

Meta-Analysis of the Healthcare Facility Management Workforce: A Learning
Framework to Address the 2030 Succession Challenge

by

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ABSTRACT

This research seeks to better understand the current state of US healthcare FM industry hiring practices from colleges and universities to identify potential employment barriers into healthcare FM and interventions to help overcome them. Two national surveys were distributed to healthcare facility managers and directors to collect quantifiable information on healthcare organizations, hiring practices from FM academic programs, individual demographics, and opinions of FM college graduates. Designated survey respondents were also contacted for phone interviews. Additionally, a Delphi method was used for this research to draw upon the collective knowledge and experience of 13 experts over three iterative rounds of input.

Results indicate that the healthcare FM industry is hiring very few college interns and new college graduates for entry-level management jobs. Strong homogeneous demographics, backgrounds, and paths of entry among existing healthcare FM professionals has created an industry bias against candidates attempting to enter healthcare FM from non-traditional sources. The healthcare FM industry's principal source for new talent comes from building trade succession within healthcare organizations. However, continuing to rely on building tradespersons as the main path of entry into the healthcare FM industry may prove problematic. Most existing healthcare facility managers and directors will be retiring within 10 years, yet it is taking more than 17 years of full-time work experience to prepare building tradespersons to assume these roles.

New college graduates from FM academic programs are a viable recruitment source for new talent into healthcare FM as younger professionals are commonly entering

the healthcare FM through the path of higher education. Although few new college graduates enter the healthcare FM industry, they are experiencing similar promotion timeframes compared to other candidate with many years of full-time work experience. Unfamiliarity with FM academic programs, work experience requirements, limited entry-level jobs within small organizations, low pay, and a limited exposure to healthcare industry topics present challenges for new FM college graduates attempting to enter the healthcare FM industry. This study shows that gaps indeed exist in student learning outcomes for a comprehensive healthcare FM education; key technical topics specific to the healthcare industry are not being addressed by organizations accrediting construction and facility management academic programs. A framework is proposed for a comprehensive healthcare FM education including accreditation, regulatory and code compliance, infection control, systems in healthcare facilities, healthcare construction project management and methods, and clinical operations and medical equipment. Interestingly, academics in the field of FM generally disagree with industry professionals that these technical topics are important student learning outcomes. Consequently, FM academics prefer to teach students general FM principles with the expectation that specific technical knowledge will be gained in the workplace after graduation from college. Nevertheless, candidates attempting to enter healthcare FM without industry specific knowledge are disadvantaged due to industry perceptions and expectations. University-industry linkage must be improved to successfully attract students into the field of healthcare FM and establish colleges and universities as a sustainable recruitment source in helping address FM attrition.

This paper is valuable in establishing the current state of the US healthcare industry's hiring practices from FM academic programs and identifying major barriers of entering the healthcare FM industry for new FM college graduates. Findings facilitate development of interventions by healthcare organizations and universities to further open FM academic programs as a sustainable source of new talent to help address healthcare FM attrition, including a healthcare FM education framework to elucidate college student learning outcomes for successful employment in healthcare FM. These student learning outcomes provide a framework for both the healthcare industry and academia in preparing future facility managers.

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TABLE OF CONTENTS

	Page
LIST OF TABLES.....	vi
LIST OF FIGURES.....	viii
CHAPTER	
1 INTRODUCTION.....	1
2 LITERATURE REVIEW.....	4
3 METHODOLOGY.....	11
4 RESULTS	
State of Healthcare Hiring from FM Academic Programs.....	21
Healthcare FM Employment Barriers for New FM College Graduates.....	29
Learning Outcomes for Healthcare FM Education.....	42
5 CONCLUSION.....	51
REFERENCES.....	59
APPENDIX	
A National Survey.....	63
B Second National Survey.....	81
C Delphi Expert Survey.....	103

LIST OF TABLES

Table	Page
1. FMAC Accredited US FM Academic Programs (Bachelor’s and Master’s).....	2
2. ABET Student Learning Outcomes at the Baccalaureate Level.....	5
3. ACCE Student Learning Outcomes at the Baccalaureate Level.....	6
4. FMAC Student Learning Outcomes at the Baccalaureate Level.....	7
5. ASHE Competencies for Senior-level Healthcare Facility Managers.....	9
6. Consensus Criteria.....	19
7. National Survey Key Information Summary for Entry-level Healthcare Facility Manager.....	22
8. National Survey Organizational Average Size Comparison Between Survey Respondents’ Organizations and Those that Hired Entry-level FM from Universities.....	24
9. National Survey Opinion on Importance of Interns: Comparing Respondents that Hired Interns to Average Respondent.....	26
10. Second National Survey Respondents’ Education Levels Grouped by Healthcare and General FM Industry.....	29
11. Second National Survey Respondents’ Education Levels Entering Healthcare FM.....	29
12. Second National Survey Respondents’ Employment Source Entering Healthcare FM with FM College Recruiting Activity.....	32
13. Second National Survey Respondents Average Years of Full-time Building Trade and Management Experience Before Entering Healthcare FM Grouped by Job.....	33
14. Second National Survey Respondents’ Average Years in First FM Job Before Advancement to More Senior Role grouped by Job Before Entering Healthcare FM.....	35

Table	Page
15. Consensus Results and Agreement for Student Outcomes Understanding in Healthcare FM Education.....	45
16. Rank of Student Outcomes in Healthcare FM Education by Median Scores of Industry and Academic Groups.....	46
17. Consensus Results and Agreement for Learning Levels of Student Outcomes in Healthcare FM Education.....	47
18. Framework for Comprehensive Healthcare FM Education.....	53

LIST OF FIGURES

Figure	Page
1. Location of National Survey Respondent Distribution.....	12
2. Location of Second National Survey Respondent Distribution.....	14
3. Delphi Method Procedure.....	15
4. National Survey Respondents' Healthcare Organizations Grouped by Space (sq ft).....	21
5. Figure 5. National Survey Respondents' Healthcare Organizations Grouped by Certified Beds.....	21
6. National Survey Respondents' Agreement Levels on Demonstration of Satisfactory Skills by College Interns in Quality, Leadership, and Knowledge.....	26
7. Second National Survey Respondents Grouped by Planned Retirement.....	28
8. Second National Survey Respondents' Jobs Prior to Entering Healthcare FM.....	31
9. Second National Survey Respondents Opinion of New FM College Graduates' Demonstration of Satisfactory Skills.....	38

CHAPTER 1

INTRODUCTION

The facilities management (FM) industry is experiencing a high rate of attrition, with large numbers of managers retiring and a shortage of new FM professionals entering the field (Sullivan et al., 2010). This FM attrition problem is exacerbated within the healthcare industry from a demand for FM professionals to possess unique experience in the healthcare built environments, including an understanding of complex building systems and myriad government regulations (ASHE succession planning, 2017; Shoheit, 2002; Moy, 1995). Highlighting the risk of having too few qualified facility managers to support the needs of hospitals and clinics across the United States, the American Society for Healthcare Engineering (ASHE) has designated the recruitment of new FM professionals as a top strategic initiative for their membership (ASHE strategic plan, n.d.; Barber, 2007).

Historically, there has been no clear career path into the FM profession. New talent entering the field come from varying sources, with the FM industry relying heavily on promotion from the building trades to address management attrition (Sullivan et al., 2010). However, the trade-to-management succession model may be unsustainable as vocational education declines and the building trade workforce ages and struggles with a talent shortage of their own (Benavot, 1983; Bigelow et al., 2017).

Colleges and universities have been a primary recruitment source for most organizations to fill entry-level jobs (Lindquist & Endicott, 1986), and the benefits gained by employing highly capable college graduates are well documented (Perna, 2003;

Howard, 1986; Miner & Wachtel, 1995). As such, a greater emphasize has been made by the general FM industry to recruit younger talent from colleges and universities to counterbalance the declining pool of building tradespersons for FM jobs (Sullivan et al., 2010). The significant growth of FM academic programs in the United States over the last decade suggests that universities are supporting the industry in producing FM trained graduates. Although still relatively few, there are 17 FM academic programs accredited by the Facilities Management Accreditation Commission (FMAC) in the United States that offer a bachelor’s or master’s degree in facilities management; there were only 9 such programs in 2010 (Sullivan et al., 2010; IFMA registry, n.d; Table 1).

Table 1. FMAC Accredited US FM Academic Programs (Bachelor’s and Master’s)

2010	2019
Arizona State University	Arizona State University
Brigham Young University	Brigham Young University
Cornell University	Cornell University
Ferris State University	Ferris State University
Georgia Institute of Technology	Florida A&M
North Dakota State	Georgia Institute of Technology
Pratt Institute	Indiana University Purdue University at Indianapolis
Texas A&M University	Kennesaw State University
Wentworth Institute of Technology	New York City College of Technology

Pratt Institute

Rochester Institute of Technology

South Seattle College

Temple University

University of Minnesota

University of North Carolina Charlotte

Weber State University

Wentworth Institute of Technology

This growth of FM academic programs, and strong industry demand for built environment graduates, suggest a viable path from college into the FM profession is emerging (Bilboa et al., 2000). However, healthcare FM leaders appear to dismiss university recruitment as a viable source of new talent and the healthcare industry's state of hiring from FM academic programs is unknown (ASHE succession planning, 2017). This research seeks to better understand the current state of US healthcare FM industry hiring practices from colleges and universities to identify potential employment barriers into healthcare FM and interventions to help overcome them.

CHAPTER 2

LITERATURE REVIEW

State of Healthcare Hiring from FM Academic Programs

An extensive literature review found no published research on the healthcare FM industry's hiring practices from academic programs. Sullivan et al. (2010) did establish the general FM industry's hiring practices from academic programs. Younger FM professionals are more likely to consciously choose the profession compared to older FM professionals who usually enter the profession through the building trades. Most FM professionals value the creation of FM undergraduate programs and recruiting employment candidates from those programs. The general FM industry has an aged workforce with many candidates entering the field without higher education. Jackson (1991) and Schneider (1987) establish that employers prefer to hire candidates like themselves, thus organizations with older workforces may tend not to hire many new college graduates.

Cabral & Mindonca (2012) highlight the value industry places on built environment graduates, with strong employability upon graduation and beyond. Bilboa et al. (2000) describes how the robust industry demand has created a deficit of college graduates with construction and facilities management training. Consequently, competition to hire these students is stiff. To attract new college graduates, recruiting companies are raising entry-level salaries and increasing campus presence and interactions with faculty and staff (Christofferson et al., 2006).

Rynes et al. (1997) proposes that availability of students based on cyclical graduation dates and long onboarding periods to reach adequate productivity levels are potential employment barriers for new college graduates. The American Society for Healthcare Engineering (2017), from interviews with several healthcare facility professionals, offers additional barriers as scarcity of available entry-level healthcare facility manager jobs, students' unawareness of the healthcare FM profession, lengthy healthcare FM employment tenures, and the extensive training required for even the best college graduates to become effective healthcare managers after graduation. The National Research Council (2008) highlights many of the competencies necessary for effectively trained facility managers including communication, quality and innovation, technology, sustainability, and technical skills. Battersby (1999) defines the effective use of skills and knowledge as learning outcomes, what a student should know or be able to do upon completion of a course or program.

Student learning outcomes are established by The Accreditation Board for Engineering and Technology (ABET), the American Council for Construction Education (ACCE), and the Facility Management Accreditation Commission (FMAC) to assess student achievement and ensure a minimum level of learning for graduation from an accredited undergraduate degree program (ABET, 2017; Table 2; ACCE, 2017; Table 3; FMAC, 2017; Table 4). ABET, ACCE, and FMAC are the programmatic organizations accrediting engineering, construction management, and facility management academic programs, respectively.

Table 2. ABET Student Learning Outcomes at the Baccalaureate Level

Student Learning Outcomes

An ability to apply knowledge of mathematics, science, and engineering

An ability to design and conduct experiments, as well as to analyze and interpret data

An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability

An ability to function on multidisciplinary teams

An ability to identify, formulate, and solve engineering problems

An understanding of professional and ethical responsibility

An ability to communicate effectively

The broad education necessary to understand the impact of engineering solutions in global, economic, environmental, and societal context

A recognition of the need for, and ability to engage in life-long learning

A knowledge of contemporary issues

An ability to use the techniques, skills, and modern engineering tools necessary for engineering practices

Table 3. ACCE Student Learning Outcomes at the Baccalaureate Level

Student Learning Outcomes

Create written communications appropriate to the construction discipline

Create oral presentations appropriate to the construction discipline

Create a construction project safety plan

Create construction project cost estimates

- Create construction project schedules
- Analyze professional decisions based on ethical principles
- Analyze construction documents for planning and management of construction processes
- Analyze methods, materials, and equipment used to construct projects
- Apply construction management skills as a member of a multi-disciplinary team
- Apply electronic-based technology to manage the construction process
- Apply basic surveying techniques for construction layout and control
- Understand different methods of project delivery and the roles and responsibilities of all constituencies involved in the design and construction process
- Understand construction risk management
- Understand construction accounting and cost control
- Understand construction quality assurance and control
- Understand construction project control processes
- Understand the legal implications of contract, common, and regulatory law to manage a construction project
- Understand the basic principles of sustainable construction
- Understand the basic principles of structural behavior
- Understand the basic principles of mechanical, electrical, and piping systems

Table 4. FMAC Student Learning Outcomes at the Baccalaureate Level

Student Learning Outcomes

Graduates understand the FM history, practice, and profession

Graduates can plan and manage projects

Graduates can manage building systems, facility operations, occupant services and maintenance operations

Graduates apply assessment, management and leadership principles of facility organizations and their stakeholders

Graduates apply fiscal management tools to the Facility program and organization

Graduates apply human factor principles to the facility operation and stakeholders

Graduates are effective communicators

Graduates will be able to apply FM Computer Applications

In the United States, accreditation of colleges, universities, and academic programs are performed by private organizations. There are three types of accrediting organizations: regional, national, and programmatic. The United States Department of Education (USDE) and the Council for Higher Education Accreditation (CHEA) are the foremost organizations that officially recognize these accrediting organizations (CHEA, 2016; CHEA, 2017). For accrediting organizations to receive official recognition by CHEA or USDE, they must meet eligibility requirements and supply information to enable a review process that assesses if accreditation is warranted (CHEA, 2016). These requirements are established to ensure that accrediting organizations have standards that advance academic quality, demonstrate accountability to the public and community, and encourage improvement for sustained student achievement (CHEA, 2010).

Programmatic accrediting organizations review educational programs to ensure students receive training consistent with standards for entry into practice within a specific profession or field of study. Accordingly, a primary goal of the FMAC is to ensure FM college students acquire the skills, competencies, and knowledge to positively impact employer organizations (FMAC, n.d.). Both ABET and ACCE are currently recognized by CHEA and had previously been recognized by USDE; FMAC is not, and has never been, recognized by either CHEA or USDE (CHEA, 2018). It is unclear whether current learning outcomes establish a comprehensive educational framework for healthcare FM. The American Society for Healthcare Engineering (ASHE) recently defined eight essential competencies for senior-level healthcare FM roles, listing the skills, talents, and traits necessary to adequately perform the tasks of a director-level healthcare FM professional (ASHE, 2018; Kurian, 2013; Table 5).

