

Original Articles

A 2015–2016 Survey of American Board of Cardiovascular Perfusion Certified Clinical Perfusionists: Perfusion Profile and Clinical Trends

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Abstract: To document the current perfusion workforce status and to anticipate the future demands of an ever-changing perfusion workplace environment, a valid survey is needed to help guide the future of the perfusion workforce. The American Board of Cardiovascular Perfusion (ABCP) sponsored a survey of Certified Clinical Perfusionist (CCP) demographic and clinical trends that was linked electronically to the 2015–2016 ABCP online recertification process. Of 3,875 eligible CCP's, 3,056 (78.9%) responded to the survey. The 12 survey questions covered the topics of gender, age, education levels, years of clinical experience, annual clinical activity exposure, high fidelity

simulation experience, recertification requirement satisfaction and professional activity requirement contentment. The results of the ABCP annual survey are being published in accordance with the ABCP's commitment to establish and maintain interactive communication with the community of CCPs. The goal of this survey is to present the perfusion and health-care community with important statistics related to the current field of perfusion and establish trends to guide the future of perfusion. **Keywords:** ABCP, CCP, online survey, questionnaire, clinical caseload, simulation, clinical trends. *J Extra Corpor Technol. 2017;49:137–149*

The American Board of Cardiovascular Perfusion (ABCP) was established in 1975 with the primary purpose to protect the public through the establishment and maintenance of standards in the field of cardiovascular perfusion. Certification in cardiovascular perfusion is evidence that a perfusionist's qualifications for operation of extracorporeal equipment are recognized by his/her peers. It is not intended to define requirements for employment, to gain special recognition or privileges, to define the scope of extracorporeal circulation or to state who may not engage in cardiovascular perfusion.

As the perfusion profession continues to evolve in an ever-changing health-care environment, anecdotal observations, and predictions are often made. The ABCP, with its responsibility to the Certified Clinical Perfusionist (CCP) credential and perfusion community, continues to assess certification requirements in an effort to reflect current perfusion practice and technological changes in the cardiovascular industry. The ABCP embarked on this survey to capture accurate information from as many CCP's as possible during the recertification process.

A variety of survey questions aimed at understanding perfusion workforce demographics, education, clinical experiences, and workforce direction for the future were selected. The impetus to create this survey was driven by numerous petitions to the ABCP from perfusion educational organizations, peer-credentialing organizations, manufacture vendors, and individual researchers. The ABCP would be the most consistent and valid source to capture and survey the workplace environment of the CCP. Although empathetic to the value of any survey but

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The senior author has stated that the authors have reported no material, financial, or other relationship with any healthcare-related business or other entity whose products or services are discussed in this paper.

Figure 1. Gender of CCP survey respondents: 64.3% (*n* = 1,960) of the respondents were male and 35.7% (*n* = 1,088) were female. Eight respondents skipped this question.

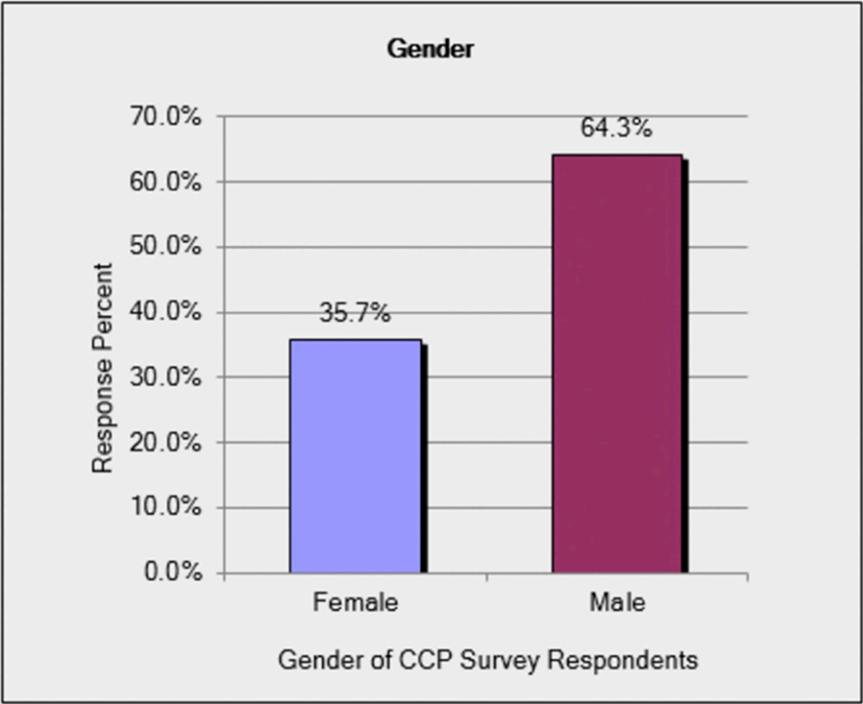
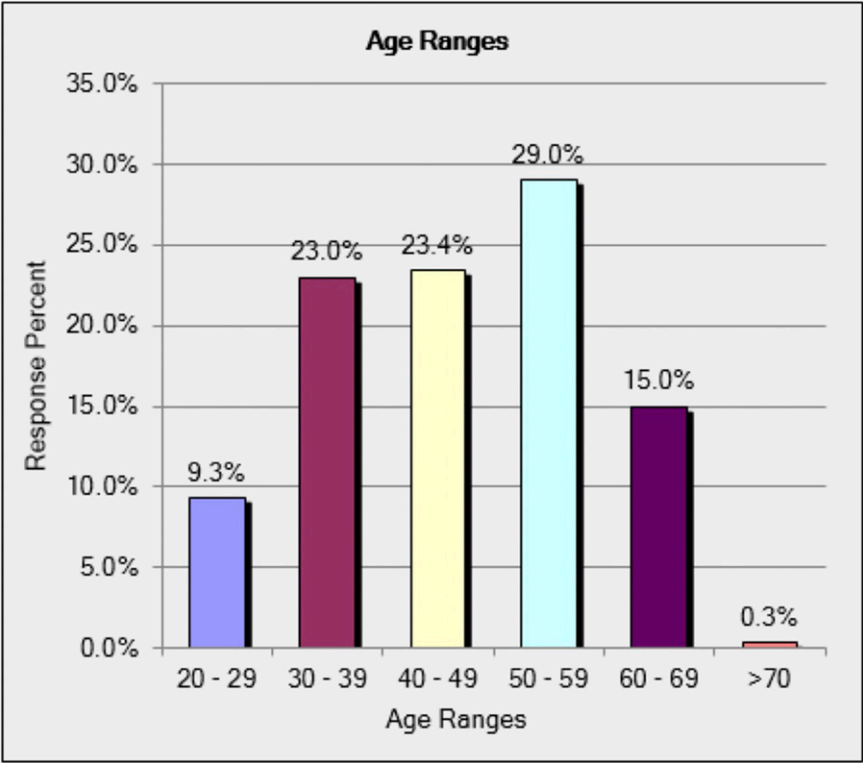


