	0.43%
Kenya	0.09%
Lebanon	0.26%
Libya	0.09%
Malaysia	0.17%
Mexico	0.17%
New Zealand	0.09%
Nigeria	0.43%
Oman	0.09%
Pakistan	0.09%
Philippines	0.09%
Qatar	1.19%
Rwanda	0.09%
Saudi Arabia	5.20%
Uganda	0.09%
United Arab Emirates	2.98%
United Kingdom	0.09%
United States of America & Territories	75.98%
Yemen	0.17%
Zimbabwe	0.09%
Other (Please specify.) _____	0.26%
Total	100.00%

Figure 17. 11b. If Canada, select Province or Territory

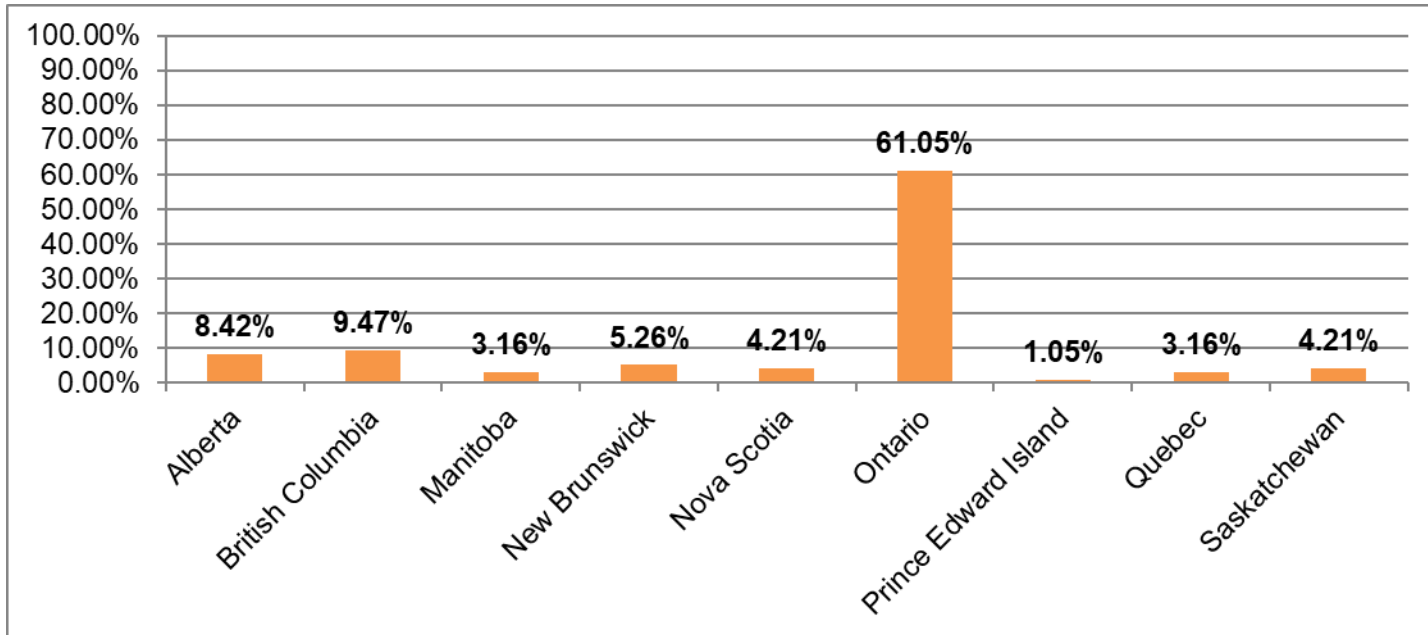


Figure 18. 12. Which of the following best describes your highest level of education completed?