Table 5. ASHE Competencies for Senior-level Healthcare Facility Managers

Competencies

Technical and System Knowledge - regulatory awareness, code compliance, building system operation and shutdowns, and energy management

Ability to Transform - problem solving, strategic facility planning, culture transformation, and strategic leadership.

Communication - project management and infection control

Cultural understanding - networking and relationship building

Diverse talents - contract management, commissioning, financial decision making, business case development, property management, and safety management

Collaboration

Resource Management - compliance management and construction delivery method

Personnel Management

CHAPTER 3

METHODOLOGY

There was insufficient empirical data to establish the current state of healthcare FM hiring practices from FM academic programs. To secure the necessary data, surveys were developed to collect information from healthcare organizations regarding their hiring practices from FM academic programs. Organizational demographics information was sought to understand structure, size, and market demand for entry-level healthcare facility managers, as well as specific hiring practices for full-time and internship jobs and respondents' opinions on this subject.

The scope of the study concentrates on the FM healthcare field within the United States. The research targeted members of ASHE holding director-level titles containing the words engineering, maintenance, physical plant, operations, support services, facility or facilities. The director-level title concentration sought to prevent redundant data from multiple managers within the same healthcare organizations, as healthcare organizations typically only employ a single FM director. However, as many healthcare organizations are also part of a healthcare system, titles containing the words system, corporate, regional, national, administrative, or executive were omitted as part of the study to prevent redundant data from multiple directors within the same healthcare system. Titles containing the words planning, construction, or design were also omitted to focus participation from healthcare professionals with primarily FM responsibilities, compared to design and construction or environmental services, though it is not uncommon for FM healthcare directors to have some overlap in these responsibilities.

Prior to a full survey, a pilot survey was developed using the available literature, past research, and input provided by a panel of seven healthcare FM experts. The expert panel operated under a two-step Delphi approach prior to release of the first pilot survey. The pilot survey was sent to 75 healthcare FM executives across the US. Twenty-one healthcare FM executives completed the survey for a 28% response rate. The results of this pilot survey are not included in the national survey data.

A national survey was then developed, without further input from an expert panel, based upon pilot survey results. The national survey was sent to 1,132 healthcare FM directors from the ASHE membership directory across all 50 states. Of the 1,132 healthcare FM directors contacted to participate in the survey, 291 completed the survey for a 26% response rate that represented 49 of 50 states (Figure 1). To encourage participation, at least one email was sent to the entire list of 1,132 healthcare FM directors and 820 were contacted by phone to encourage participation in the survey. Data collection was managed through a national survey administered by an online survey tool from Qualtrics©, which collected and stored all responses in an online database. Survey respondents who hired directly from an academic program were contacted for a phone interview to validate survey data accuracy and further explore the respondent's hiring practices and opinions.

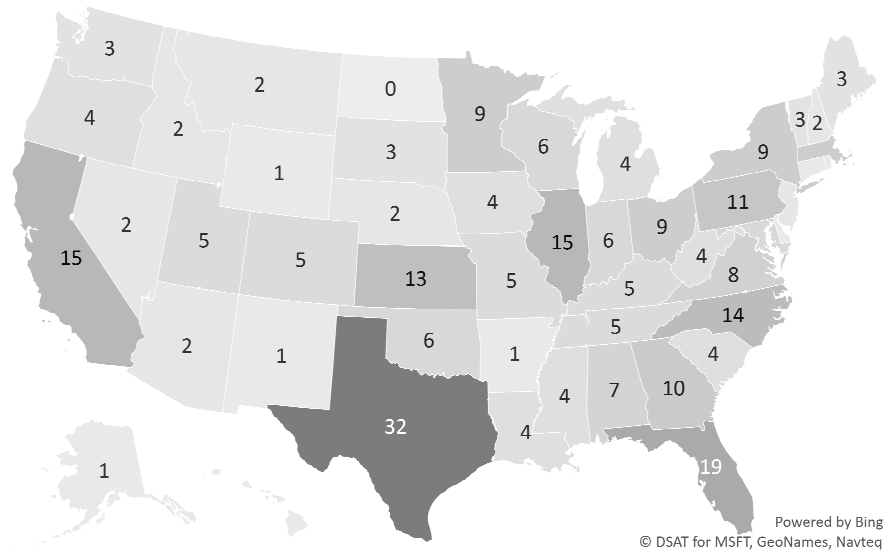


Figure 1. Location of National Survey Respondent Distribution

The national survey showed a lack of hiring by the healthcare industry from FM academic programs, and the review of literature evinced insufficient empirical data to establish the employment barriers into the healthcare FM industry for new FM college graduates. To secure the necessary data, a second pilot survey with 32 questions and a second national survey with 44 questions were developed to address hypotheses established from available literature:

1. The healthcare FM industry prefers to hire candidates with previous building trade and healthcare experience
2. Slow career advancement discourages new FM college graduates from entering healthcare FM
3. New FM college graduates are unaware of, or lack interest in, healthcare FM careers

4. New FM college graduates do not possess necessary skills to be effective entry-level healthcare facility managers

Survey data was collected from healthcare facility managers and directors regarding their employment and hiring experiences, past and current, from a combination of questions that included multiple choice and rankings on a Likert scale. Demographics information was sought to understand respondents' age, retirement timeframes, and educational attainment. Type and duration of work experience, hiring preferences and opinions, and familiarity with FM academic programs was also discovered. The scope of the study concentrates on the FM healthcare field within the United States. The research targeted members of ASHE holding manager and director-level titles with engineering, maintenance, physical plant, operations, support services, facility, or facilities. Job titles with planning, construction, or design were omitted to focus participation from healthcare professionals with primarily FM responsibilities, compared to design and construction or environmental services.

The second pilot survey was sent to 71 healthcare FM executives across the United States. Fifteen healthcare FM executives completed the survey for a 21 percent response rate. The results of this second pilot survey are not included in the second national survey data to ensure data consistency as some questions were added or modified for the national survey. The second national survey was sent to 1,909 healthcare facility managers and directors across all 50 states. Of the 1,909 healthcare facility managers and directors contacted to participate in the survey, 343 completed the survey for a 18% response rate that represented 48 of 50 states (Figure 2). To encourage

participation, an email was sent to the entire list of 1,909 healthcare facility managers and directors; an attempt was also made to contact the entire list via phone, with 853 participants accepting a call directly or by voicemail. Data collection was managed through an online survey tool from Qualtrics©, which collected and stored all survey responses in an online database. The five percent of survey respondents that never recruited new FM college graduates for entry-level healthcare FM jobs, but strongly agree that new FM college graduates have the necessary skills to be effective entry-level healthcare facility managers, were contacted for a single phone interview to better understand their reasons for not recruiting new FM college graduates.

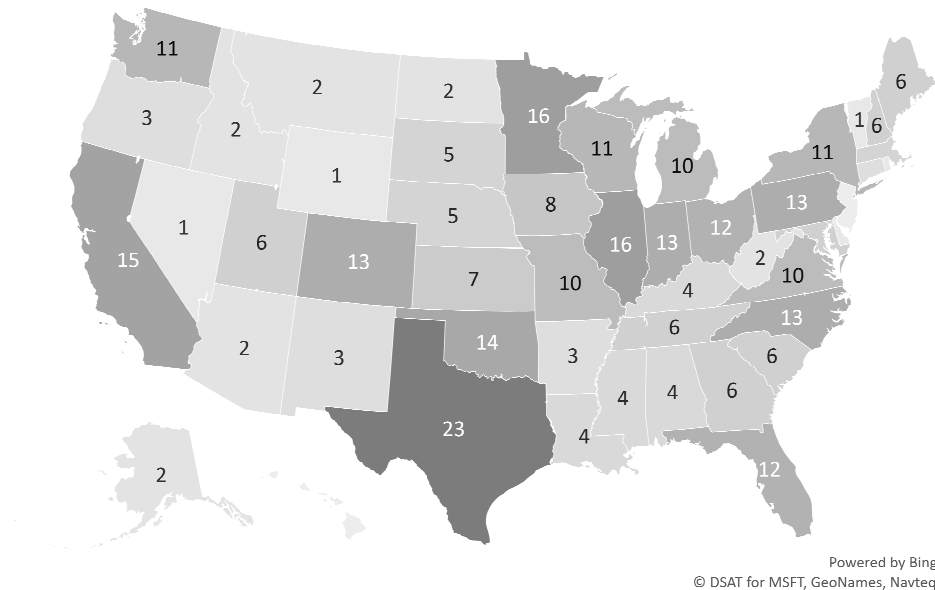


Figure 2. Location of Second National Survey Respondents

The second national survey exposed a healthcare industry perception that new FM college graduates are not being sufficiently trained. The review of literature provided a

foundation for current student learning outcomes at accredited engineering, construction, and facility management undergraduate programs. However, there was insufficient data to determine if any student learning outcome gaps exist for a comprehensive healthcare FM education to successfully prepare future healthcare FM professionals for entry-level jobs; comparing these contemporary student learning outcomes to senior-level competencies described by ASHE, the supposition is there are missing outcomes specifically related to regulatory and code compliance, building systems, and infection control. Therefore, the hypothesis is that ABET, ACCE, and FMAC lack undergraduate student learning outcomes for a comprehensive healthcare FM education.

The Delphi method was used for this research to draw upon the collective knowledge and experience of experts. Hallowell and Gambatese (2010) explained that the Delphi method is an interactive research technique that secures experts' input from two or more rounds of structured surveys to develop highly reliable results on a specific topic. After each round, inputs were analyzed and anonymous summaries were provided back to the experts with the goal of eventually achieving group consensus (Figure 3).

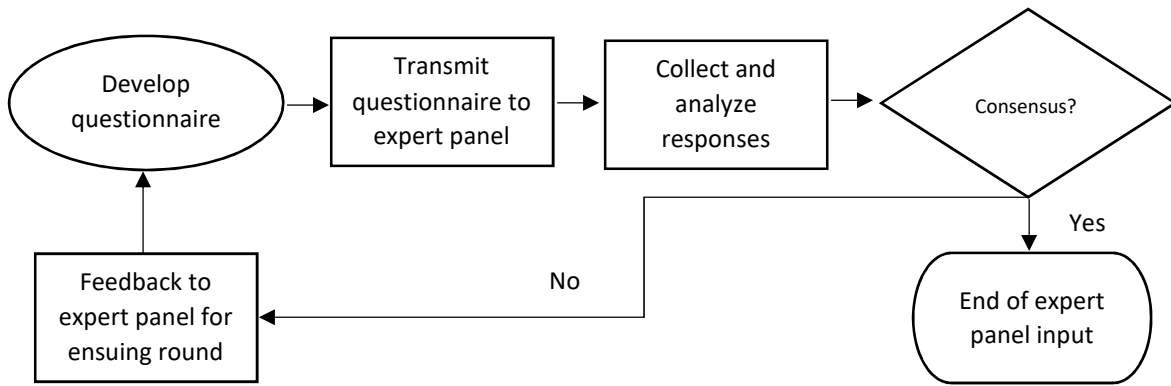


Figure 3. Delphi Method Procedure

As the success of a Delphi study depends upon the proper selection of expert panelists (Chan et al., 2001), this selection process was guided by the Flexible Point System for the Qualification of Expert Panelists established by Hallowell and Gambatese (2010). At least eight experts were sought but no more than twenty (Ameyaw et al., 2014); all experts involved with this research exceeded the minimum qualifications by scoring more than 10 points and at least one point in four different achievement or experience categories. Categories included education levels, professional registration and experience, conference presentations, committee or faculty membership, and journal authorship. Thirteen expert panelists were selected for this research study. Experts include eight facility management executives, employed by large healthcare systems or national service providers accountable for healthcare FM accounts; five of these healthcare FM executives have local or national leadership roles with the American Society for Healthcare Engineering (ASHE). Two healthcare human resource (HR) directors are also part of the expert panel, as many healthcare organizations control

candidate screening and recruitment activity within their HR departments (Call et al., 2018b); both HR directors hold local leadership roles in the American Society for Healthcare Human Resources Administration (ASHHRA) and have responsibility for healthcare FM recruiting within their healthcare system. Three academics complete the panel as active instructors and researchers within the field of facility management; a technical college and two research universities are represented.

Round one served as a brainstorming round to identify all potential student learning outcomes in healthcare FM and solicited opinions from the expert panel in an open-ended way. A questionnaire was developed from a review of literature and listed all existing baccalaureate level student learning outcomes from the organizations accrediting engineering, construction management, and facility management programs (Tables 2 – 4). Several new student learning outcomes were also proposed based upon ASHE competencies (Table 5). Panelists were instructed to review the list of learning outcomes and respond with recommended changes to the list or suggestions for new student learning outcomes they considered missing for a comprehensive healthcare FM education. Panelists considered their responses in the context of learning outcomes required for new college graduates in the first three years of employment as an entry-level plant operations and maintenance (POM) managers at a large healthcare FM department; clarifying timing is important in this context as college students average three years in their first healthcare FM job before promotion to a more senior-level role (Call et al., 2018b). Clarifying the POM role is also important as FM in healthcare can be interpreted as either POM or environmental services (EVS); however, it is not uncommon

for healthcare POM managers to have some overlap in these responsibilities. The entry-level classification for this role was also explained to hold a title that included, but not limited to, foreman, coordinator, supervisor, team leaders, assistant managers, or manager. Additionally, a large healthcare FM department was defined as an organization that managed more than a million square feet, 500 beds, and 50 inhouse POM staff; this emphasis is also important as most recruiting and hiring for entry-level healthcare facility managers in the United States comes from large healthcare organizations (Call et al., 2018a; Call et al., 2018b).

After input was received from the expert panelists on the round one questionnaire, the information was summarized and provided to the panelists for review with explanations and reasoning. They were asked to review the summarized results and respond with any changes or additions they considered necessary to establish a comprehensive healthcare FM education prior to developing a structured questionnaire. This concluded round two.

A structured questionnaire was developed for round three based upon the expert panel input from the previous two rounds. This questionnaire included a list of new student learning outcomes suggested by the expert panelists; panelists were asked to rate their level of agreement on a Likert scale (1 = strongly disagree to 9 = strongly agree) that students should understand each new learning outcome. They were also asked to select a higher learning category, if they believe it was expected, based upon a progressive description of Blooms Taxonomy: understand, apply, analyze, evaluate, and create (ACCE, 2017); a Likert scale was used (1 = understand to 5 = create). The two

academic panelists from research universities institutions were interviewed by phone to better understand their rationale for Likert scale scores on students’ understanding of healthcare regulations and systems.

For this research, absolute deviation was used to measure consensus, as is most common in CEM research (Ameyaw et al., 2016). Consensus for student learning outcomes was considered achieved with absolute deviation within one unit on the 1-9 scale (Hallowell & Gambatese, 2010). Furthermore, agreement levels were categorized by median Likert scale scores (Table 6). Consensus for learning levels for each student outcome was considered achieved with absolute deviation within one unit on the 1-5 scale.