Figure 2. Age ranges by Gender. When comparing age ranges by gender, 9.2% (*n* = 282) of the CCPs who responded are in the 20–29 age range with 4.4% (*n* = 135) being male and 4.8% (*n* = 147) being female; 23.0% (*n* = 698) are in the 30–39 age range with 11.4% (*n* = 347) being male and 11.6% (*n* = 351) being female; 23.5% (*n* = 712) are in the 40–49 age range with 20.6% (473) being male and 8.4% (*n* = 239) being female; 29.0% (*n* = 881) are in the 50–59 age range with 20.6% (*n* = 626) being male and 8.4% (*n* = 255) being female; 15.1% (*n* = 458) are in the 60–69 age range with 12.1% (*n* = 367) being male and 3.0% (*n* = 90) being female; .3% (*n* = 8) CCP survey respondents reported being in the >70 age range.



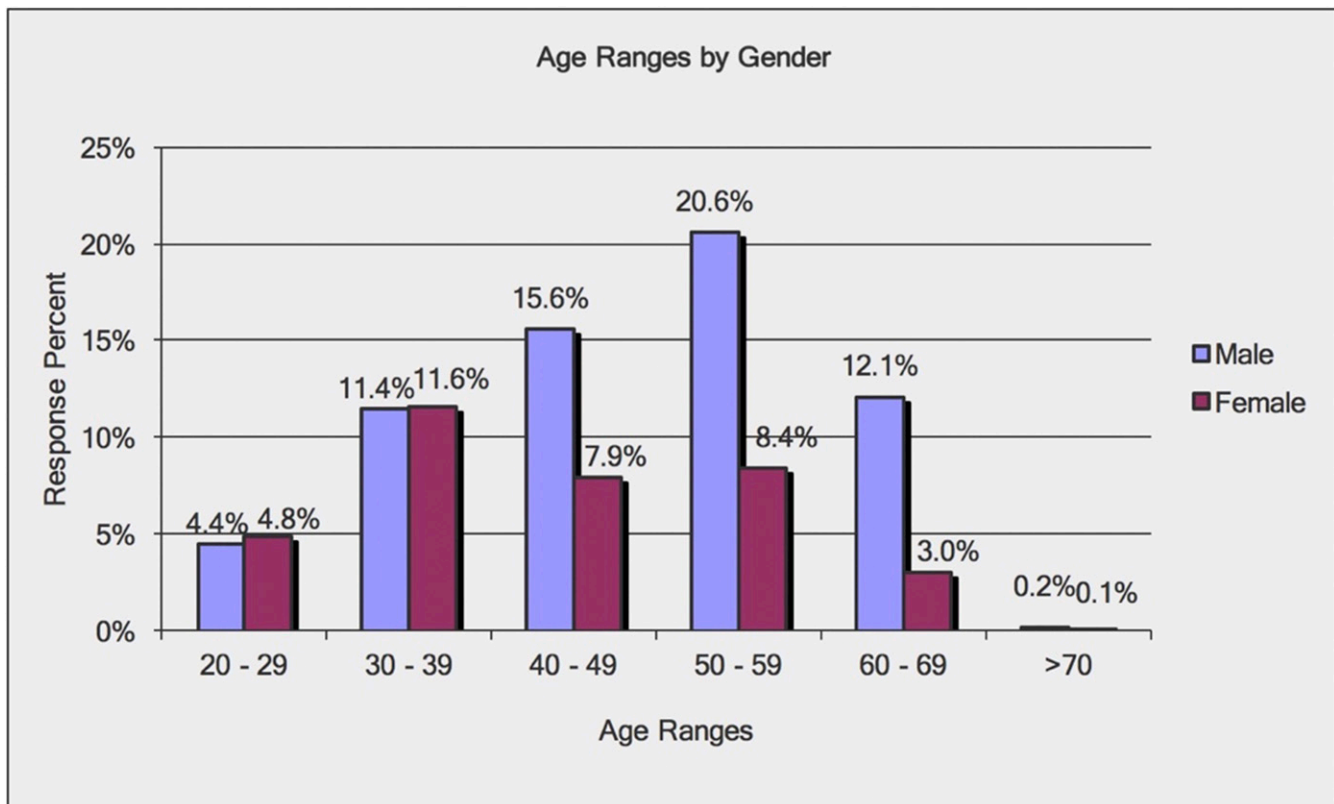