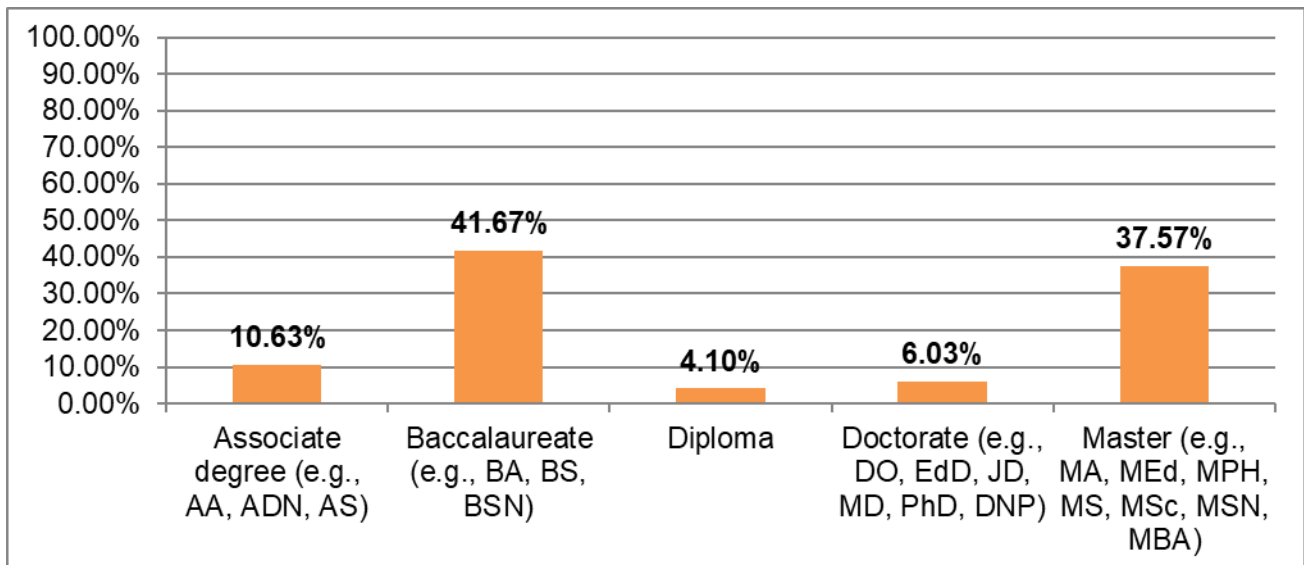


Figure 19. 13. Which of these describes your professional background?