Table 6. Consensus Criteria

Agreement Levels	Conditions
Strong agreement	Absolute deviation ≤ 1 and median score 8-9 (Likert scale 1-9)
Agreement	Absolute deviation ≤ 1 and median score 6-7 (Likert scale 1-9)
Disagreement	Absolute deviation ≤ 1 and median score 3-5 (Likert scale 1-9)
Strong disagreement	Absolute deviation ≤ 1 and median score 1-2 (Likert scale 1-9)

CHAPTER 4

RESULTS

State of Healthcare Hiring from Academic Programs

Pilot survey – healthcare FM industry’s hiring practices from academic programs

The pilot survey data describing the FM industry’s hiring practices from academic programs suggested that the healthcare FM industry was not hiring from academic programs. Pilot survey respondents employ 322 entry-level facility managers and only 26 (8%) hold degrees. Pilot survey respondents hired a total of 41 entry-level facility managers over the past 12 months, and 8 (20%) were hired directly from a university; however, only 1 of the 8 came from an FM academic program. Over the past 12 months, 11 interns were hired and 3 (27%) were hired for a full-time position within a year of internship completion. These data were not included in the national survey analysis.

National survey - healthcare industry demographics

Most healthcare organizations are non-profit; of the 291 respondents, 64 (22%) were from for-profit organizations and 227 (78%) were from non-profit organizations with 80% of organizations managing less than 2,000,000 total square feet of space (Figure 4). The average space managed was between 500,001 to 1,000,000 square feet. Most space was healthcare occupancy at 65%, followed by business at 19% and ambulatory at 17%. Of the respondents’ healthcare organizations, 79% manage less than 501 certified beds (Figure 5) with the average being between 201 – 500 beds.

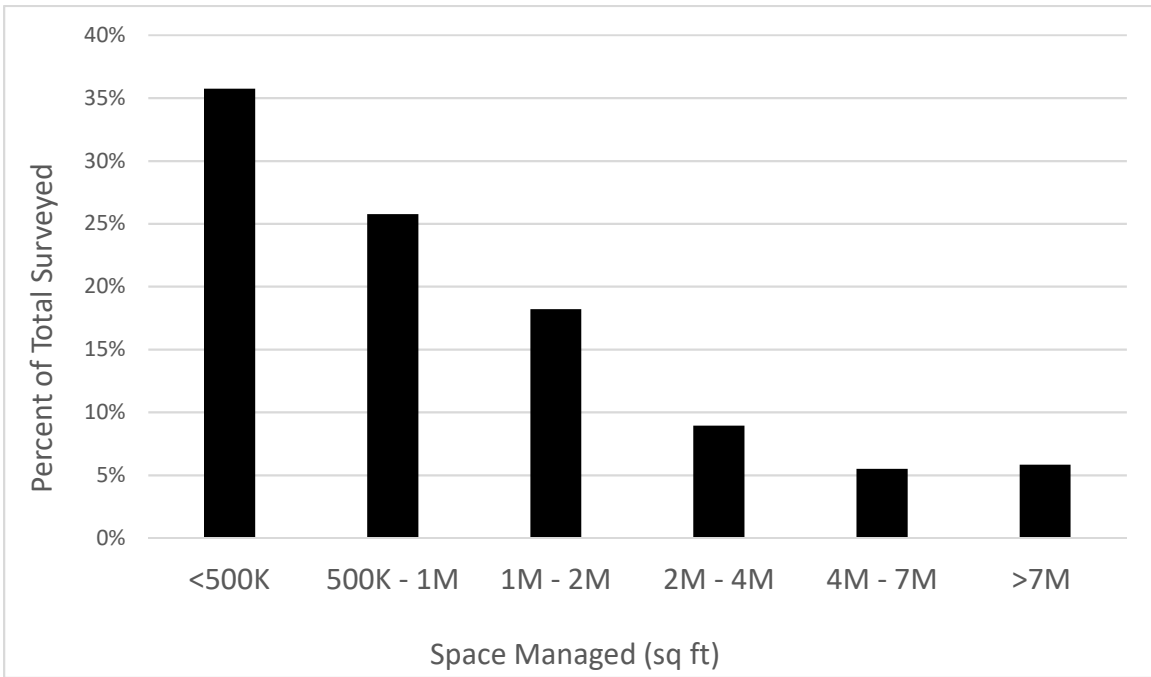


Figure 4. National Survey Respondents' Healthcare Organizations Grouped by Space (sq ft)

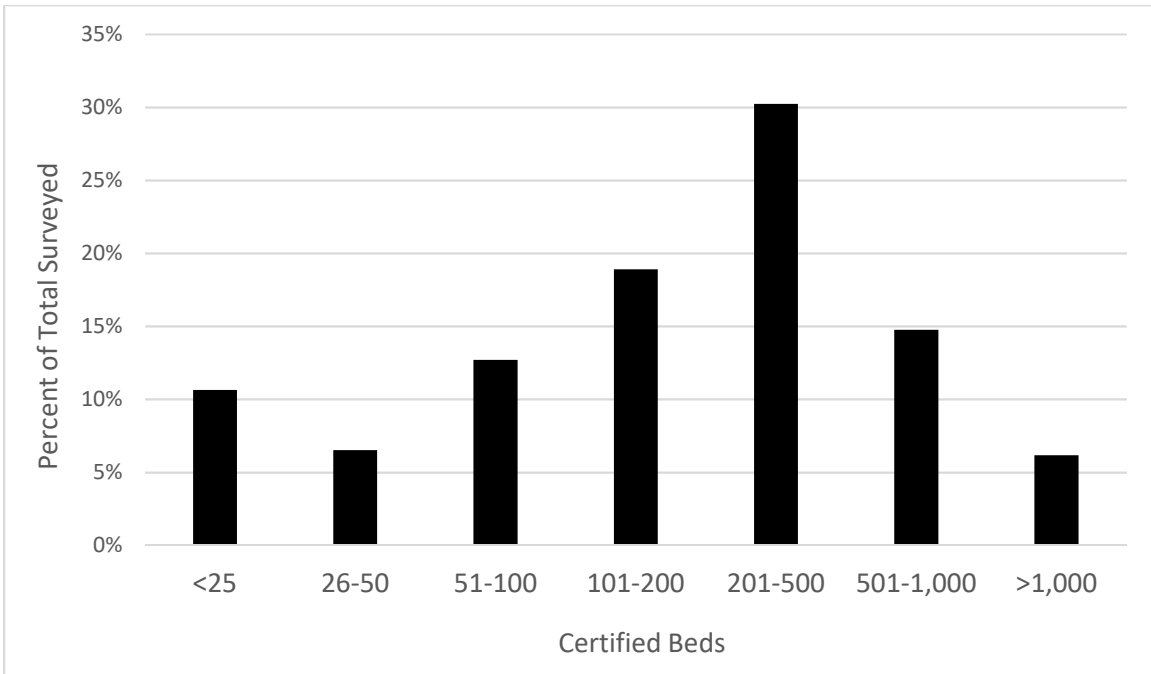


Figure 5. National Survey Respondents’ Healthcare Organizations Grouped by Certified Beds

National survey - data describing FM department demographics

Respondents’ healthcare FM departments maintain small management teams with an average of only two entry-level facility managers; a large majority, 83%, of their employees are employed inhouse. Respondents’ healthcare FM departments have an average total staff size between 11 – 50 people. Most entry-level facility managers are also employed inhouse (83%). These managers have an average salary of \$50,000 – \$60,000 annually and 458 of 1,270 (36%) hold a degree, but only 87 of 1,270 (7%) hold an FM degree (Table 7). In addition to their plant operations and maintenance (POM) focused responsibilities, entry-level facility managers average 19% of their time

managing construction activities and 2% of their time managing environmental services activities.

Table 7. National Survey Key Information Summary for Entry-level Healthcare Facility Managers

Employed inhouse	83%
Annual salary (\$)	50,000 – 60,000
Hold a degree	36%
Hold a degree in FM	7%

National survey - healthcare FM industry's hiring practices for full-time jobs from academic programs

The data collected indicate that the US healthcare FM industry is hiring very low levels from academic programs for full-time, entry-level manager jobs. Of the 291 survey respondents, only 7 organizations (2%) hired at least 1 full-time, inhouse, entry-level FM job directly from a university over the past 12 months for a total of 8 hires; only 1 of the 8 came from an FM academic program. The extremely low levels of hiring from academic programs could be a major concern for the healthcare FM industry, as even specially trained FM students are not entering the field of healthcare FM.

The survey data suggest the lack of hiring from academic programs is not a result of limited entry-level FM healthcare job opportunities, as survey respondents alone hired 204 entry-level FM healthcare jobs over the past 12 months. Inhouse entry-level FM hiring activity was not evenly distributed, but all occurred within 117 (40%) of the

respondents' healthcare organizations. Only 7 of the 117 organizations accounted for all university hiring. On average, these 7 organizations are larger than the average respondents' healthcare organization. They manage more space, beds, and staff. They also hire more entry-level healthcare facility managers and employ more existing entry-level facility managers with degrees (Table 8). Although there doesn't appear to be a clear statistical correlation between these factors and hiring levels from universities for entry-level FM healthcare jobs, the results suggest that a healthcare organization's size, hiring activity, and educational norms for entry-level managers may play a role in hiring levels from colleges and universities.

Survey respondents strongly agree, on average, that there is a shortage of talent entering the healthcare FM profession, but opinions vary greatly on the importance of hiring from academic programs. There does not appear to be a correlation between a respondent's opinion on the importance of hiring from academic programs and actual hiring levels from academic programs. A strong agreement that recruiting from academic programs is important to healthcare succession planning, even from an FM director that has the authority to make hiring decisions, does not seem to affect actual entry-level hiring. Therefore, the lack of hiring from academic programs for entry-level FM healthcare jobs may be more of an organizational or systemic issue rather than a matter of individual opinion.

Table 8. National Survey Organizational Average Size Comparison Between Survey Respondents' Organizations and Those that Hired Entry-level FM from Universities

	Area (sq ft)	Beds	Inhouse entry-level facility managers currently employed	Inhouse entry-level facility managers with degrees	Inhouse entry-level facility managers hired last 12 months
Average respondent's organization that hired from university	1,000,001 – 2,000,000	501 – 1,000	6.00	1.00	1.00
Average for all respondents' organizations	500,001 – 1,000,000	201– 500	2.00	0.00	0.00

National survey - Healthcare FM industry's hiring practices college internships

The data collected show healthcare organizations are hiring college internships at very low levels. Only 21 of the 291 (7%) of survey respondents hired at least 1 college intern over the past 12 months, and none were hired for a full-time, entry-level FM position within 12 months of internship completion. This is surprising considering ASHE's strong support of, and even funding for, college internships within healthcare organizations (ASHE Internship, n.d.).

After phone interviews with 9 of the 21 respondents that hired interns, it appears that the primary focus of these internships was on building trades or construction, not on facilities management. On average, survey respondents that hired interns were satisfied

with the intern's quality and skills (Figure 6), suggesting that the absence of hiring interns for full-time jobs is not a matter of dissatisfaction with overall intern quality or skillset. However, since very few internships were management focused, it is unclear if this postulation translates to entry-level healthcare FM hiring practices.

The data also suggest a relationship between a respondent's opinion on the importance of internships and actual hiring levels for internships. Survey respondents that hire interns are significantly more likely to strongly agree that internships are important to succession planning than those with lower scores (Table 9). When considering that a respondent's agreement level regarding the importance of recruiting from academic programs doesn't increase the likelihood of entry-level hiring, the data suggest there may be fewer barriers to hiring interns compared to full-time, entry-level management jobs.

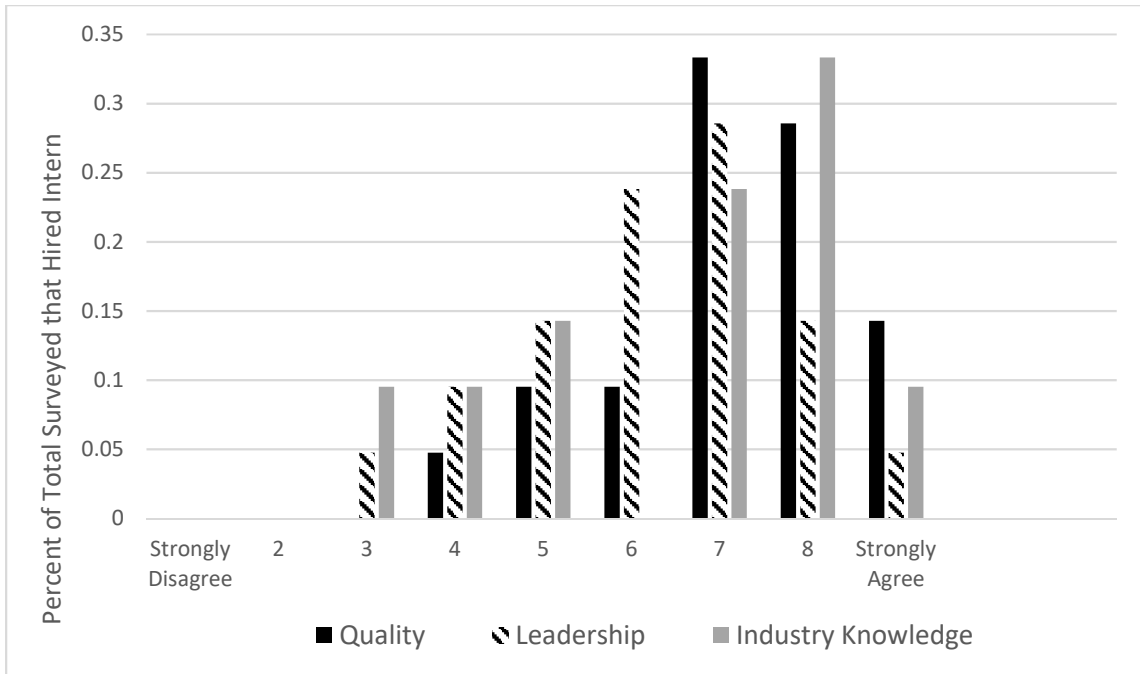


Figure 6. National Survey Respondents' Agreement Levels on Demonstration of Satisfactory Skills by College Interns in Quality, Leadership, and Knowledge

Table 9. National Survey Opinion on Importance of Interns: Comparing Respondents that Hired Interns to Average Respondent

	Strongly disagree that interns are important (Likert score 1 – 3)	Strongly agree that interns are important (Likert score 7 – 9)
Average respondent's agreement that hired intern	14%	57%
Average respondent's agreement	33%	29%

Healthcare FM Employment Barriers for New College Graduates

Second pilot survey

The second pilot survey data suggested there may be employment barriers into healthcare FM from academic programs. All second pilot survey respondents were 54 years of age or older and none entered the healthcare FM field as a college student. Second pilot survey respondents had median 3 – 5 years of full-time building trade experience and 6 – 10 years of full-time management experience upon entering a management position in healthcare FM. Most pilot respondents (73%) had never recruited a FM college graduate for a full-time entry-level healthcare FM job, with results suggesting that minimum experience requirements for entry-level FM jobs and college students' disinterest in healthcare FM as possible barriers into healthcare FM for new college graduates.