Figure 3. Age ranges of CCP survey respondents were as follows: 9.3% ($n = 283$) in the 20–29 age range; 23.0% ($n = 699$) in the 30–39 age range; 23.4% ($n = 712$) in the 40–49 age range; 29.0% ($n = 884$) in the 50–59 age range; 15.0% ($n = 458$) in the 60–69 age range; and 0.3% ($n = 8$) greater than 70. Twelve respondents skipped this question.

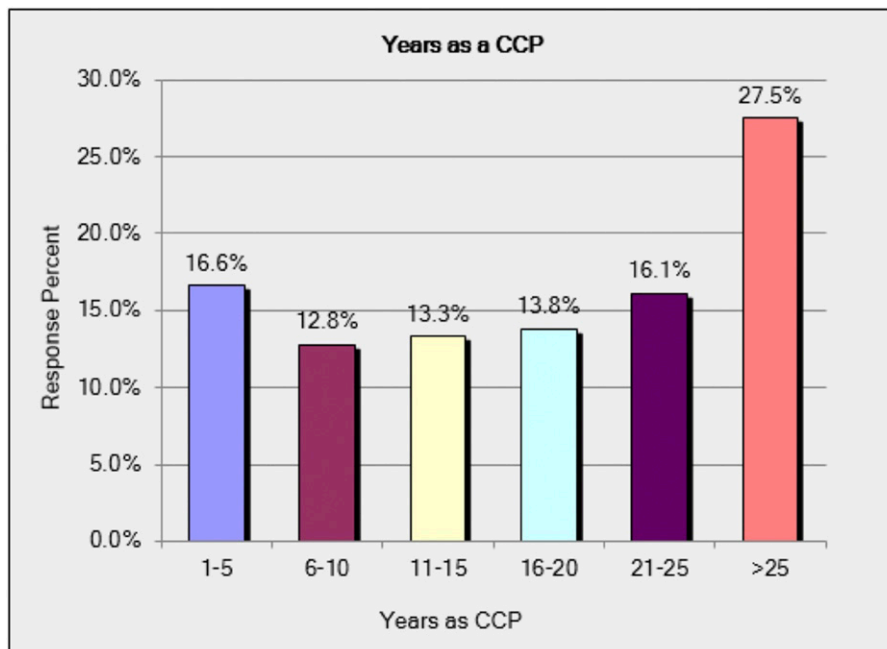


Figure 4. Years as CCP. When asked how many years as a CCP, the responses were as follows: 16.6% ($n = 505$) reported between 1 and 5 years of experience; 12.8% ($n = 389$) reported between 6 and 10 years of experience; 13.3% ($n = 405$) reported between 11 and 15 years of experience; 13.8% ($n = 418$) reported between 16 and 20 years of experience; 16.1% ($n = 488$) reported between 21 and 25 years of experience; and 27.5% ($n = 835$) reported having greater than 25 years of experience.