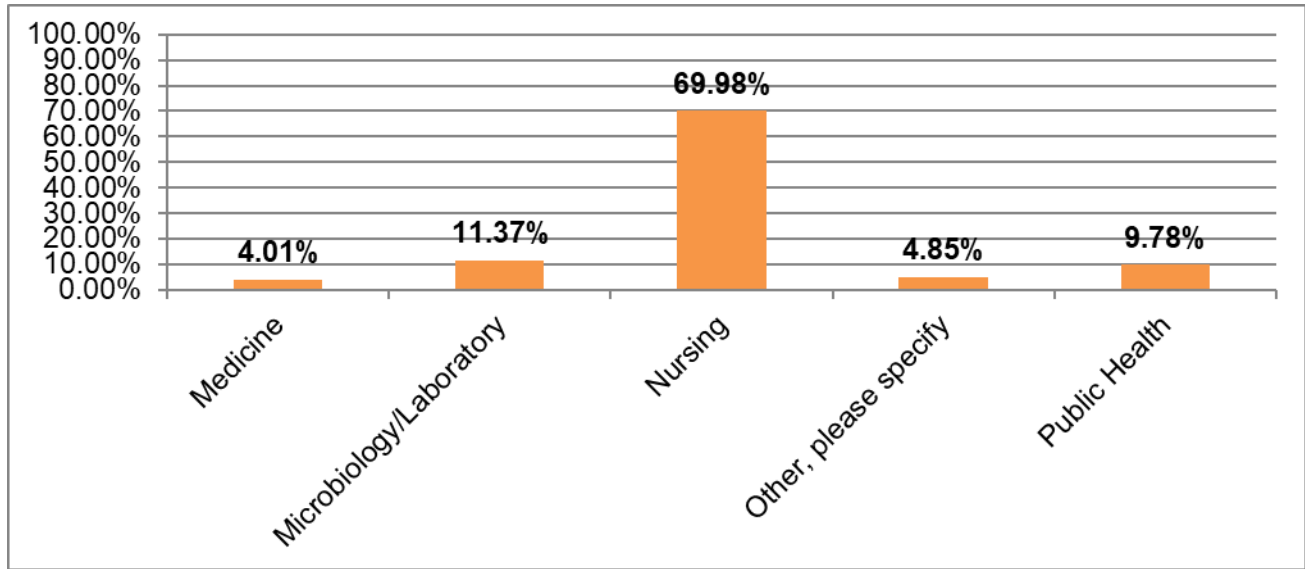


Figure 20. 14. What is your primary language?

14. What is your primary language?	Percent
Algerian Arabic	1.45%
Assamese	0.09%
Bengali	0.17%
Cebuano	0.34%
Czech	0.09%
Dutch	0.09%
Egyptian Arabic	1.71%
English	86.83%
French	0.26%
Gujarati	0.34%
Hejazi Arabic	0.17%
Hindi (Sanskritised Hindustani)[9]	0.26%
Hungarian	0.09%
Igbo	0.09%
Japanese	0.26%
Malayalam	1.20%
Marathi	0.26%
Mesopotamian Arabic	0.09%
North Levantine Arabic	0.17%
Portuguese	0.34%
Sa'idi Arabic	0.77%
Spanish	0.77%
Sudanese Arabic	0.60%

Tagalog	1.45%
Tamil	0.51%
Telugu	0.34%
Tunisian Arabic	0.09%
Urdu (Persianised Hindustani)[9]	0.77%
Vietnamese	0.09%
Yoruba	0.34%
Total	100.00%

Figure 21. 15. What is your gender?

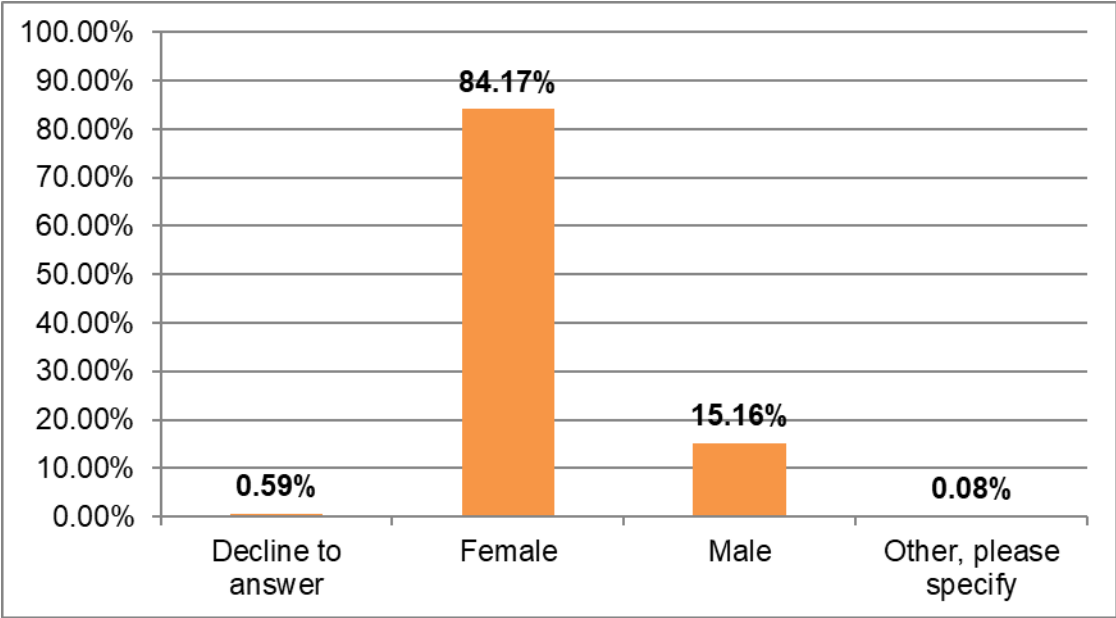


Figure 22. 16. What is your age?