Second national survey data describing healthcare FM workforce age and education

Demographic data show an aging healthcare FM workforce. Most respondents (60%) are 54 years of age or older; 31 percent of respondents are between 40 to 53 years of age, and 9 percent are 39 years of age or younger. Consequently, much of the healthcare FM workforce plans to retire within the next 10 years (Figure 7), with a significant increase in facility managers planning to retire within the next five years when compared to the general FM workforce in 2010 (Sullivan et. al, 2010). A chi-square test of homogeneity, used to assess differences in groups, confirmed a statistically significant

difference between these two independent binomial proportions ($p = .04$), highlighting the severity of the FM attrition issue within the healthcare industry.

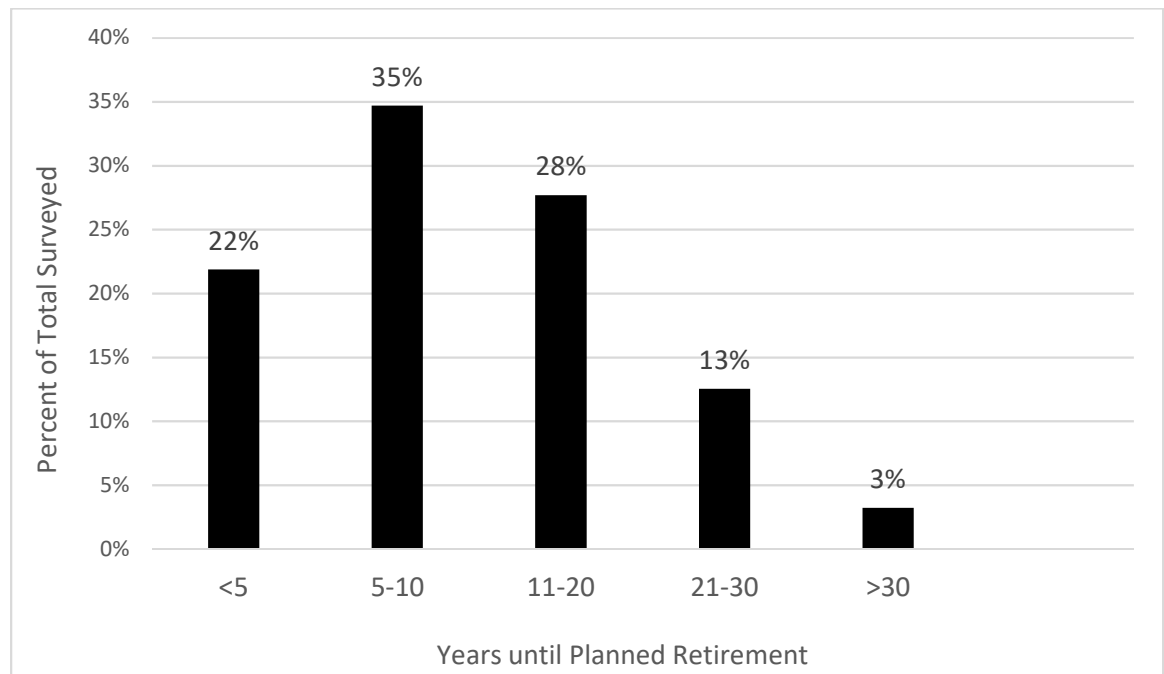


Figure 7. Second National Survey Respondents Grouped by Planned Retirement

The second national survey data suggest healthcare FM workforce lacks higher education attainment, even when compared to the general FM industry. Only 53 percent of respondents have attained at least a bachelor's degree. This level of educational attainment is significantly less than the general FM population, as 76 percent of general FM professionals have attained at least a bachelor's degree (Sullivan et al., 2010). A chi-square test of homogeneity was run comparing educational levels of survey respondents to general FM respondents in the Sullivan et al. survey. The two multinomial probability distributions were not equal in the population, $X^2(4) = 34.589, p < .001$. Observed percentages are presented in Table 10. Upon entering healthcare FM, 38 percent of

respondents had attained at least a bachelor’s degree; this educational level is also less than the general FM population, as 64 percent of general FM professional had attained at least a bachelor’s degree prior to entering FM.

Table 10. Second National Survey Respondents’ Education Levels Grouped by Healthcare and General FM Industry

Education Level	Healthcare FM	General FM (Sullivan, 2010)
High School	6%	3%
Some College	20%	14%
Associates/Vocational degree	21%	7%
Bachelor’s degree	36%	50%
Master’s degree	17%	26%

Younger healthcare FM professionals are entering the industry significantly more educated than older healthcare FM professionals. Age of respondents are delineated by generations to reflect different economic and social conditions. A chi-square test of homogeneity was run comparing educational levels of younger participants, born after 1978, and older participants, born 1978 or earlier, prior to entering healthcare FM. The two multinomial probability distributions were not equal in the population, $X^2(5) = 15.593, p = .008$. Observed percentages are presented in Table 11. Younger respondents are almost twice as likely to enter healthcare FM with a bachelor’s or master’s degree than older respondents. Conversely, older respondents are four times more likely to have entered healthcare FM with no college experience compared to younger respondents.

Table 11. Second National Survey Respondents' Education Levels Entering Healthcare FM

Education Level	Younger (born after 1978)	Older (born 1978 or earlier)
High School	3%	13%
Some College	13%	24%
Associates/Vocational degree	15%	28%
Bachelor's degree	60%	27%
Master's degree	9%	8%

Hypothesis 1: The healthcare FM industry prefers to hire candidates with previous building trade and healthcare experience

Data collected illustrate that transitioning from the building trades to management is the main path of entry to healthcare FM, with 38% of respondents entering healthcare FM from the building trades (Figure 3). Employment succession from the building trades into management is common in the FM industry, but healthcare FM appears to transition noticeably larger proportion of tradespersons into management roles (Sullivan et al., 2010). Two-hundred and forty-five respondents (71%) entered healthcare FM from traditional sources as full-time building tradespersons, facility professionals, or construction professionals; of these respondents, 147 (60%) were working full-time in healthcare organizations prior to entering healthcare FM, emphasizing healthcare FM's preference for hiring candidates with healthcare experience. Additionally, healthcare FM shows a strong penchant for promoting internally, as 126 (86%) of those working in

healthcare prior to entering healthcare FM were promoted within their same healthcare organization (Figure 8). Only 3 percent of respondents entered healthcare FM as full-time college students; of this group of students, 82 percent had no full-time management or building trade experience prior to entering healthcare FM and most graduated from undergraduate programs in engineering, facility management, or construction management.

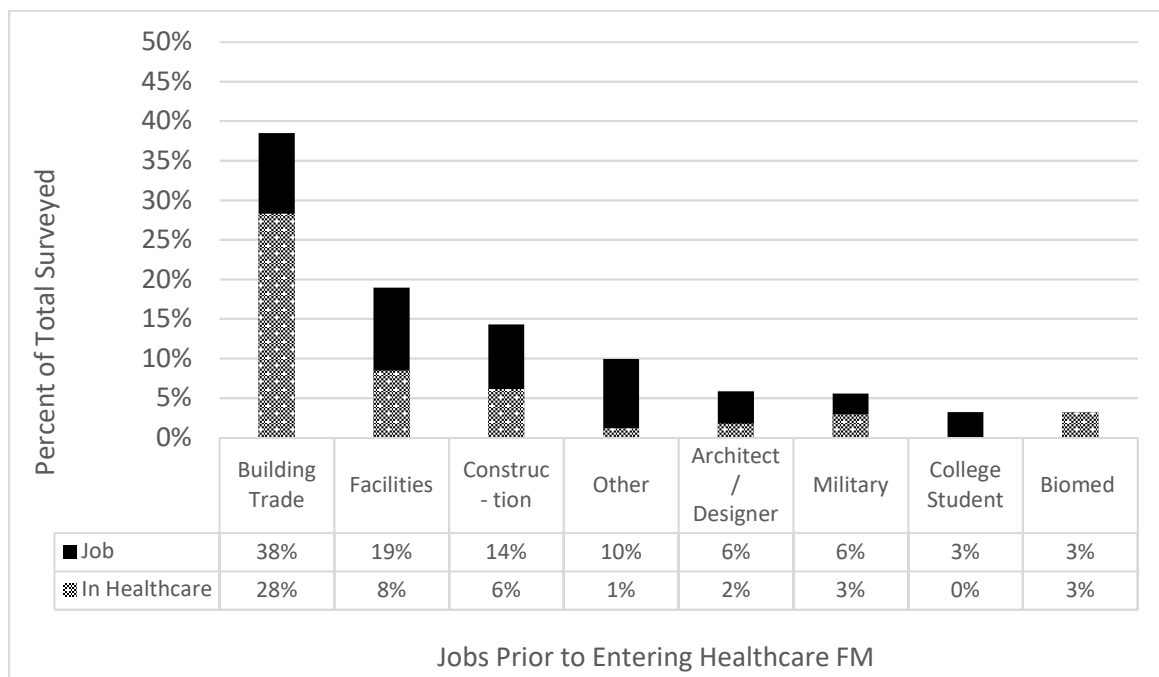


Figure 8. Second National Survey Respondents’ Jobs Prior to Entering Healthcare FM

The second national survey data confirms that healthcare FM is recruiting or hiring very few new FM college graduates. Only 5% of respondents have ever, at any point in their career, recruited a new FM college graduate for an entry-level healthcare FM job. Interestingly, respondents that have recruited new FM college graduates are more likely to have entered healthcare FM from non-traditional sources (other than

building trades or facility and construction professions). A chi-square test of homogeneity was run comparing employment sources and the recruitment of FM college students. There was a statistically significant difference in their proportions of $p = .036$. Observed percentages are presented in Table 12.

Table 12. Second National Survey Respondents' Employment Source Entering Healthcare FM with FM College Recruiting Activity

Recruited FM College Student	Employment Source Entering Healthcare FM	
	Non-traditional	Traditional
No	91%	96%
Yes	9%	4%

The second national survey data suggest a possible association between college internships and new FM college graduate hiring. A chi-square test of independence was conducted between college internship hiring and FM college recruiting; with 75 percent of cells having an expected count greater than or equal to five, there appears to be a statistically significant association, $X^2(1) = 16.527, p = .0005$. Of the respondents that have recruited new FM college graduates, 50 percent hired college interns in FM; only 17 percent of all respondents hired a college intern in FM at some point in their career. Interestingly, very few healthcare organizations recruit previous interns for full-time entry-level FM jobs upon graduating from college; of the 216 respondents with an opinion on this matter, only 20 percent agreed by selecting 6 – 9 on the Likert scale (1 - strongly disagree to 9 - strongly agree and “I don’t know”) that their organization recruits previous interns for full-time entry-level healthcare FM jobs. This may be due to the

tendency of healthcare organizations to centralize and control recruitment activity within the human resource department, reinforced by the fact that 37 percent of respondents didn't know their healthcare organization's internship recruitment activity.

Survey data illustrate that work experience requirements for entry-level healthcare FM job descriptions may be a recruiting barrier for new college graduates. Survey respondents average 18 years of full-time FM experience, 79 percent of which has been in a healthcare organization, though tenure length by position is unknown. Prior to entering healthcare FM, respondents averaged 7 years of full-time building trade experience and 5 years of full-time management experience, for a total of 12 years of combined full-time building trade and management experience prior to entering healthcare FM (Table 13). Survey respondents disagree, with an average Likert scale score of 4.70, that healthcare organizations' work experience requirements for entry-level FM job descriptions allow full consideration of new college graduates. New FM college graduates' cyclical availability, however, does not appear to be an employment barrier for new college graduates into healthcare FM; survey respondents agree, with an average Likert scale score of 5.44, that timing of job openings and students' availability, typically after graduation in Spring or Fall, is not a barrier to hiring.

Table 13. Second National Survey Respondents Average Years of Full-time Building Trade and Management Experience Before Entering Healthcare FM Grouped by Job

Job Before Entering Healthcare FM	Average Years of Full-time Experience Before Entering Healthcare FM	
	Building Trade	Management
Building Tradesperson	10	3
Facility Professional	5	7
Construction Professional	10	9
Other	4	9
Architect/Designer	1	5
Military	3	8
College Student	<1	<1
Biomedical Professional	1	4

Hypothesis 2: Slow career advancement discourages new college graduates from entering healthcare FM

The second national survey data show that new college graduates achieve similar career advancement durations from entry-level healthcare FM jobs compared to other candidates, and prior building trade or management experience are not related to the durations of entry-level career advancements. A Pearson’s product-moment correlation

was run to evaluate the relationship between respondents' prior building trade and management experience and the time it took to advance to a more senior level healthcare FM job. Preliminary investigation showed a linear relationship for both normally distributed variables by Shapiro-Wilk's tests ($p > .05$) with no outliers. There was not a statistically significant correlation between the time it took respondents to advance from entry-level FM jobs and prior building trade, $r(294) = .031$, $p = .597$, or management experience, $r(294) = .069$, $p = .234$.

It took the second national survey respondents an average of 5 years from entering healthcare FM to receive their first job advancement to a more senior role (Table 14); it took respondents that entered healthcare FM as college students an average of 3 year to achieve the same advancement. A one-way ANOVA was conducted to determine if advancement times from entry-level healthcare FM jobs into a more senior role was significantly different based on respondents' job prior to entered healthcare FM. Respondents were classified into eight groups: building tradesperson ($n = 132$), facility professional ($n = 64$), construction professional ($n = 49$), other ($n = 36$), architect/designer ($n = 20$), military ($n = 20$), college student ($n = 11$), and biomedical professional ($n = 11$). There were no outliers evaluated by boxplots and there was homogeneity of variance determined by Levene's test of homogeneity of variances ($p = .526$). The difference in advancement times from entry-level healthcare FM jobs into a more senior role between groups was not statistically significant, $F(7, 288) = 0.737$, $p = 0.526$.

Table 14. Second National Survey Respondents' Average Years in First FM Job Before Advancement to More Senior Role grouped by Job Before Entering Healthcare FM

Job Before Healthcare FM	Average Years to Advance from Entry-level Healthcare FM Job
Building Tradesperson	5
Facility Professional	5
Construction Professional	5
Other	4
Architect/Designer	6
Military	5
Student	3
Biomedical Professional	4

Hypothesis 3: New FM college graduates are unaware of, or lack interest in, healthcare FM careers

The second national survey data suggests that many healthcare FM professionals are unfamiliar with FM academic programs; however, those familiar with FM academic programs believe FM college students are interested in working in the healthcare FM industry. Forty-five percent of respondents selected 1 – 4 or “I don’t know” when asked if they were familiar with colleges or universities that offer degrees in FM. Respondents with an opinion on FM college students’ interest in working in healthcare FM agree, with

an average Likert score of 5.42, that FM college students are interested in working in healthcare FM. Further consideration of the data show that younger respondents are just as likely to be unfamiliar with FM academic programs as older respondents. A chi-square test of homogeneity was run comparing FM program familiarity levels of younger and older respondents; there was not a statistically significant difference between the two independent binomial proportions, $p = .345$. This fact suggests that familiarity to FM academic programs is not simply an issue of older generations unfamiliar with recent growth in these programs but may also be due to a lack of promotion within the healthcare FM industry and colleges that house FM academic programs.