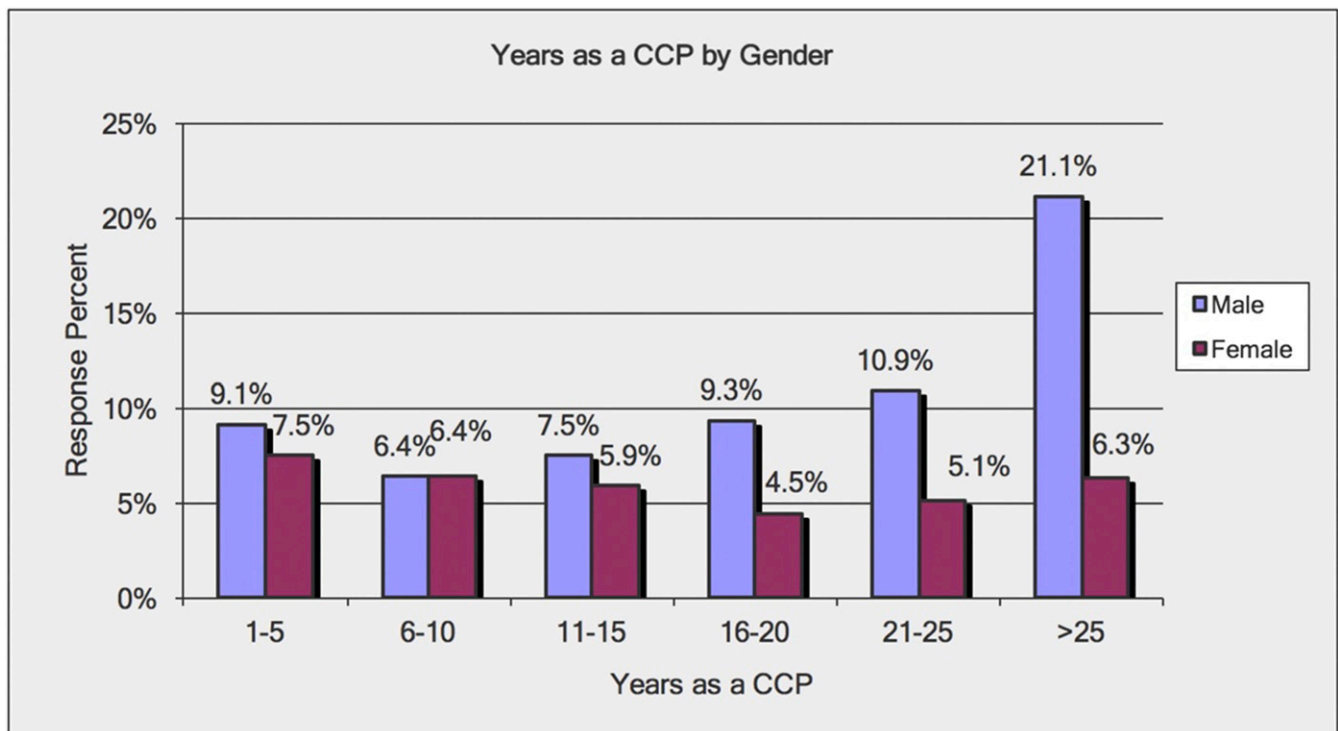


Figure 5. Years as CCP by Gender. When comparing years as a CCP by gender, 16.6% ($n = 504$) of the CCPs who responded have between 1 and 5 years of experience with 9.1% ($n = 277$) being male and 7.5% ($n = 227$) being female; 12.8% ($n = 387$) have between 6 and 10 years of experience with 6.4% ($n = 193$) being male and 6.4% ($n = 194$) being female; 13.4% ($n = 401$) have between 11 and 15 years of experience with 7.5% ($n = 227$) being male and 5.9% ($n = 178$) being female; 13.8% ($n = 418$) have between 16 and 20 years of experience with 9.3% ($n = 283$) being male and 4.5% ($n = 135$) being female; 16.0% ($n = 486$) have between 21 and 25 years of experience with 10.9% ($n = 330$) being male and 5.1% ($n = 156$) being female; 27.4% ($n = 833$) have greater than 25 years of experience with 21.1% ($n = 641$) being male and 6.3% ($n = 192$) being female.

reluctant to sponsor countless measures, the ABCP decided to regularly sponsor an annual array of questions that benefit the ABCP and the community we serve. With the robust response rate of this survey, many discussions surrounding perfusion professional and educational concerns can be addressed and refined.

MATERIALS AND METHODS

During the 2015–2016 recertification period, the ABCP conducted a survey of CCPs in the United States and Canada. Questions were aimed at understanding the profile and clinical trends of the typical certified perfusionist. The survey was designed to take 2–3 minutes to complete and covered topics of basic demographics, education, retirement, clinical caseload, simulation exposure, and specific clinical and educational experiences. The survey was posted through SurveyMonkey linked to the ABCP website following the mandatory online recertification process. The ABCP does not have an Institutional Review Board protocol for this type of study; however, the ABCP ethics committee reviewed the survey to ensure anonymity of respondents and responsible

reporting of survey findings. Of 4,003 perfusionists certified by the ABCP, 3,875 had an opportunity to complete the online questionnaire. One or more of the 12 questions were completed by 3,056 CCPs with an overall response rate of 78.9%.

DISCUSSION

The status of the CCP workforce is ever changing; however, the profession's needs and changes have not been sufficiently studied. The perfusion workforce is not only subject to changes in patient demographics, disease frequency, and medical advancements but is also subject to changes within its own aging workforce, work place staffing demands, educational and certification requirements, and advancements in extracorporeal technology.

To document the current perfusion workforce and to anticipate the future demands of an ever-changing perfusion environment, a valid survey is needed. Perfusion societies, perfusion educational programs, perfusion-related social media and individuals have all attempted workforce studies in the past but the sampling sizes and