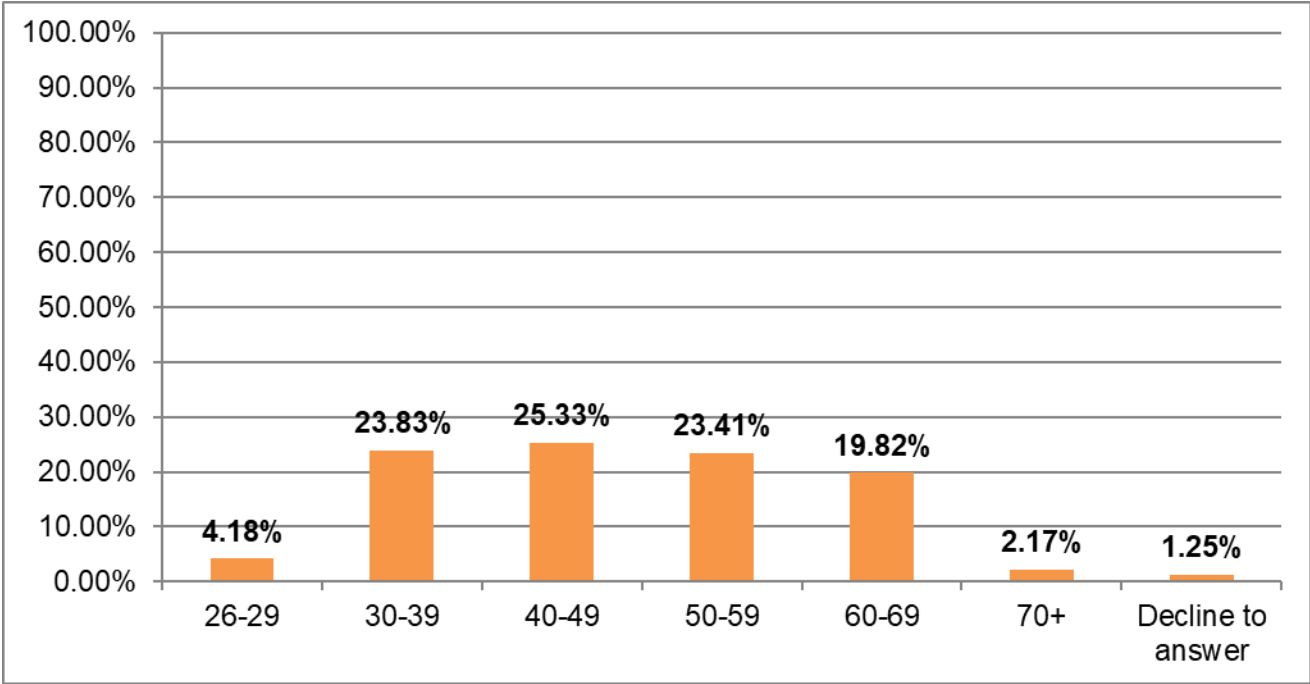
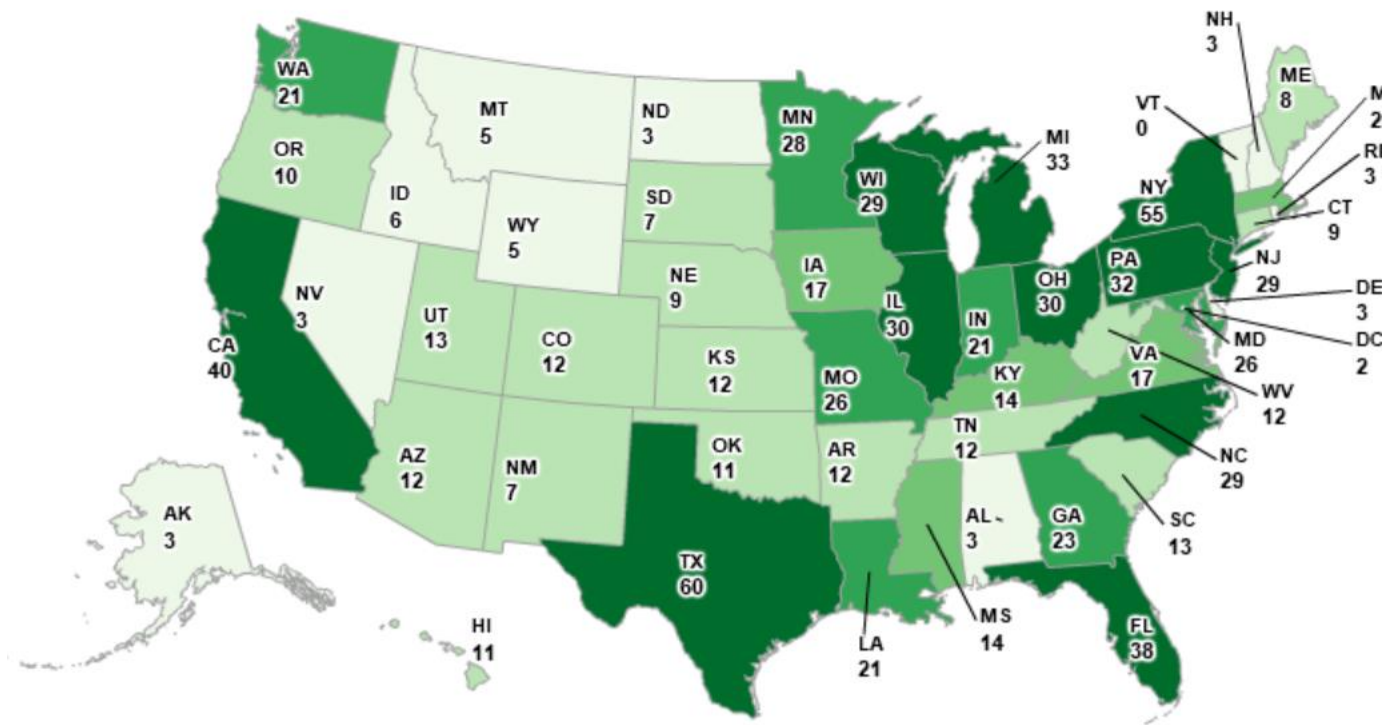