Hypothesis 4: New FM college graduates do not possess necessary skills to be effective entry-level healthcare facility managers

The second national survey data indicate that most healthcare FM professionals do not believe FM college graduates possess the necessary skills to be effective entry-level healthcare facility managers. Thirty-nine percent of respondents did not know if FM colleges graduates possessed necessary skills to be effective entry-level healthcare facility managers; however, respondents with an opinion on the matter, averaging a Likert score of 4.98, disagree that FM college graduates possess necessary skills to be effective entry-level healthcare facility managers. The more familiar a healthcare FM professional is with FM academic programs, the more likely they are to agree that FM college graduates do possess necessary skills to be effective entry-level healthcare facility managers. Somers'd was run to determine the impact on respondents' opinion of FM college graduates' skills to be effective entry-level healthcare facility managers and

familiarity with FM programs; there was a moderate, statistically significant, positive correlation between these factors ($d = .244, p < .0005$).

Only 7 percent of respondents have ever, at any point in their career, hired or worked closely with an entry-level healthcare facility manager that filled the position as a new FM college graduate. However, these respondents agree that new FM college graduates demonstrate satisfactory skills, with an average Likert score of 6.54 for quality, 6.46 for communication, 6.75 for technology, and 6.00 for sustainability; the only disagreement by respondents, with an average of 4.63, was regarding new FM college graduates' demonstration of satisfactory industry knowledge (Figure 9).

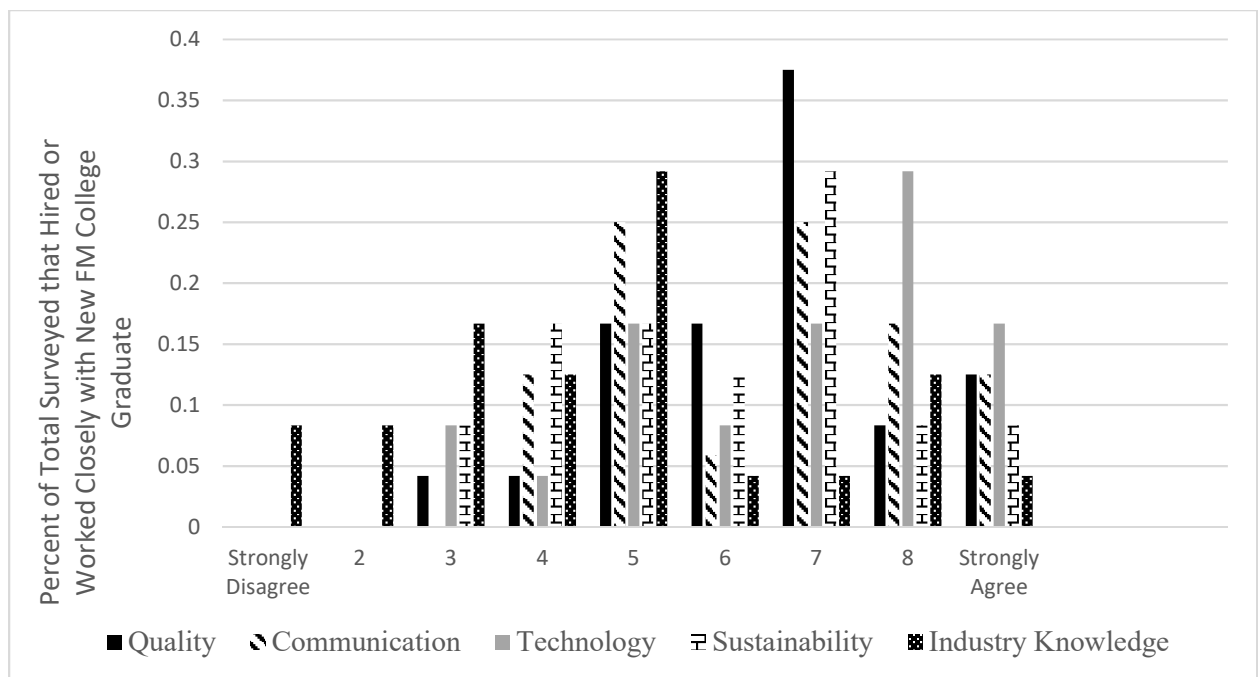


Figure 9. Second National Survey Respondents Opinion of New FM College Graduates' Demonstration of Satisfactory Skills

Surprisingly, the second national survey data also indicate that recruiting activity doesn't change whether a healthcare FM professional agrees or disagrees that new FM college graduate have the necessary skills to be effective entry-level facility managers. Respondents that have recruited FM college graduates, and those who have not, share identical median Likert scale score of 5.00 regarding agreement that new FM college graduates have the necessary skills to be effective entry-level healthcare facility managers. Five percent of respondents that strongly agree that new FM college graduates have the necessary skills to be effective entry-level facility managers (7 – 9 on Likert scale) have recruited a new FM college graduate at some point in their career; four percent of respondents that strongly disagree on this topic (1 – 3 on Likert scale) have recruited a new FM college graduate at some point in their career.

The group of respondents that strongly agree that new FM college graduates have the necessary skills to be effective entry-level healthcare facility managers but have never recruited new FM college graduates for entry-level healthcare FM jobs, were contacted for phone interviews. Twenty-one percent responded to the phone interview question of why they have never recruited new FM college graduates if they believe they have the necessary skills to be effective entry-level healthcare facility managers. Fifty-five percent of these respondents stated that small healthcare organization's do not have entry-level healthcare FM jobs for new college graduates as available jobs in small organizations are limited to building tradesperson or FM director; this supports the suggestion by Call et. al (2018) that large healthcare organizations are the industry's

primary source of entry-level healthcare FM jobs. Forty-five percent of respondents expected candidates to possess some healthcare experience.

Learning Outcomes for Healthcare FM Education

Regulatory Compliance

Data collected from the Delphi method demonstrate a strong panel consensus that understanding accreditation, regulatory, and code compliance for the healthcare built environment is important for college students preparing for employment in healthcare FM. This student learning outcome was explained to include healthcare related regulations and codes from the American Institute of Architects (AIA), Building Officials Code Administrators International (BOCA), Southern Building Code Congress International (SBCCI), International Building Code (IBC), Uniform Building Code (UBC), Americans with Disabilities Act (ADA), The Joint Commission (TJC), National Fire Protection Association (NFPA), Occupational Safety and Health Administration (OSHA), Centers for Disease Control and Prevention (CDC), Centers for Medicare & Medicaid Services (CMS), Facility Guidelines Institute (FGI), and American Society of Heating, Refrigeration and Air-Conditioning Engineering (ASHRA). This student learning outcome had a median Likert scale score of 9.0 and consensus was achieved with absolute deviation at 1.0 (Table 15).

Panel consensus was also achieved regarding the level of learning expected of college graduates for accreditation, regulatory, and code compliance in the healthcare built environment; the expert panel selected “apply” with a median score of 3.0 and

absolute deviation at 0.0 (Table 17). Interestingly, academics disagreed that an understanding of accreditation, regulatory, and code compliance for the healthcare built environment is important for college students preparing for employment in healthcare FM with a median Likert scale score of 5.0. Comparing rankings suggests a gap between industry and academia on expected student learning outcomes for understanding of accreditation, regulatory, and code compliance in healthcare FM education (Table 16).

Building Systems

Data collected show a strong panel consensus that systems in healthcare facilities are important for college students preparing for employment in healthcare FM. This student outcome was explained to include medical gas, vacuum, and pneumatic tube systems; it had a median Likert scale score of 9.0 and consensus was achieved with absolute deviation at 0.0 (Table 15). Panel consensus was also achieved regarding the level of learning expected of college graduates for systems in healthcare facilities; the expert panel selected “apply” with a median score of 2.0 and absolute deviation at 0.0 (Table 17).

Interestingly, the academic group disagreed that an understanding of systems in healthcare facilities is important for college students preparing for employment in healthcare FM with a median Likert scale score of 4.0 (Table 16). Furthermore, academic panelists scored significantly lower than the 9.0 score from healthcare FM executives. A Mann-Whitney U test shows a statistical difference in these two groups with ordinal dependent variables, $U = 1.5$, $z = -2.3$, $p = .02$, confirming a considerable divide between industry and academia on expected student learning outcomes for

technical understanding of systems in healthcare facilities in healthcare FM education. Moreover, the academic panelist representing the technical college scored 8.0 on this topic, highlighting misalignment with the two academic panelists from research universities. Both academics from research universities reported during phone interviews that their classroom instruction is general to the FM industry with the expectation that industry specific knowledge or skills would be learned in the workplace after graduation.

Infection Control

Data collected reveal a strong panel consensus that infection control in the healthcare built environment is important for college students preparing for employment in healthcare FM. This student learning outcome had a median Likert scale score from expert panelists at 8.0; consensus was achieved with absolute deviation at 1.0 (Table 15). Panel consensus was also achieved regarding the level of learning expected of college graduates for infection control. The expert panel selected “apply” with a median score of 3.0 and absolute deviation at 0.0 (Table 17).

Lifecycle Asset Management

Data collected reveal a strong panel consensus that lifecycle asset management concepts, practices, and tools is important for college students preparing for employment in healthcare FM. This student learning outcome had a median Likert scale score from expert panelists at 8.0; consensus was achieved with absolute deviation at 1.0 (Table 15). Panel consensus was also achieved regarding the level of learning expected of college

graduates for lifecycle asset management concepts, practices, and tools. The expert panel selected “apply” with a median score of 2.0 and absolute deviation at 1.0 (Table 17).

Operational Excellence

Data collected show a strong panel consensus that operational excellence in FM is important for college students preparing for employment in healthcare FM. This student outcome was explained to include outsourcing considerations and continuous quality and process improvement (i.e. Lean six-sigma). This student learning outcome had a median Likert scale score from expert panelists at 8.0; consensus was achieved with absolute deviation at 1.0 (Table 15). Panel consensus was also achieved regarding the level of learning expected of college graduates for operational excellence in FM. The expert panel selected “evaluate” with a median score of 4.0 and absolute deviation at 1.0 (Table 17).

Construction Project Management

Data collected show a strong panel consensus that healthcare construction project management and methods are important for college students preparing for employment in healthcare FM. This student outcome was explained to include access, environmental remediation, shielding, smoke and fire compartments, system redundancy and shutdown, project phasing, and moves and changes. This student learning outcome had a median Likert scale score from expert panelists at 8.0; consensus was achieved with absolute deviation at 1.0 (Table 15). Panel consensus was also achieved regarding the level of learning expected of college graduates for healthcare construction project management

and methods. The expert panel selected “analyze” with a median score of 3.0 and absolute deviation at 1.0 (Table 17).

Conflict Resolution

Data collected show a strong panel consensus that employee and customer conflict resolution is important for college students preparing for employment in healthcare FM. This student outcome was explained to include communication and negotiation with diverse stakeholders like patients, visitors, doctors, nurses, and community leaders. This student learning outcome had a median Likert scale score from expert panelists at 8.0; consensus was achieved with absolute deviation at 1.0 (Table 15). Panel consensus was also achieved regarding the level of learning expected of college graduates for employee and customer conflict resolution. The expert panel selected “analyze” with a median score of 3.0 and absolute deviation at 1.0 (Table 17). Interestingly, comparing rankings suggests a large gap between industry and academia on expected student outcomes for employee and customer conflict in healthcare FM education, with academic panelists valuing these soft skills more than healthcare FM executives (Table 16).

Clinical Operations

Data collected show a panel consensus that clinical operations and medical equipment is important for college students preparing for employment in healthcare FM. This student learning outcome had a median Likert scale score from expert panelists at 7.0; consensus was achieved with absolute deviation at 1.0 (Table 15). Panel consensus

was also achieved regarding the level of learning expected of college graduates for clinical operations and medical equipment. The expert panel selected “apply” with a median score of 2.0 and absolute deviation at 1.0 (Table 17).

Materials Management

Data collected show a panel consensus that materials management in healthcare facilities is important for college students preparing for employment in healthcare FM. This student outcome was explained to include supply chain and sourcing. This student learning outcome had a median Likert scale score from expert panelists at 6.0; consensus was achieved with absolute deviation at 1.0 (Table 15). Panel consensus was also achieved regarding the level of learning expected of college graduates for materials management in healthcare facilities. The expert panel selected “analyze” with a median score of 3.0 and absolute deviation at 1.0 (Table 17).

Environmental Services

Data collected show a consensus was not achieved for environmental services (EVS) in healthcare facilities with absolute deviation at 1.5, the only student outcome not to achieve panel consensus (Table 15). This student outcome was explained to include waste management and cleaning processes.

Comprehensive Healthcare FM Education

Data collected show a strong panel consensus that the list of new student learning outcomes (Table 15) fill the gaps in existing ABET, ACCE, and FMAC student outcomes

for a comprehensive healthcare FM education. For this question, panelists had a median Likert scale score of 8.0 with absolute deviation at 0.0 (Table 17)

Table 15. Consensus Results and Agreement for Student Outcomes Understanding in Healthcare FM Education

Student Learning Outcomes	Median Score (Likert Scale 1-9)	Average Score (Likert Scale 1-9)	Absolute Deviation	Agreement Level
Accreditation, regulatory, and code compliance for healthcare built environments	9.0	8.2	0.0	Strong agreement
Systems in healthcare facilities	9.0	7.9	0.0	Strong agreement
Infection control in the healthcare built environment	8.0	8.1	1.0	Strong agreement
Lifecycle asset management concepts, practices, and tools	8.0	7.9	1.0	Strong agreement
Operational excellence in FM	8.0	7.8	1.0	Strong agreement
Healthcare construction project management and methods	8.0	7.8	1.0	Strong agreement
Employee and customer conflict resolution	8.0	7.6	1.0	Strong agreement
Clinical operations and medical equipment	7.0	6.7	1.0	Agreement
Materials management in healthcare facilities	6.0	6.0	1.0	Agreement

Environmental services (EVS) in healthcare facilities	6.5	6.75	1.5	-
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Table 16. Rank of Student Outcomes in Healthcare FM Education by Median Scores of Industry and Academic Groups

Student Learning Outcomes	Healthcare FM Executives' Median Score (Likert Scale 1-9)	Academics' Median Score (Likert Scale 1-9)	Industry Rank	Academic Rank
Accreditation, regulatory, and code compliance for healthcare built environments	9.0	5.0	1	9
Systems in healthcare facilities	9.0	4.0	1	10
Infection control in the healthcare built environment	8.5	7.0	3	4
Lifecycle asset management concepts, practices, and tools	8.5	8.0	3	2
Operational excellence in FM	8.5	7.0	3	4
Healthcare construction project management and methods	8.0	8.0	6	2
Employee and customer conflict resolution	7.5	9.0	7	1
Clinical operations and medical equipment	7.0	6.0	8	7
Materials management in healthcare facilities	5.5	6.0	9	7
Environmental services (EVS) in healthcare facilities	5.5	6.5	9	6

Table 17. Consensus Results and Agreement for Learning Levels of Student Outcomes in Healthcare FM Education