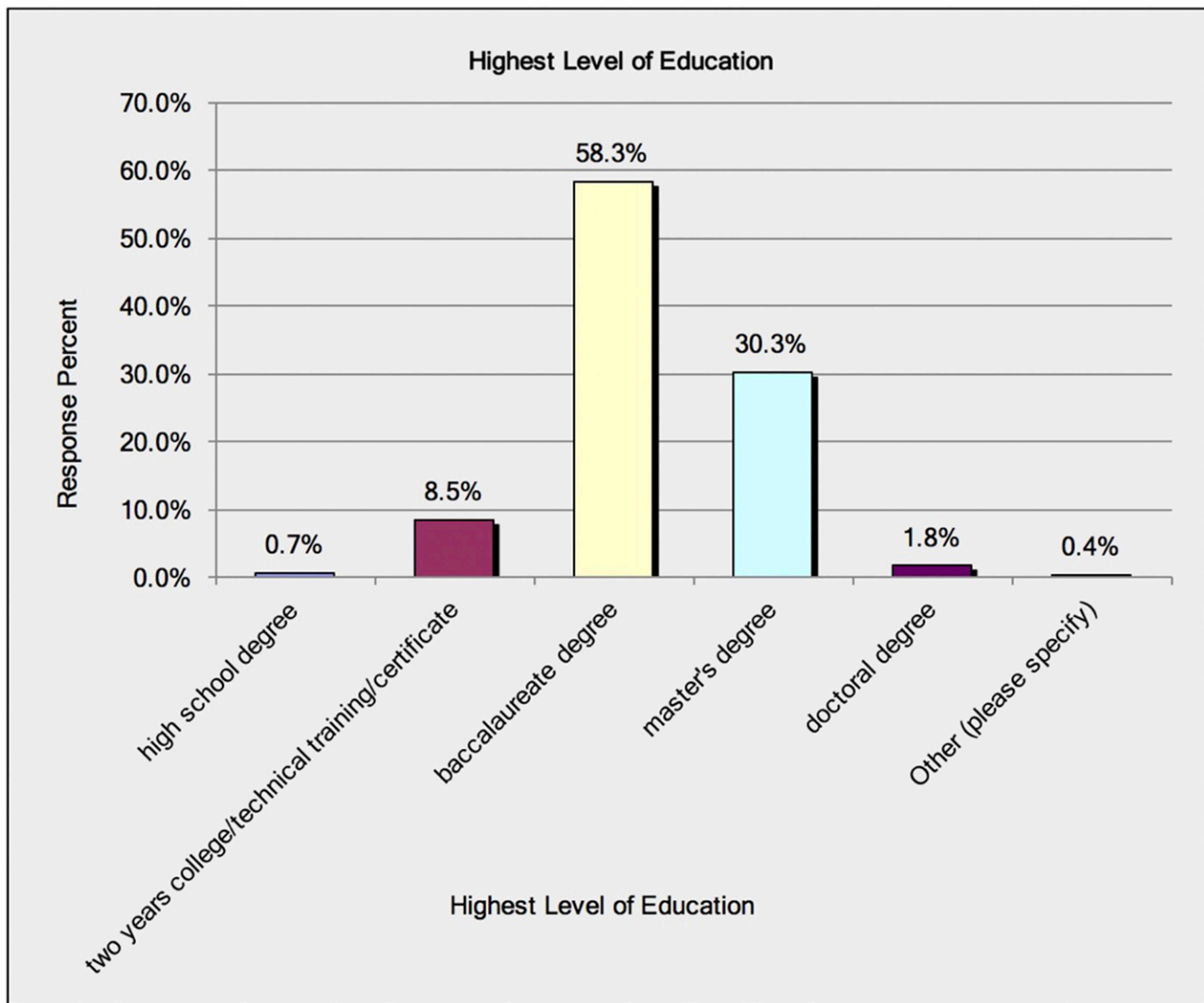


Figure 6. Highest level of education. The breakdown for highest level of education reported by the respondents was: .7% ($n = 22$) with a high school degree; 8.5% ($n = 259$) with 2 years of college/technical training/certificate; 58.3% ($n = 1,775$) with a baccalaureate degree; 30.3% ($n = 922$) with a master's degree; 1.8% ($n = 54$) with a doctoral degree; and 0.4% ($n = 12$) selected other. Military training, perfusion school (without specifying type of program), and CCP (without further elaboration) were listed as the other types of educational preparation.

methods have had limited value to the general perfusion workforce (1).

In accordance with the ABCP's established commitment to maintain interactive communication and to further support the mission statement of its leadership role within the perfusion community, the ABCP developed this valid peer-driven survey. Our goal is to provide the perfusion community with pertinent information to assist and guide the current perfusion workforce as well as the future of the perfusion profession. This survey provides vital workforce data that may impact perfusion educational programs, perfusion organizations, health-care employers, perfusion practices, and individual CCP's.

The survey response rate was 78.9%, which represented 3,056 CCP's out of 3,875 eligible CCP's. The difference between the number of eligible CCP's and the survey is 819. Those who did not complete the survey may include perfusionists on Extension, Conditional Certification, or Extended Leave, as well as new CCP's who passed exams in the spring of 2016, as this group would not be utilizing online filing at the time of this survey.

The ABCP Directors developed survey questions which focus on age and gender demographics, years of experience as a CCP, practice caseload, perfusion education, retirement issues, simulation experience,