Figure 23. 11a. If US, select State or Territory



** American Samoa had 1 respondent, Guam had 1 respondent, Puerto Rico had 3 respondents, and 18 respondents selected more than 1 state.

Task and Knowledge Overall Ratings

The following provides a summary of survey respondents' ratings of the task and knowledge. The survey respondents passed 182 (100%) of the 182 task and knowledge statements.

Tasks

Means and standard deviations for the tasks included on the survey are in Appendix D1 and D2. A total of 102 (100%) of the 102 tasks achieved high importance means. Table 1 shows the delineation of tasks in Pass, Borderline, and Fail categories by domain.

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

Task Domains	No. of Task Statements	Pass (Mean 2.50 or Above)	Borderline (Mean 2.40 to 2.49)	Fail (Mean Less than 2.40)
1. Processes to Identify Infectious Diseases	7	7	0	0
2. Surveillance and Epidemiologic Investigation	30	30	0	0
3. Preventing/Controlling the Transmission of Infectious Agents	21	21	0	0
4. Employee/Occupational Health	7	7	0	0
5. Management and Communication of the Infection Prevention Program	14	14	0	0
6. Education and Research	11	11	0	0
7. Environment of Care	8	8	0	0
8. Cleaning, Disinfection, Sterilization of medical devices and equipment	4	4	0	0
Total	102	102	0	0
Percentage		100%	0%	0%

Knowledge

Analysis of the knowledge statements included on the survey are in Appendix E. A total of 80 (100%) of the 80 knowledge statements achieved high importance means. Table 2 shows the knowledge statements placed in Pass, Borderline, and Fail categories.