Student Learning Outcomes Achieving Consensus	Median Score (Likert Scale 1-5)	Absolute Deviation
Accreditation, regulatory, and code compliance for healthcare built environments	2 - Apply	0.0
Systems in healthcare facilities	3 - Analyze	0.0
Infection control in the healthcare built environment	2 - Apply	0.0
Lifecycle asset management concepts, practices, and tools	3 - Analyze	1.0
Operational excellence in FM	4 - Evaluate	1.0
Healthcare construction project management and methods	3 - Analyze	1.0
Employee and customer conflict resolution	3 - Analyze	1.0
Clinical operations and medical equipment	2 - Apply	1.0
Materials management in healthcare facilities	3 - Analyze	1.0

CHAPTER 6

CONCLUSION

This study concludes that the healthcare FM industry is hiring very few college graduates for entry-level management jobs. At first glance, it is perplexing to consider the lack of hiring from FM academic programs when most healthcare professionals agree there is a lack of new talent entering the field, the general industry strongly supports recruiting from FM academic programs, and the availability of specially trained FM college graduates is growing. However, this research shows strong homogeneous demographics and paths of entry among existing healthcare FM professionals has created an industry bias against candidates attempting to enter healthcare FM other than from traditional sources in building trades, facilities operations, or construction. The healthcare FM industry's principal source for new talent comes from building trade succession within healthcare organizations. Continuing to rely on the promotion of internal building tradespersons as the main path of entry into the healthcare FM industry, however, may prove problematic. The majority of existing healthcare facility managers and directors will be retiring within 10 years, with almost a quarter of this workforce retiring in less than 5 years. Alarming, it is taking more than 17 years of full-time work experience to prepare building tradespersons for these roles. Upon entering the healthcare FM industry, most candidates have limited higher education attainment but possess many years of full-time trade and management experience within healthcare. Consequently, most healthcare FM professionals don't believe new FM college graduates have the necessary skills and experience to be effective entry-level healthcare facility managers

and don't attempt to hire new FM college graduates for entry-level healthcare FM jobs. Nevertheless, healthcare FM professionals familiar with FM academic programs do believe new FM graduates are interested in working in healthcare and possess necessary skills to be effective entry-level healthcare facility managers. Accordingly, the few healthcare FM professionals currently hiring and recruiting FM college graduates usually entered the healthcare FM industry as students or from other non-traditional sources. Younger professionals are more commonly entering the healthcare FM industry through the path of higher education. Although few in number, most healthcare FM professionals that entered the industry as full-time college students graduated from undergraduate programs in engineering, construction management, or facility management. These new college graduates typically have no full-time work experience but are experiencing similar promotion timeframes compared to other candidate with many years of full-time building trade, management, and healthcare experience. This reality is significant as the industry develops strategies to address the healthcare FM attrition problem.

Remarkably, even if a healthcare FM professional strongly believes new FM college graduates possess necessary skills to be effective entry-level healthcare facility managers, it does not affect their recruitment activity. This fact suggests that barriers other than a general bias against new college graduates still exist. A reason for this recruitment dearth doesn't appear to be the lack of entry-level FM jobs, although there are limited opportunities within small healthcare organizations as they typically employ only building trade or director-level jobs. Pay is a major employment barrier into healthcare FM for new FM college graduates. The average new FM college graduate has

limited prior full-time work experience. However, upon graduation they currently enjoy salaries approximately \$10,000 more per year than the average entry-level healthcare facility manager: the average salary for entry-level healthcare facility manager jobs is approximately \$55,000 annually compared \$65,000 for new FM college graduates (IFMA, 2017); considering the average entry-level healthcare facility manager enters the field with 12 years of full-time work experience, the real pay gap may be closer to \$30,000 annually. As new FM college students face restrictive work experience expectations and excessive pay gaps within healthcare FM, they will undoubtedly seek other industries that are actively recruiting for their services at market salaries.

Another key employment barrier for college students into healthcare FM is the industry expectation that new college graduates have healthcare industry knowledge. Even FM professionals that are overwhelmingly satisfied with the overall quality of new FM college graduates, having hired or worked closely with them in an entry-level healthcare FM role, still believe new FM college graduates lack necessary healthcare industry knowledge. This study confirms that some learning outcomes are missing for a comprehensive healthcare FM education; central learning outcomes not being addressed by organizations accrediting engineering, construction management, and facility management undergraduate programs appear to be technical or vocational topics specific to the healthcare industry that include regulatory compliance, infection control, and building systems. Interestingly, academics in the field of facility management generally disagree with healthcare industry professionals that these technical topics are important student learning outcomes. Consequently, FM academics prefer to teach students general

FM principles with the expectation that industry specific knowledge be gained in the workforce after graduation from college; this approach seems reasonable considering the myriad industries that employ facility managers. Additionally, the rapid promotion timeframes FM college graduates are experiencing in the healthcare industry suggests that the learning outcome gaps are being closed quickly and sufficiently. Nevertheless, candidates attempting to enter healthcare FM without industry specific knowledge are disadvantaged due to industry perceptions and expectations.

The list of healthcare FM learning outcomes, elucidated from this research, can be adopted into academic programs to better prepare graduates with at least a basic understanding of key healthcare FM topics and help overcome the current healthcare industry recruiting bias. Many of these learning outcomes could be readily joined or integrated with existing learning outcomes adopted by FMAC accredited undergraduate programs due to their similarities (Table 15). Integrating specific industry learning outcomes like healthcare regulations and infection control, however, may not be so ostensible; these student learning outcomes could be addressed with additional courses and/or developed outside of a classroom environment through internships. Notably, participation in healthcare FM internships show a positive association with new college graduate hiring.

Facility management academic programs interested in providing a more comprehensive healthcare FM education may consider a concentration or emphasis in healthcare FM. At minimum, it is proposed that dedicated courses be adopted to address

the following top tier of expected healthcare FM learning outcomes that may not be easily addressed in existing courses:

- Accreditation, regulatory, and code compliance for healthcare built environments
- Infection control in the healthcare build environment

Other healthcare FM learning outcomes that may warrant dedicated courses include:

- Systems in healthcare facilities
- Healthcare construction project management and methods
- Clinical operations and medical equipment
- Materials management in healthcare facilities

Ultimately, it is incumbent upon the healthcare FM industry to encourage and support adoption of more comprehensive healthcare FM education at academic programs to attract new talent in response to an ongoing FM workforce shortage. Currently, there appears to be little incentive for academic programs to expend resources implementing these changes as so few students are being recruited by healthcare FM professionals. With historically high placement rates for graduates, FM academic programs are clearly inclined to focus on industries that proactively support and connect with students and faculty. The healthcare FM industry should consider ways to improve its relationship with colleges and universities including funding program resources and research, sponsoring student events and internships, and participating in advisory boards. Nevertheless, even if university-industry linkage improves and healthcare FM professionals dramatically increase recruitment levels of new FM college graduates with

a comprehensive healthcare FM education, these efforts may not significantly increase the number of new college graduates entering the healthcare FM field due to low starting salaries compared to offers typically received by new FM college graduates. The healthcare FM industry must address competitive pay in conjunction with its other fundamental recruiting issues to attract students and ensure that colleges and universities open as a sustainable recruitment source in helping address FM attrition.

Although this research sought to better understand student learning outcomes specific to healthcare FM education, it also elucidated learning outcomes that may be considered applicable for FM education in general. These student learning outcomes include:

- Lifecycle asset management concepts, practices, and tools
- Operational excellence in FM
- Employee and customer conflict resolution

Table 18. Framework for Comprehensive Healthcare FM Education

FMAC Student Learning Outcomes	Healthcare FM Student Learning Outcomes
Graduates understand the FM history, practice, and profession	
Graduates can plan and manage projects	Healthcare construction project management and methods
Graduates can manage building systems, facility operations, occupant services and maintenance operations	Systems in healthcare facilities Materials management in healthcare facilities

Graduates apply assessment, management and leadership principles of facility organizations and their stakeholders	Lifecycle asset management concepts, practices, and tools Operational excellence in FM
Graduates apply fiscal management tools to the Facility program and organization	
Graduates apply human factor principles to the facility operation and stakeholders	
Graduates are effective communicators	Employee and customer conflict resolution
Graduates will be able to apply FM Computer Applications	
	Accreditation, regulatory, and code compliance for healthcare built environments
	Clinical operations and medical equipment
	Infection control in the healthcare built environment

Limitations

This research was limited to the area of healthcare FM. The impact of FM attrition on the healthcare industry was not measured in this research. The educational framework does not address curriculum development but focuses on student learning outcomes.

Future Research

Further research may be warranted to better understand the healthcare FM industry's unfamiliarity with FM academic programs and benefits to promoting awareness.

Additionally, exploring faculty and students' familiarity with FM academic programs at colleges and universities that house these programs may be meaningful in promoting awareness, especially among students with undeclared majors and their academic advisors. Insight into how these FM academic programs recruit students, both internally and externally, may highlight opportunities to attract prospects with backgrounds and experiences that complement formal academic training to yield new FM graduates with ideal work and education blends for enhanced employability in healthcare and other distinct industries. With such a strong focus on building tradesperson succession to management in healthcare FM, measuring possible attrition in this field may also be valuable to understand its impact to the healthcare industry; furthermore, exploring building tradespersons' motivation and will to manage is useful to recognize within this context.

Understanding how these new student learning outcomes can be better integrated into FM education to prepare future FM professionals is also warranted. Moreover, exploring how accrediting organization and academic programs ensure student learning outcomes align with evolving FM industry expectations is necessary to continuously produce highly capable graduates. Subsequently, understanding the current and future demand for healthcare FM professionals is necessary to predict the supply of new graduates needed to meet this demand as support for the advancement of healthcare FM education.

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APPENDIX A

NATIONAL SURVEY

Healthcare Plant Operations & Maintenance (POM) Management Succession Planning Survey

The purpose of this survey is an initial step in understanding and strengthening the relationship between the healthcare facilities management industry and academia. Your participation will help develop solutions to the unique succession planning challenges facing healthcare organizations and provide direction for the development of future leaders.

This survey will take approximately 10 minutes to complete. You may start the survey and save for a later completion if necessary. Responses will be kept confidential. Please contact Steve Call at sacall@asu.edu with any questions.

What is the name of your healthcare organization?

What is the name of the person taking this survey?

What is the email of the person taking this survey?

What is the phone number of the person taking this survey?

Page Break

The following series of questions are regarding demographics for your healthcare organization:

Note: If you are part of a healthcare system, please provide information for only the hospital(s) and/or medical center(s) that you direct.

Please do not included information for facilities outside the United States.

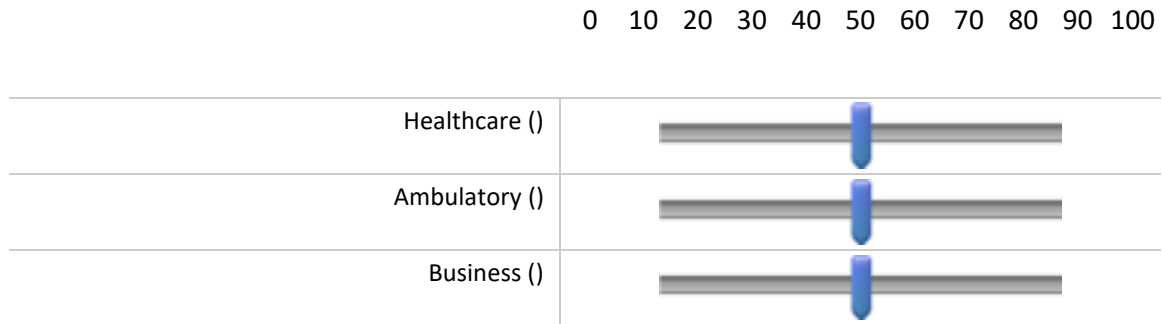
Q1 Which of the following categories best describes the healthcare organization you represent?

- For-profit
- Not-for-profit

Q2 How much total space (square feet) is managed by your organization?

- Less than 500,000
- 500,001 - 1,000,000
- 1,000,001 - 2,000,000
- 2,000,001 - 4,000,000
- 4,000,001 - 7,000,000
- 7,000,001 - 11,000,000
- 11,000,001 - 15,000,000
- 15,000,001 - 20,000,000
- 20,000,001 - 25,000,000
- More than 25,000,000

Q3-Q5 What percent of space managed by your organization is the following occupancy type?



Q6 How many certified beds are managed by your organization?

- Less than 25
- 26 - 50
- 51 - 100
- 100 - 200
- 201 - 500
- 501 - 1,000
- 1,001 - 2,000
- 2,001 - 4,000
- More than 4,000

Q7 How many stand-alone hospital facilities are managed by your organization?

- 0
 - 1 - 5
 - 6 - 10
 - 11 - 15
 - 16 - 20
 - 21 - 25
 - 26 - 30
 - More than 30
-

Q8 How many stand-alone clinic facilities are managed by your organization?

- 0
 - 1 - 9
 - 10 - 25
 - 26 - 50
 - 51 - 100
 - 101 - 150
 - 151 - 200
 - More than 200
-

Q9 How many stand-alone office facilities are managed by your organization?

- 0
- 1 - 5
- 6 - 10
- 11 - 25
- 26 - 50
- 51 - 75
- 76 - 100
- More than 100

Page Break

The next series of questions are regarding demographics for your healthcare organization's Plant Operations & Maintenance (POM) department(s):

Q10 How many total in-house POM Staff are employed by your organization?

- 0
 - 1 - 10
 - 11 - 50
 - 51 - 100
 - 101 - 200
 - 201 - 400
 - 401 - 800
 - More than 800
-

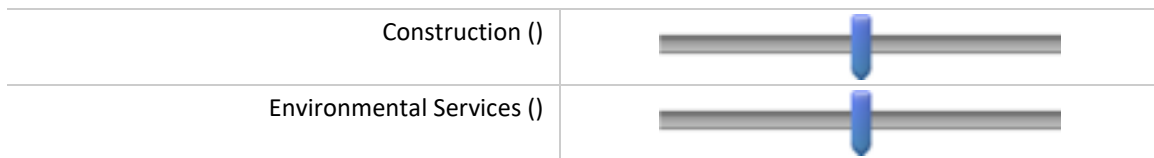
Q11 How many total contracted POM Staff are employed by your organization?

- 0
- 1 - 10
- 11 - 50
- 51 - 100
- 101 - 200
- 201 - 400
- More than 400

Note: "Entry-level manager" may hold various titles such as, but not limited to: foreman, supervisor, team leader, assistant manager, or manager.

Q12-Q13 What percent of time, on average, do your organization's POM *entry-level* managers spend managing the following auxiliary activities?

0 10 20 30 40 50 60 70 80 90 100



Q14-Q15 How many POM *entry-level* managers does your organization employ?

In-house : _____

Contracted : _____

Total : _____

Display This Question:

If How many POM entry-level managers does your organization employ? [In-house] > 0

Q16-Q17 How many in-house POM *entry-level* managers in your organization have:

Degree in facilities management : _____

Degree but not in facilities management : _____

Total : _____

Display This Question:

If How many POM entry-level managers does your organization employ? [Contracted] > 0

Q18-Q19 How many contracted POM *entry-level* managers in your organization have:

Degree in facilities management : _____

Degree but not in facilities management : _____

Total : _____

Display This Question:

If How many POM entry-level managers does your organization employ? [In-house] > 0

Or How many POM entry-level managers does your organization employ? [Contracted] > 0

Q20 What is the average annual starting salary for POM *entry-level* managers in your organization?