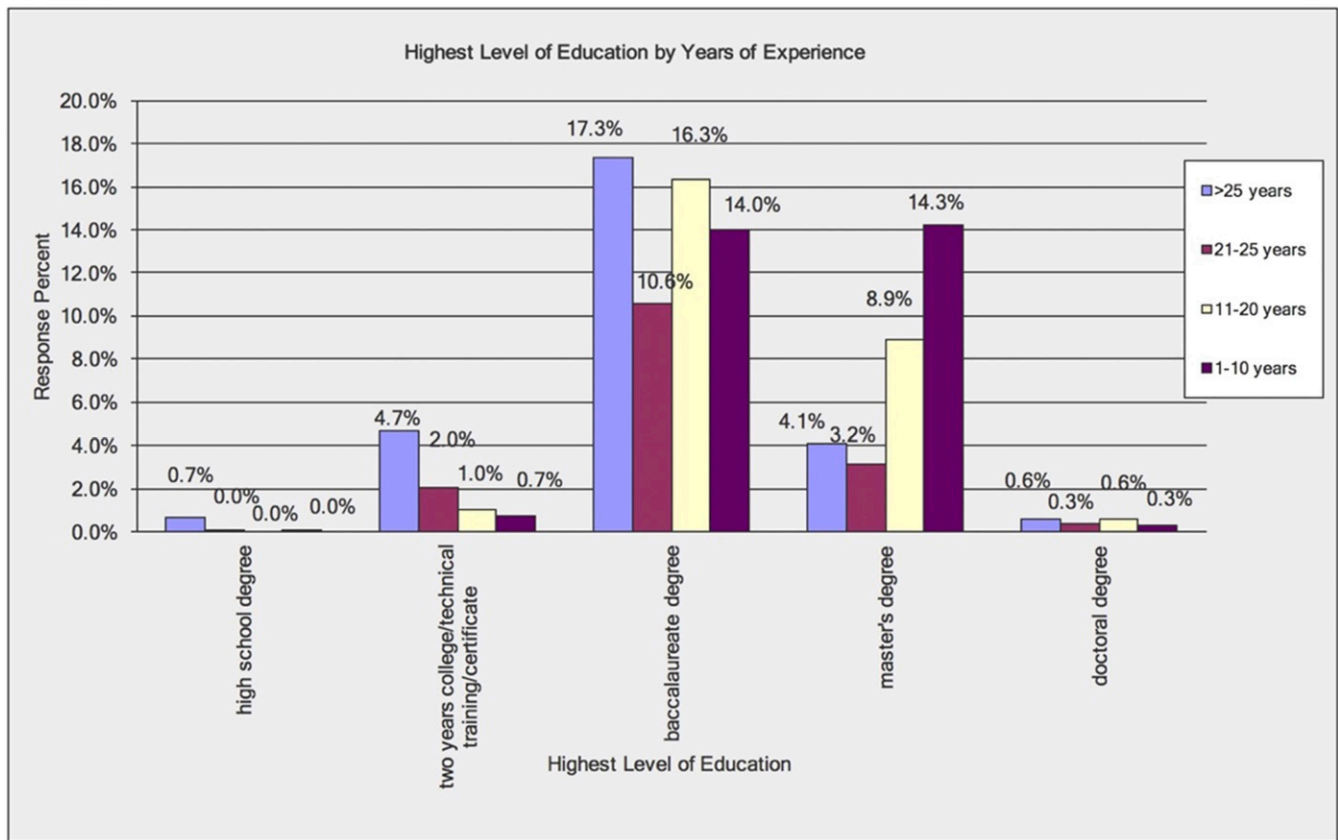


Figure 7. Highest level of education by years of experience. When comparing the highest level of education attained by years of experience of the CCP respondents, .7% ($n = 22$) of the CCPs reported a high school degree as their highest level of education, and of that group, those with greater than 25 years of experience were the only ones reporting this level of education ($n = 20$). Of the CCP respondents, 8.4% ($n = 257$) reported 2-year college/technical training/certificate as their highest level of education. Of that group, 0.7% ($n = 22$) have between 1 and 10 years of experience, 1.0% ($n = 31$) have between 11 and 20 years of experience, 2.0% ($n = 62$) have between 21 and 25 years of experience, and 4.7% ($n = 142$) have greater than 25 years of experience. Of the CCP respondents, 58.2% ($n = 1,765$) reported a baccalaureate degree as their highest level of education. Of that group, 14.0% ($n = 425$) have between 1 and 10 years of experience, 16.3% ($n = 495$) has between 11 and 20 years of experience, 10.6% ($n = 320$) has between 21 and 25 years of experience, and 17.3% ($n = 525$) has greater than 25 years of experience. Of the CCP respondents, 30.5% ($n = 921$) reported a master's degree as their highest level of education. Of that group, 14.3% ($n = 432$) have between 1 and 10 years of experience, 8.9% ($n = 270$) has between 11 and 20 years of experience, 3.2% ($n = 96$) has between 21 and 25 years of experience, and 4.1% ($n = 123$) has greater than 25 years of experience. Of the CCP respondents, 1.8% ($n = 54$) reported a doctoral degree as their highest level of education. Of that group, .3% ($n = 9$) have between 1 and 10 years of experience, .6% ($n = 17$) has between 11 and 20 years of experience, 0.3% ($n = 10$) has between 21 and 25 years of experience, and 0.6% ($n = 18$) has greater than 25 years of experience.

and ABCP certification and recertification-related questions.

The results of the survey provide valid representation of the current perfusion workforce. Interpretation of these current demographics indicates that the perfusion workforce is a male-dominated profession with 64.3% males and 35.7% females (Figure 1). Taking this a step further, when comparing CCP's older than 40 years old, the bulk of the workforce is male dominated with 71.5% being males compared to 28.4% females (Figure 2). However, when comparing CCP's less than 39 years old, a more balanced workforce with females at 50.8% and males slightly behind with 49.1% is demonstrated (Figure 2). It would be interesting to drill down on the application data of the perfusion schools to ascertain the current ratio of female to male applicants.

When looking at the age of the current CCP workforce, the 50- to 59-year-old category is the dominant group, with 29.0% (Figure 3) followed by the 30- to 39-year-old category at 23.0% (Figure 3) and the 40- to 49-year-old category at 23.4% (Figure 3). The survey revealed that 15.3% of the CCP workforce is over the age of 60 years old with some CCP's reporting working into their 70's (Figure 3).