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

Knowledge Domains	No. of Knowledge	Pass (Mean 2.50 or Above)	Borderline (Mean 2.40 to 2.49)	Fail (Mean Less than 2.40)
1. Processes to Identify Infectious Diseases	8	8	0	0
2. Surveillance and Epidemiologic Investigation	23	23	0	0
3. Preventing/Controlling the Transmission of Infectious Agents	11	11	0	0

Knowledge Domains	No. of Knowledge	Pass (Mean 2.50 or Above)	Borderline (Mean 2.40 to 2.49)	Fail (Mean Less than 2.40)
4. Employee/Occupational Health	4	4	0	0
5. Management and Communication of the Infection Prevention Program	12	12	0	0
6. Education and Research	10	10	0	0
7. Environment of Care	8	8	0	0
8. Cleaning, Disinfection, Sterilization of medical devices and equipment	4	4	0	0
Total	80	80	0	0
Percentage		100%	0%	0%

Subgroup Analysis of Task 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 and is tailored to the purpose of a job analysis study more 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 job 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 areas shows how to compute the index. If two groups passed the same 96 knowledge areas and failed the same 2 knowledge areas (out of the 100 total knowledge areas in the survey), the consistency index would be computed as $Agreement = (96 + 2)/100 = 0.98$. Values of 0.80 or less show less than optimal agreement and therefore additional mean analyses are required.

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

- Years working in Infection Prevention
- Practice setting
- Bed capacity
- Annual outpatient visits
- Number of practitioners in your facility
- Hours spent in infection prevention
- Primary facility accreditation
- Current certification
- Length of accreditation
- Plans for certification
- Certification requirement by employer
- Country
- Professional background
- Age

The agreement coefficients were all 1.00 for tasks and knowledge statements. For questions where the agreement coefficients for all groups was greater than 0.80, no additional mean analysis is required. For the tasks and knowledge, none of the background questions had less than optimal agreement requiring additional mean analysis.

Content Coverage Ratings

The survey participants indicated 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 and knowledge ratings are provided in Tables 3 and 4. For the task domains, the means ranged from 4.05 to 4.23 and for the knowledge statements ranged from 4.12 to 4.29. These means provide evidence that the task and knowledge were well to very well covered on the survey.

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

Task Domain	Mean	SD	Content Coverage Frequency Percentage				
			1=Very poorly	2=Poorly	3=Adequately	4=Well	5=Very well
1. Processes to Identify Infectious Diseases	4.19	0.78	0.25%	0.67%	19.23%	39.55%	40.13%
2. Surveillance and Epidemiologic Investigation	4.22	0.77	0.00%	0.84%	18.56%	38.13%	42.31%
3. Preventing/Controlling the Transmission of Infectious Agents	4.17	0.78	0.08%	1.17%	19.48%	40.05%	38.96%

4. Employee/Occupational Health	4.23	0.76	0.08%	0.59%	17.73%	38.96%	41.97%
5. Management and Communication of the Infection Prevention Program	4.14	0.78	0.08%	0.92%	21.15%	40.38%	36.79%
6. Education and Research	4.05	0.83	0.33%	1.51%	24.16%	37.46%	32.61%
7. Environment of Care	4.18	0.80	0.25%	0.67%	19.06%	35.20%	38.46%
8. Cleaning, Disinfection, Sterilization of medical devices and equipment	4.18	0.81	0.08%	1.00%	19.65%	33.03%	38.80%

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. Processes to Identify Infectious Diseases	4.29	0.77	0.25%	0.33%	15.05%	33.61%	42.73%
2. Surveillance and Epidemiologic Investigation	4.26	0.76	0.08%	0.33%	16.05%	33.61%	40.80%
3. Preventing/Controlling the Transmission of Infectious Agents	4.19	0.78	0.08%	0.92%	17.47%	34.87%	36.71%
4. Employee/Occupational Health	4.25	0.76	0.08%	0.33%	16.14%	34.11%	39.97%
5. Management and Communication of the Infection Prevention Program	4.22	0.78	0.17%	0.25%	17.89%	33.11%	38.88%
6. Education and Research	4.12	0.81	0.17%	0.92%	20.90%	33.70%	34.36%
7. Environment of Care	4.20	0.80	0.25%	0.75%	18.06%	33.03%	37.96%
8. Cleaning, Disinfection, Sterilization of medical devices and equipment	4.21	0.81	0.33%	0.84%	17.14%	32.44%	39.13%

Survey respondents could write in tasks or knowledge that they believe should be included in the listing of important task and knowledge. See Appendices G1 and G2 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: Recommendations for Test Content, participants were asked to assign a percentage weight to each knowledge domain. The sum of percentage weights was required to equal 100. This information guided the Test Specifications Committee in making decisions about how much emphasis the

domains should receive on the test content outline. The mean weights across all survey respondents are in Table 5.