- \$40,000 or less
- \$40,001 - \$50,000
- \$50,001 - \$60,000
- \$60,001 - \$70,000
- \$70,001 - \$80,000
- \$80,001 - \$90,000
- \$90,001 - \$100,000
- More than \$100,000

Page Break

The next series of questions are regarding hiring practices for your organization's Plant Operations and Maintenance (POM) department(s):

Q21-22 How many university/college students has your organization hired for POM internships over the *past 12 months*?

In-house : _____

Contracted : _____

Total : _____

Display This Question:

If How many university/college students has your organization hired for POM internships over the pas... [In-house] > 0

Or How many university/college students has your organization hired for POM internships over the pas... [Contracted] > 0

Q23-28 Please rate your level of agreement that POM interns hired by your organization demonstrated satisfactory skills for the following areas:

	Strongly disagree 1	2	3	4	5	6	7	8	Strongly agree 9
Quality (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Communication (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Technology (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Leadership (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sustainability (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Industry knowledge (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Display This Question:

If How many POM entry-level managers does your organization employ? [In-house] > 0

And How many POM entry-level managers does your organization employ? [Contracted] > 0

And How many university/college students has your organization hired for POM internships over the pas... [In-house] > 0

And How many university/college students has your organization hired for POM internships over the pas... [Contracted] > 0

Q29-Q30 How many university/college students, hired for POM internships with your organization over the past 12 months, were hired by your organization for a full-time POM entry-level management position within the past 12 months?

In-house : _____

Contracted : _____

Total : _____

Display This Question:

If How many POM entry-level managers does your organization employ? [In-house] > 0

Or How many POM entry-level managers does your organization employ? [Contracted] > 0

Q31-Q32 How many POM *entry-level* managers has your organization hired over the past 12 months?

In-house : _____

Contracted : _____

Total : _____

Display This Question:

If How many POM entry-level managers has your organization hired over the past 12 months? [In-house] > 0

Q33-Q34 How many in-house POM *entry-level* managers in your organization, over the past 12 months, were hired directly from:

University/college with a degree in facilities management : _____

University/college with a degree but NOT in facilities management : _____

Total : _____

Display This Question:

If How many POM entry-level managers has your organization hired over the past 12 months? [Contracted] > 0

Q35-Q36 How many contracted POM *entry-level* managers in your organization, over the past 12 months, were hired directly from:

University/college with a degree in facilities management : _____

University/college with a degree but NOT in facilities management : _____

Total : _____

Display This Question:

*If How many in-house POM entry-level managers in your organization, over the past 12 months, were hi...
[University/college with a degree in facilities management] > 0*

*Or How many contracted POM entry-level managers in your organization, over the past 12 months, were...
[University/college with a degree in facilities management] > 0*

Q37 What was the average starting salary for POM *entry-level* managers hired by your organization, over the past *12 months*, directly from a university/college with a degree in facilities management?

- \$40,000 or less
- \$40,001 - \$50,000
- \$50,001 - \$60,000
- \$60,001 - \$70,000
- \$70,001 - \$80,000
- \$80,001 - \$90,000
- \$90,001 - \$100,000
- More than \$100,000

Display This Question:

*If How many in-house POM entry-level managers in your organization, over the past 12 months, were hi...
[University/college with a degree but NOT in facilities management] > 0*

*Or How many contracted POM entry-level managers in your organization, over the past 12 months, were...
[University/college with a degree but NOT in facilities management] > 0*

Q38 What was the average starting salary for POM *entry-level* managers hired by your organization, over the past *12 months*, directly from a university/college with a degree but not in facilities management?

- \$40,000 or less
- \$40,001 - \$50,000
- \$50,001 - \$60,000
- \$60,001 - \$70,000
- \$70,001 - \$80,000
- \$80,001 - \$90,000
- \$90,001 - \$100,000
- More than \$100,000

Display This Question:

*If How many in-house POM entry-level managers in your organization, over the past 12 months, were hi...
[University/college with a degree in facilities management] > 0*

*Or How many contracted POM entry-level managers in your organization, over the past 12 months, were...
[University/college with a degree in facilities management] > 0*

Q39-Q44 Please rate your level of agreement that POM *entry-level* managers hired directly from a university/college with a **degree in facilities management** have superior starting skills than

new POM *entry-level* managers hired directly from a university/college with a **degree but not in facilities management** in the following areas:

	Strongly disagree 1	2	3	4	5	6	7	8	Strongly agree 9
Quality (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Communication (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Technology (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Leadership (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sustainability (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Industry knowledge (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

 Page Break

The next series of questions are regarding succession planning:

Q45-Q50 Please rate your level of agreement to the following statements:	Strongly disagree 1	2	3	4	5	6	7	8	Strongly agree 9
Your healthcare POM department(s) has a formal succession plan that adequately addresses entry-level management needs (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Recruiting university/college students is an important aspect of a healthcare POM department's succession plan (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
University/college internships are an important aspect of a healthcare POM department's succession plan (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
There are sufficient numbers of new candidates entering healthcare POM to address the CURRENT demand for new entry-level management (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

There are sufficient numbers of new candidates entering healthcare POM to address the FUTURE demand for entry-level management (5)



Thank you for taking this survey!



Page Break



APPENDIX B

SECOND NATIONAL SURVEY

The purpose of this survey is to better understand future workforce needs in healthcare facilities management (FM) and develop solutions to attract more qualified talent into the industry. It will take less than 10 minutes to complete, but you may start and save for a later completion if necessary. Responses will be kept confidential. Please contact Steve Call at sacall@asu.edu with any questions.

Page Break

The following series of questions are regarding demographics for your healthcare organization. *Note: If you are part of a healthcare system, please provide information for only the hospital(s) and/or medical center(s) that you directly manage.*

Q1 How much total space (square feet) is managed by your organization?

- Less than 100,000
- 100,000 - 250,000
- 250,001 - 500,000
- 500,001 - 1,000,000
- 1,000,001 - 2,000,000
- 2,000,001 - 3,000,000
- 4,000,001 - 5,000,000
- More than 5,000,000

Q2 How many certified beds are managed by your organization?

- NA
 - Less than 25
 - 26 - 50
 - 51 - 100
 - 101 - 200
 - 201 - 500
 - 501 - 1,000
 - 1,001 - 2,000
 - 2,001 - 4,000
 - More than 5,000
-

Q3 How many total staff are employed by your organization's FM department?

- Less than 10
 - 10 - 50
 - 51 - 100
 - 101 - 200
 - 201 - 400
 - 401 - 800
 - More than 800
-

The following series of questions are regarding healthcare FM demographics.

Q4 What is your current job title/level?

- Coordinator
 - Supervisor
 - Assistant Manager
 - Manager
 - Senior Manager
 - Assistant Director
 - Director
 - Assistant Vice President
 - Vice President
-

Q5 How many total years of full-time management experience do you have in the FM industry?

- Less than 1
- 1 - 2
- 3 - 5
- 6 - 10
- 11 - 15
- 16 - 20
- 21 - 25
- 26 - 30
- More than 30

Q6 What percent of your total full-time FM management experience has been in healthcare?

0 10 20 30 40 50 60 70 80 90 100



Q7 In how many years do you plan to retire?




- Less than 5
 - 5 - 10
 - 11 - 20
 - 21 - 30
 - 31 - 40
 - More than 40
-

Q8 What is your generational affiliation?

- Traditionalist (born prior to 1946)
 - Baby boomer (born 1946 - 1964)
 - Generation X (born 1965 - 1978)
 - Generation Y (born 1979 - 1997)
 - Generation Z (born 1998 or later)
-

Q9-11 What percent of your time is managing the following activities?

0 10 20 30 40 50 60 70 80 90 100

plant operations & maintenance (POM) ()	
environmental services (EVS) ()	
construction ()	

Q12 What is the highest level of education you have attained?

- Less than a high school diploma
 - High school graduate, no college
 - Some college, no degree
 - Vocational degree
 - Associates degree
 - Bachelors degree
 - Masters degree
 - PhD or other doctorate
-

Q13 Which of the following professional credential(s) do you hold (choose all that apply)?

- CHFM
- CHC
- CPMM
- FMP
- CFM
- PMP
- PE

Page Break _____

*Note: entry level management titles may include, but are not limited to, foreman, coordinator, supervisor, team leader, assistant manager, or manager.
Building tradesperson titles may include, but are not limited to, plumber, electrician, carpenter, painter, welder, mechanic, HVAC tech, or maintenance tech.*

Q14 What full-time position did you hold immediately before entering a management position in healthcare FM?

- Building tradesperson
- Student
- FM professional
- Construction professional
- Architecture/Design/Planning professional
- Clinical/Medical professional
- Military
- Other

Display This Question:

If What full-time position did you hold immediately before entering a management position in healthc... = Building tradesperson

Q15 You selected building tradesperson; was this position in a healthcare organization?

- Yes
- No

Display This Question:

If You selected building tradesperson; was this position in a healthcare organization? = Yes

Q16 Did this transition from building tradesperson to management occur within the same healthcare organization?

Yes

No

Display This Question:

If What full-time position did you hold immediately before entering a management position in healthc... = FM professional

Q17 You selected FM professional; was this position in a healthcare organization?

Yes

No

Display This Question:

If You selected FM professional; was this position in a healthcare organization? = Yes

Q18 Did your transition from FM professional to management occur within the same healthcare organization?

Yes

No

Display This Question:

If What full-time position did you hold immediately before entering a management position in healthc... = Construction professional

Q19 You selected Construction professional; was this position in a healthcare organization?

Yes

No

Display This Question:

If You selected Construction professional; was this position in a healthcare organization? = Yes

Q20 Did your transition from Construction professional to management occur within the same healthcare organization?

Yes

No

Display This Question:

If What full-time position did you hold immediately before entering a management position in healthc... = Architecture/Design/Planning professional

Q21 You selected Architecture/Design/Planning professional; was this position in a healthcare organization?

Yes

No

Display This Question:

If You selected Architecture/Design/Planning professional; was this position in a healthcare organiz... = Yes

Q22 Did your transition from Architecture/Design/Planning professional to management occur within the same healthcare organization?

Yes

No

Display This Question:

If What full-time position did you hold immediately before entering a management position in healthc... = Other

Q23 You selected "Other"; what was the job title?

Display This Question:

If What full-time position did you hold immediately before entering a management position in healthc... = Military

Q24 You selected "Military"; was your role healthcare FM related?

Yes

No

Display This Question:

If What full-time position did you hold immediately before entering a management position in healthc... = Student

Q25 You selected "Student"; what was your major or degree program?

Q26 Did you have any full-time building trade experience before first entering a management position in healthcare FM?

Yes

No

Display This Question:

If Did you have any full-time building trade experience before first entering a management position... = Yes

Q27 How many years of full-time building trade experience did you have before first entering a management position in healthcare?

Less than 1

1 - 2

3 - 5

6 - 10

11 - 15

16 - 20

More than 20

Q28 Did you have any full-time management experience before first entering a management position in healthcare FM?

Yes

No

Display This Question:

If Did you have any full-time management experience before first entering a management position in h... = Yes

Q29 How many years of full-time management experience did you have before first entering a management position in healthcare?

- Less than 1
- 1 - 2
- 3 - 5
- 6 - 10
- 11 - 15
- 16 - 20
- More than 20

Display This Question:

If Did you have any full-time management experience before first entering a management position in h... = Yes

Q30 What percent of this full-time management experience was outside of healthcare?

0 10 20 30 40 50 60 70 80 90 100

Click to write Choice 1



Q31 What was your educational level before first entering a management position in healthcare FM?

- Less than a high school diploma
- High school graduate, no college
- Some college, no degree
- Vocational degree
- Associates degree
- Bachelors degree
- Masters degree
- PhD or other doctorate

Page Break

Note: senior level management titles may include, but are not limited to, manager, senior manager, assistant/associate director, or director

Q32 How many years were you in your first management position in healthcare FM before your first promotion or move to a more senior healthcare FM position?

- Less than 1
- 1 - 2
- 3 - 5
- 6 - 10
- 11 - 15
- 16 - 20
- More than 20
- NA - I still hold an entry level management position
- NA - I left healthcare FM prior to being promoted or moving to a more senior position

Skip To: Intro C If How many years were you in your first management position in healthcare FM before your first prom... = NA - I still hold an entry level management position

Skip To: Intro C If How many years were you in your first management position in healthcare FM before your first prom... = NA - I left healthcare FM prior to being promoted or moving to a more senior position

Q33 Did your promotion or move from your first management position in healthcare FM occur within the same healthcare organization?

- Yes
 - No
-

Page Break

The following series of questions are regarding healthcare FM hiring practices from FM academic programs.

Note: Though they may have some technical building trade and construction experiences, management interns typically focus on analyzing, planning, coordinating, and directing people, processes, and assets that drive built environment and business outcomes.

Q34 At any point in your career, have you hired an intern in healthcare POM management?

Yes

No

Q35 Please select your level of agreement to the following statements (1 = strongly disagree to 9 = strongly agree):

	1	2	3	4	5	6	7	8	9	I don't know
Hiring interns at my organization is an uncomplicated process. (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Hiring interns focused on building trades is preferred to hiring interns focused on management. (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My organization recruits previous interns for full-time building trade jobs upon graduation. (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My organization recruits previous interns for full-time entry level POM manager jobs upon graduation. (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My department has adequate budget to employ interns. (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Page Break

Q36 At any point in your career, have you recruited a new FM college graduate for a full-time entry level healthcare POM manager job?

Yes

No

Q37 Please select your level of agreement to the following statements (1 = strongly disagree to 9 = strongly agree):

	1	2	3	4	5	6	7	8	9	I don't know
I am familiar with colleges or universities that offer degrees in FM. (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
New FM graduates have necessary skills to be effective entry level healthcare POM managers. (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Work experience requirements for entry level POM managers' job descriptions at my organization allow full consideration of new college graduates. (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
New FM graduates are interested in working in the healthcare FM industry. (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Timing of job openings and students' full-time availability (typically after graduation in Spring, Fall) is not a barrier to hiring new college graduates.
(5)



Page Break

Q38 At any point in your career, have hired or worked closely with an entry level POM manager(s) that filled the position as a new FM college graduate?

Yes

No

Display This Question:

If At any point in your career, have hired or worked closely with an entry level POM manager(s) that... = Yes

Q39 Please rate your level of agreement that new FM college graduates demonstrate satisfactory skills for the following areas in entry level POM manager jobs (1 = strongly disagree to 9 = strongly agree):

	1	2	3	4	5	6	7	8	9
Quality (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Communication (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Technology (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sustainability (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Industry knowledge (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Thank you for taking this survey!

APPENDIX C

DELPHI EXPERT SURVEY

The purpose of this survey is to understand expected student outcomes for healthcare facilities management (FM) education to develop a framework to attract and prepare future healthcare FM professionals seeking entrance into the field through the path of higher education.