When asked about years of experience as a CCP, the majority of respondents, at 27.5% (Figure 4), had more than 25 years of experience in the workforce. This is a positive outcome for longevity in the workforce marketplace. The next largest group represented was the respondents in the 1–5 years of workforce experience with 16.6% (Figure 4). This may indicate a trend

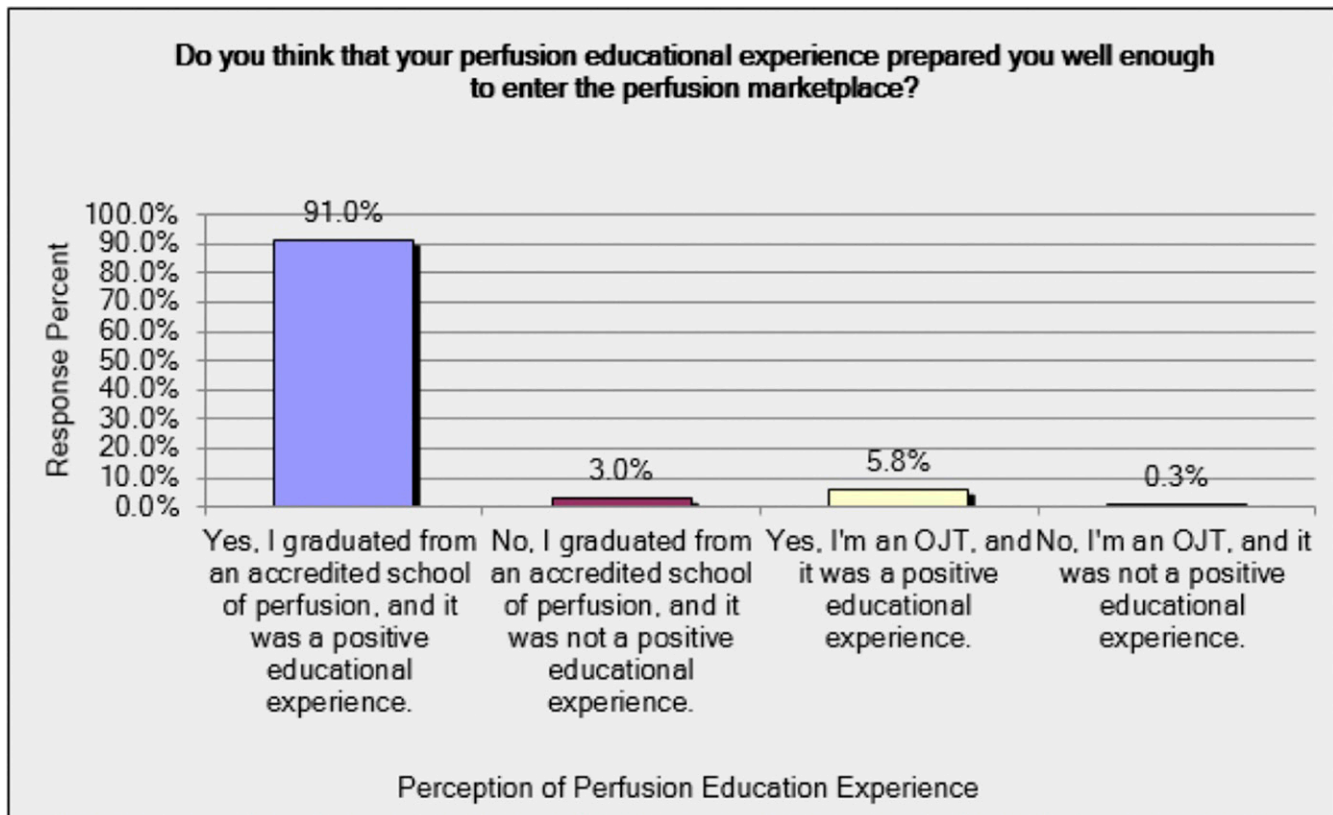


Figure 8. Perception of perfusion educational experience: 91.0% ($n = 2,764$) of the respondents indicated that they graduated from an accredited school of perfusion and had a positive educational experience; 3.0% ($n = 90$) indicated that they graduated from an accredited school of perfusion and did not have a positive educational experience; 5.8% ($n = 176$) indicated that they received on-the-job-training and had a positive educational experience; and .3% ($n = 8$) indicated they received on-the-job-training and did not have a positive educational experience.

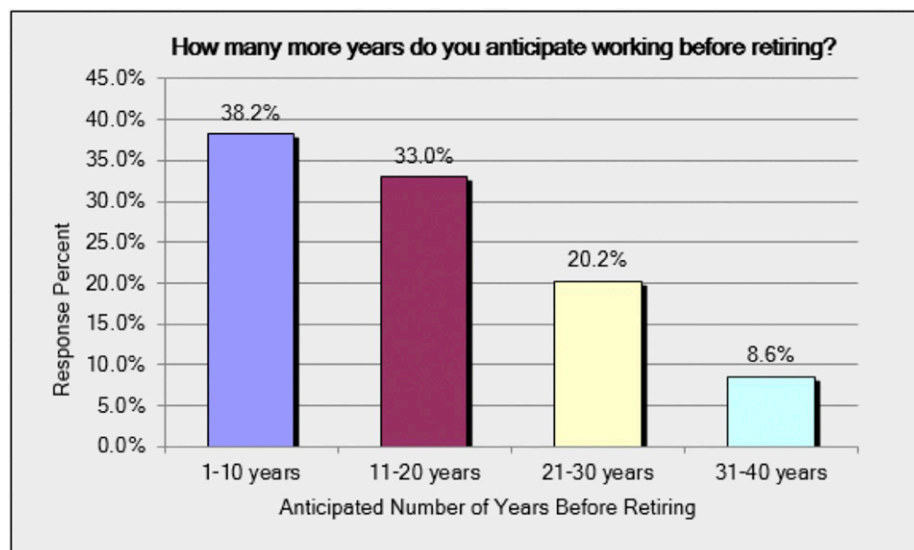


Figure 9. Anticipated number of years before retiring: 38.2% ($n = 1,160$) of the CCP respondents anticipate retiring in 1–10 years; 33.0% ($n = 1,001$) of the respondents anticipate retiring in 11–20 years; 20.2% ($n = 614$) anticipate retiring in 21–30 years; and 8.6% ($n = 261$) anticipate retiring in 31–40 years.