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

Domain	Mean (%)	SD (%)	Range	
			Minimum	Maximum
1. Processes to Identify Infectious Diseases	15.27	5.81	0	50
2. Surveillance and Epidemiologic Investigation	15.64	5.99	0	65
3. Preventing/Controlling the Transmission of Infectious Agents	17.01	5.80	0	50
4. Employee/Occupational Health	8.74	4.19	0	30
5. Management and Communication of the Infection Prevention Program	10.34	4.91	0	50
6. Education and Research	8.15	4.12	0	30
7. Environment of Care	11.61	4.84	0	60
8. Cleaning, Disinfection, Sterilization of medical devices and equipment	13.22	5.48	0	50

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 H for write-in comments.

DEVELOPMENT OF TEST SPECIFICATIONS FOR THE CIC EXAMINATION

The test specification meeting for the CIC Exam was held remotely from September 18-20, 2020. The steps involved in the development of test specifications included the following:

- presentation of the job analysis project 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 exam; and,
- linkage of task and knowledge statements.

Presentation of the Job Analysis Project and Results to the Test Specifications Committee

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

Identification of the Task, Knowledge, and Skill Statements to be Included on the CIC Exam

The Test Specifications Committee reviewed the task and knowledge results to make final recommendations about the areas that should be included on the exam.

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.

Appendix I outlines the task and knowledge approval decisions.

Tasks Recommended for Inclusion

- A total of 102 of the 102 tasks achieved mean ratings at or above 2.50 (Pass category) and were included on the test specifications.
- 12 statements were edited for clarity
- Two statements were edited from survey comments

Knowledge Recommended for Inclusion

- A total of 80 of the 80 knowledge statements achieved mean ratings at or above 2.50 (Pass category). four statements were modified for clarity.
- Two statements were edited from the survey comments

Table 6 contains the modified task statements.

Table 6. *Task Statements Modified on the Test Specifications*

Domain	Task	Rationale
1. Processes to Identify Infectious Diseases	1.1. Interpret the relevance of diagnostic, radiologic, <u>procedural</u> , and laboratory reports	<u>Added from comments</u>

Domain	Task	Rationale
1. Processes to Identify Infectious Diseases	1.3. Correlate clinical signs, symptoms, and test results to determine <u>identify possible</u> infectious disease	<u>Edited for clarity. We don't determine</u>
1. Processes to Identify Infectious Diseases	1.6. Assess risk factors for infectious diseases (e.g., travel, vaccination status, immunocompromising e suppressive therapy factors)	<u>Edited for clarity.</u>
2. Surveillance and Epidemiologic Investigation	2.1.1. Conduct a risk assessment based on the following: geographic location, <u>demographics of</u> the population served, care, treatment, services provided, analysis of infection prevention data, <u>evidence-based guidelines or recommendations</u> , and regulatory or other requirements as applicable (e.g., licensing requirements, OSHA)	<u>Edited for clarity</u>
2. Surveillance and Epidemiologic Investigation	2.1.5. Create a process to identify epidemiologically significant findings and notify relevant parties (e.g., nursing unit, health department, <u>leadership</u>)	<u>Edited for clarity</u>
2. Surveillance and Epidemiologic Investigation	2.1.7. Establish process for identifying individuals with communicable diseases requiring <u>transmission-based precautions and/or follow up (e.g., reporting to health department) and/or transmission-based precautions</u>	<u>Edited for clarity, switched order based on actual order of activities</u>
2. Surveillance and Epidemiologic Investigation	2.1.8. Periodically evaluate the effectiveness <u>ability</u> of the surveillance plan <u>to obtain relevant data</u> and modify as necessary	<u>Edited for clarity</u>
2. Surveillance and Epidemiologic Investigation	2.2.1. Collect data using standardized definitions (<u>e.g., surveillance or case definitions</u>)	<u>Edited for clarity</u>
3. Preventing/Controlling the Transmission of Infectious Agents	3.5. Adapt transmission based precautions to the specific healthcare setting, the facility design characteristics, and the type of patient interaction	<u>Edited for clarity</u>