This survey will take approximately 10 minutes complete. You may start the survey and save for a later completion. Responses will be kept confidential. Please contact Steve Call at sacall@asu.edu or (509) 290-4704 if you have any questions.

Page Break _____

The following series of questions are to recognize panel member experience:

Q1 What is the highest level of education you have attained?

- High School Diploma
- Vocational/Associates Degree
- Bachelors Degree
- Masters Degree
- Doctorate Degree

Q2 Do you hold a professional credential/registration/certification (PE, CHFM, PHR, etc.)?

- Yes
- No

Display This Question:

If Do you hold a professional credential/registration/certification (PE, CHFM, PHR, etc.)? = Yes

Q3 Please describe the professional credential(s)/registration(s)/certification(s) you hold:

Q4 Have you ever been invited to present at a conference on a topic related to healthcare or facilities management?

Yes

No

Q5 Are you, or have you ever been, a member of a committee(s) or board(s) focused on healthcare or facilities management?

Yes

No

Display This Question:

If Are you, or have you ever been, a member of a committee(s) or board(s) focused on healthcare or f... = Yes

Q6 What is the name of the committee(s) or board(s) that you are, or were, a member focused on healthcare or facilities management

Q7 Have you ever written a book chapter or peer reviewed journal article on the topic of healthcare or facilities management?

Yes

No

Q8 How many total staff do you manage, directly or indirectly through subordinates, within your organization?

Less than 10

10 - 50

51 - 100

101 - 200

210 - 400

401 - 800

More than 800

Q9 Are you a HR director in a healthcare organization?

Yes

No

Display This Question:

If Are you a HR director in a healthcare organization? = Yes

Q10 How many years of full-time professional experience do you have in the human resource industry?

Display This Question:

If Are you a HR director in a healthcare organization? = Yes

Q11 What percent of your full-time professional human resource experience has been in healthcare?

0 10 20 30 40 50 60 70 80 90 100



Display This Question:

If Are you a HR director in a healthcare organization? = Yes

Q12 Do you have, or have had at some point in your career, recruiting responsibilities for healthcare facilities management directly or indirectly through subordinates?

Yes

No

Display This Question:

If Are you a HR director in a healthcare organization? = No

Q13 How much total space (square feet) do you manage or are accountable for directly or indirectly through subordinates?

- NA - I am university faculty
- Less than 100,000
- 100,000 - 250,000
- 250,001 - 500,000
- 500,001 - 1,000,000
- 1,000,001 - 2,000,000
- 2,000,001 - 3,000,000
- 3,000,001 - 5,000,000
- 5,000,001 - 10,000,000
- More than 10,000,000

Display This Question:
If Are you a HR director in a healthcare organization? = No

Q14 How many years of full-time professional experience do you have in the FM industry?

Page Break

Display This Question:

If Are you a HR director in a healthcare organization? = No

Q15 What percent of your full-time professional FM experience has been in healthcare or managing healthcare FM accounts?

0 10 20 30 40 50 60 70 80 90 100



Page Break

The following series of questions are related to student outcomes in healthcare FM education. You will be asked to select your level of agreement to several statements on a 1 to 9 scale (1 = strongly disagree to 9 = strongly agree); you may also select "I don't know".

Note: Student learning outcomes describe what students are expected to know and be able to do by the time of graduation. Please consider your responses in the context of expected outcomes for new college graduates in the first 3 years of employment as an entry-level plant operations and maintenance (POM) manager at a large healthcare FM department (1M+ SF, 500+ beds, 50+ inhouse POM staff). An entry-level manager may hold various titles including, but not limited to, foreman, coordinator, supervisor, team leader, assistant manager, or manager.

Q16 Please select your level of agreement to the following statement (1 = strongly disagree to 9 = strongly agree)

	1	2	3	4	5	6	7	8	9	I don't know
Students should understand accreditation, regulatory, and code compliance for healthcare built environments. <i>Note: includes but not limited to AIA, BOCA, SBCCI, IBC, UBC, ADA, TJC, NFPA, OSHA, CDC, CMS, FGI, ASHRAE</i> (1)	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>

Q17 Please select your level of agreement to the following statement (1 = strongly disagree to 9 = strongly agree)

	1	2	3	4	5	6	7	8	9	I don't know
Students should understand clinical operations and medical equipment. (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q18 Please select your level of agreement to the following statement (1 = strongly disagree to 9 = strongly agree)

	1	2	3	4	5	6	7	8	9	I don't know
Students should understand environmental services (EVS) in healthcare facilities. <i>Note: includes but not limited to waste management and cleaning processes (1)</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q19 Please select your level of agreement to the following statement (1 = strongly disagree to 9 = strongly agree):

	1	2	3	4	5	6	7	8	9	I don't know (
Students should understand materials management in healthcare facilities. <i>Note: includes but not limited to supply chain and sourcing (1)</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q20 Please select your level of agreement to the following statement (1 = strongly disagree to 9 = strongly agree)

	1	2	3	4	5	6	7	8	9	I don't know
Students should understand infection control in the healthcare built environment. (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q21 Please select your level of agreement to the following statement (1 = strongly disagree to 9 = strongly agree)

	1	2	3	4	5	6	7	8	9	I don't know
Students should understand employee and customer conflict resolution. <i>Note: includes but not limited to communication and negotiation with diverse stakeholders like patients, visitors, doctors, nurses, and community leaders. (1)</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q22 Please select your level of agreement to the following statement: Please select your level of agreement to the following statement (1 = strongly disagree to 9 = strongly agree)

	1	2	3	4	5	6	7	8	9	I don't know
Students should understand lifecycle asset management concepts, practices, and tools. (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q23 Please select your level of agreement to the following statement (1 = strongly disagree to 9 = strongly agree)

	1	2	3	4	5	6	7	8	9	I don't know
Students should understand operational excellence in FM. <i>Note: includes but not limited to outsourcing considerations and continuous quality/process improvement - i.e. Lean six-sigma. (1)</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q24 Please select your level of agreement to the following statement (1 = strongly disagree to 9 = strongly agree)

	1	2	3	4	5	6	7	8	9	I don't know
Students should understand healthcare construction project management and methods. <i>Note: includes but not limited to access, environmental remediation, shielding, smoke/fire compartments, redundancy, phasing, system shutdown, and moves and changes. (1)</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q25 Please select your level of agreement to the following statement (1 = strongly disagree to 9 = strongly agree)

	1	2	3	4	5	6	7	8	9	I don't know
Students should understand systems in healthcare facilities. <i>Note: includes but not limited to medical gas, vacuum, and pneumatic tube. (1)</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q26 Please select your level of agreement to the statement regarding the following list of student learning outcomes (1 = strongly disagree to 9 = strongly agree)

- accreditation, regulatory, and code compliance for healthcare built environments
- clinical operations and medical equipment
- environmental services (EVS) in healthcare facilities
- materials management in healthcare facilities
- infection control in the healthcare built environment
- employee and customer conflict resolution
- lifecycle asset management concepts, practices, and tools
- operational excellence in FM
- healthcare construction project management and methods
- systems in healthcare facilities

Note: as a reference, below are links to existing student outcomes in engineering, construction, and facilities management education: [ABET](#) - pdf page 4-5 [ACCE](#) - pdf

	1	2	3	4	5	6	7	8	9	I don't know
The student outcomes listed above fill the gaps in existing ABET, ACCE, and IFMA outcomes for a comprehensive healthcare FM education. (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Display This Question:

If Please select your level of agreement to the statement regarding the following list of student le... = 1

Or Please select your level of agreement to the statement regarding the following list of student le... = 2

Or Please select your level of agreement to the statement regarding the following list of student le... = 3

Or Please select your level of agreement to the statement regarding the following list of student le... = 4

Or Please select your level of agreement to the statement regarding the following list of student le... = 5

Q27 What additional student outcomes would establish a comprehensive healthcare FM education?

Page Break

The following series of questions are for student outcomes you agree should be understood by new college graduates in the first 3 years of employment as an entry-level POM manager within a large healthcare FM department.

You may now select a *higher learning category* for each of these student outcomes, if you believe it is expected, from the list of verbs below in order from lower (understand) to highest (create):

Note: Description of each learning category is provided below:

Understand: Students demonstrate that they understand the content by explaining, summarizing, classifying, or translating the given information.

Apply: Students begin to put the information they are learning into context. Here they are able to integrate ideas across multiple situations, or utilize the content in a new way.

Analyze: Students may be asked to compare and contrast or take a concept and break it into parts to explore the relationships present.

Evaluate: Students are asked to judge an idea. This may involve predicting, experimenting, critiquing, or making an argument from evidence.

Create: Students are producing new ideas or products that integrate the knowledge they have gained. When students are involved in creating new artifacts, they are actively engaged in the subject matter.

Display This Question:

If Please select your level of agreement to the following statement (1 = strongly disagree to 9 = st... = 6

Or Please select your level of agreement to the following statement (1 = strongly disagree to 9 = st... = 7

Or Please select your level of agreement to the following statement (1 = strongly disagree to 9 = st... = 8

Or Please select your level of agreement to the following statement (1 = strongly disagree to 9 = st... = 9

Or Please select your level of agreement to the following statement (1 = strongly disagree to 9 = st... = 5

Q28 What level of learning outcome is expected for students, beyond understand, related to accreditation, regulatory, and code compliance for healthcare built environments?

- NA - Understand is expected
- Apply
- Analyze
- Evaluate
- Create

Display This Question:

If Please select your level of agreement to the following statement (1 = strongly disagree to 9 = st... = 5

Or Please select your level of agreement to the following statement (1 = strongly disagree to 9 = st... = 6

Or Please select your level of agreement to the following statement (1 = strongly disagree to 9 = st... = 7

Or Please select your level of agreement to the following statement (1 = strongly disagree to 9 = st... = 8

Or Please select your level of agreement to the following statement (1 = strongly disagree to 9 = st... = 9

Q29 What level of learning outcome is expected for students, beyond understand, related to clinical operations and medical equipment?

- NA - Understand is expected
- Apply
- Analyze
- Evaluate
- Create

Display This Question:

If Please select your level of agreement to the following statement (1 = strongly disagree to 9 = st... = 5

Or Please select your level of agreement to the following statement (1 = strongly disagree to 9 = st... = 6

Or Please select your level of agreement to the following statement (1 = strongly disagree to 9 = st... = 7

Or Please select your level of agreement to the following statement (1 = strongly disagree to 9 = st... = 8

Or Please select your level of agreement to the following statement (1 = strongly disagree to 9 = st... = 9

Q30 What level of learning outcome is expected for students, beyond understand, related to environmental services (EVS) in healthcare facilities.

- NA - Understand is expected
- Apply
- Analyze
- Evaluate
- Create

Display This Question:

If Please select your level of agreement to the following statement (1 = strongly disagree to 9 = st... = 5

Or Please select your level of agreement to the following statement (1 = strongly disagree to 9 = st... = 6

Or Please select your level of agreement to the following statement (1 = strongly disagree to 9 = st... = 7

Or Please select your level of agreement to the following statement (1 = strongly disagree to 9 = st... = 8

Or Please select your level of agreement to the following statement (1 = strongly disagree to 9 = st... = 9

Q31 What level of learning outcome is expected for students, beyond understand, related to materials management in healthcare facilities?

- NA - Understand is expected
- Apply
- Analyze
- Evaluate
- Create

Display This Question:

If Please select your level of agreement to the following statement (1 = strongly disagree to 9 = st... = 5
Or Please select your level of agreement to the following statement (1 = strongly disagree to 9 = st... = 6
Or Please select your level of agreement to the following statement (1 = strongly disagree to 9 = st... = 7
Or Please select your level of agreement to the following statement (1 = strongly disagree to 9 = st... = 8
Or Please select your level of agreement to the following statement (1 = strongly disagree to 9 = st... = 9

Q32 What level of learning outcome is expected for students, beyond understand, related to infection control in the healthcare built environment?

- NA - Understand is expected
 - Apply
 - Analyze
 - Evaluate
 - Create
-

Display This Question:

If Please select your level of agreement to the following statement (1 = strongly disagree to 9 = st... = 5

Or Please select your level of agreement to the following statement (1 = strongly disagree to 9 = st... = 6

Or Please select your level of agreement to the following statement (1 = strongly disagree to 9 = st... = 7

Or Please select your level of agreement to the following statement (1 = strongly disagree to 9 = st... = 8

Or Please select your level of agreement to the following statement (1 = strongly disagree to 9 = st... = 9

Q33 What level of learning outcome is expected for students, beyond understand, related to employee and customer conflict resolution?

- NA - Understand is expected
- Apply
- Analyze
- Evaluate
- Create

Display This Question:

If Please select your level of agreement to the following statement:Please select your level of agre... = 5

Or Please select your level of agreement to the following statement:Please select your level of agre... = 6

Or Please select your level of agreement to the following statement:Please select your level of agre... = 7

Or Please select your level of agreement to the following statement:Please select your level of agre... = 8

Or Please select your level of agreement to the following statement:Please select your level of agre... = 9

Q34 What level of learning outcome is expected for students, beyond understand, related to lifecycle asset management concepts, practices, and tools?

- NA - Understand is expected
- Apply
- Analyze
- Evaluate
- Create

Display This Question:

If Please select your level of agreement to the following statement (1 = strongly disagree to 9 = st... = 5

Or Please select your level of agreement to the following statement (1 = strongly disagree to 9 = st... = 6

Or Please select your level of agreement to the following statement (1 = strongly disagree to 9 = st... = 7

Or Please select your level of agreement to the following statement (1 = strongly disagree to 9 = st... = 8

Or Please select your level of agreement to the following statement (1 = strongly disagree to 9 = st... = 9

Q35 What level of learning outcome is expected for students, beyond understand, related to operational excellence in FM?

- NA - Understand is expected
- Apply
- Analyze
- Evaluate
- Create

Display This Question:

If Please select your level of agreement to the following statement (1 = strongly disagree to 9 = st... = 5

Or Please select your level of agreement to the following statement (1 = strongly disagree to 9 = st... = 6

Or Please select your level of agreement to the following statement (1 = strongly disagree to 9 = st... = 7

Or Please select your level of agreement to the following statement (1 = strongly disagree to 9 = st... = 8

Or Please select your level of agreement to the following statement (1 = strongly disagree to 9 = st... = 9

Q36 What level of learning outcome is expected for students, beyond understand, related to healthcare construction project management and methods?

- NA - Understand is expected
- Apply
- Analyze
- Evaluate
- Create

Display This Question:

If Please select your level of agreement to the following statement (1 = strongly disagree to 9 = st... = 5

Or Please select your level of agreement to the following statement (1 = strongly disagree to 9 = st... = 6

Or Please select your level of agreement to the following statement (1 = strongly disagree to 9 = st... = 7

Or Please select your level of agreement to the following statement (1 = strongly disagree to 9 = st... = 8

Or Please select your level of agreement to the following statement (1 = strongly disagree to 9 = st... = 9

Q37 What level of learning outcome is expected for students, beyond understand, related to systems in healthcare facilities?

- NA - Understand is expected
- Apply
- Analyze
- Evaluate
- Create

End of Block: Default Question Block