Domain	Task	Rationale
	immunization programs for patients (e.g., influenza)	
3. Preventing/Controlling the Transmission of Infectious Agents	3.6. Collaborate with key stakeholders on antimicrobial stewardship programs (e.g., leadership, pharmacist, infectious disease specialist)	<u>Edited for clarity</u>
4. Employee/Occupational Health	4.3. Collaborate with employee/occupational health to evaluate data related to infection prevention and provide recommendations (e.g., needle stick injuries , splashes)	<u>Edited for clarity</u>
4. Employee/Occupational Health	4.5. Consult on use of alternative infection prevention practices <u>options</u> (e.g., allergies to products)	<u>Edited for clarity</u>
5. Management and Communication of the Infection Prevention Program	5.1.2. Assess needs then recommend specific equipment, personnel, <u>information technology</u> , and resources to support the Infection Prevention Program	<u>Added from comments</u>
6. Education and Research	6.1.2. Prepare, present, or coordinate, <u>and/or disseminate</u> educational content that is appropriate for the audience	<u>Edited for clarity</u>
6. Education and Research	<u>6.1.6. Assess the effectiveness of education and learner outcomes (e.g., observation of practice, process measures)</u>	<u>Edited to include all audiences</u>
7. Environment of Care	7.1.1. Recognize and collaborate on processes for a safe care environment (e.g., Heating Ventilation Air Conditioning management, water pathogen prevention <u>management</u> , laundry, waste management, <u>environmental cleaning</u>)	<u>Edited for clarity</u>
7. Environment of Care	7.1.3. Collaborate with others to select and evaluate environmental <u>cleaning and</u> disinfectant products	<u>Edited for clarity</u>

**Text written in red indicates a change to the original wording.

Development of Test Content Weights

The Test Specifications Committee participated in an exercise that required each member 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 exam.

Table 7 shows the test specifications recommendations including the percentage content. The complete test specifications are in Appendix J.

Table 7. *CIC Test Content Weights Recommended by the Test Specifications Committee*

Task Domains	No. of State-ments	% Weight
1. Processes to Identify Infectious Diseases	8	16%
2. Surveillance and Epidemiologic Investigation	28	17%
3. Preventing/Controlling the Transmission of Infectious Agents	12	17%
4. Employee/Occupational Health	4	8%
5. Management and Communication of the Infection Prevention Program	15	10%
6. Education and Research	12	9%
7. Environment of Care	10	10%
8. Cleaning, Disinfection, Sterilization of medical devices and equipment	4	13%

Linkage of Task and Knowledge Statements

Task and knowledge linking verifies that each knowledge area included on an examination relates to the competent performance of important tasks. As such, linking supports the content validity of the task 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 knowledge is identified as being related to the performance of at least one, or in most cases several, important tasks.

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

SUMMARY AND CONCLUSIONS

The job analysis study for infection control professionals identified task and knowledge statements that are important to the work performed by infection control professionals. Further, the data collected will guide the development of the test specifications that will be used to develop the examination.

The task and knowledge statements were developed through an iterative process involving the combined efforts of CBIC, subject matter experts, and Prometric staff. These statements were entered into a survey format and subjected to verification/refutation through the dissemination of a survey to infection control professionals. The survey participants were asked to rate the importance of task and knowledge statements.

The results of the study support the following:

- All of the task 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 CIC Examination.
- Evidence was provided in this study that the comprehensiveness of the content within the task and knowledge domains was well 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 knowledge that are important to the work performed by infection control professionals. The results of the study were used to develop the test specifications for the CIC Examination.