that perfusion schools are graduating more students into the marketplace because of anticipated retirement projections. In addition, a gender gap is reflected as experience level as a CCP increases. This finding trends

closely to earlier reported gender data.¹⁰ With 16 years or more of experience as a CCP, 72.1% of the respondents were males compared to 27.8% of females with similar workplace experience (Figure 5). In the

Figure 10. Anticipated number of years before retiring by gender. When comparing the anticipated number of years before retiring by gender of the CCP respondents, 38.2% ($n = 1,157$) of the CCPs plan to work between 1 and 10 more years before retiring, and of that group, 26.8% ($n = 813$) are males and 11.4% ($n = 344$) are females; 33.0% ($n = 999$) of the CCPs plan to work between 11 and 20 more years before retiring, and of that group, 21.1% ($n = 639$) are males and 11.9% ($n = 360$) are females; 20.3% ($n = 613$) of the CCPs plan to work between 21 and 30 more years before retiring, and of that group, 11.5% ($n = 347$) are males and 8.8% ($n = 266$) are females; 8.6% ($n = 261$) of the CCPs plan to work between 31 and 40 more years before retiring, and of that group, 4.9% ($n = 148$) are males and 3.7% ($n = 113$) are females.

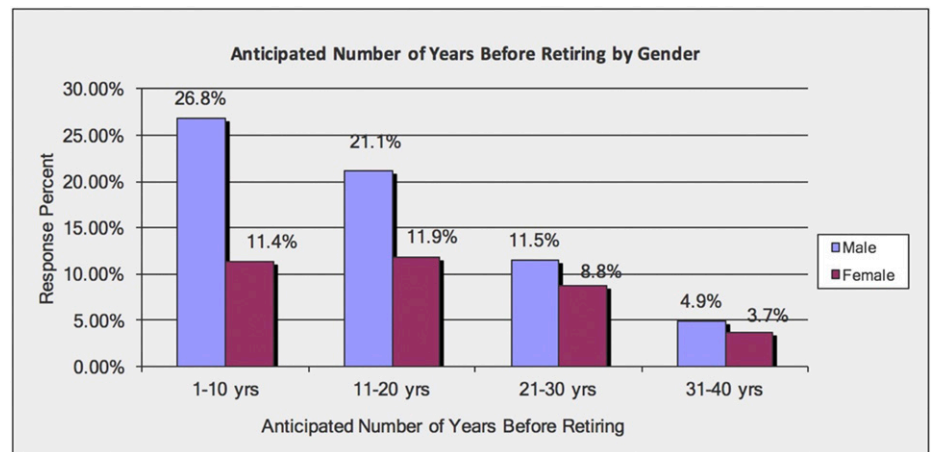
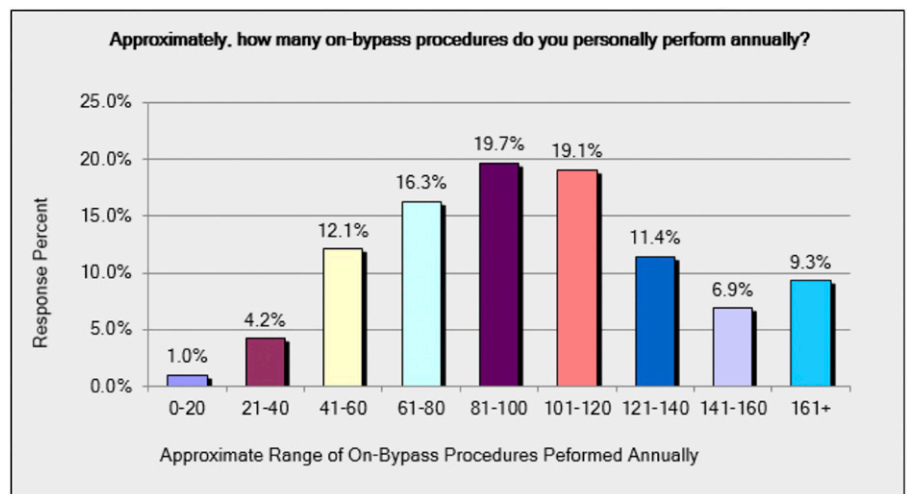


Figure 11. Anticipated range of on-bypass procedures performed annually. CCPs were asked how many on-bypass procedures each personally performs annually. The responses were as follows: 1.0% ($n = 29$) perform 0–20 on-bypass procedures; 4.2% ($n = 129$) perform 21–40 on-bypass procedures; 12.1% ($n = 367$) perform 41–60 on-bypass procedures; 16.3% ($n = 495$) perform 61–80 on-bypass procedures; 19.7% ($n = 600$) perform 81–100 on-bypass procedures; 19.1% ($n = 580$) perform 101–120 on-bypass procedures; 11.4% ($n = 347$) perform 121–140 on-bypass procedures; 6.9% ($n = 210$) perform 141–160 on-bypass procedures; and 9.3% ($n = 283$) perform 161 or more on-bypass procedures.



group with less than 16 years of experience, the trend is more balanced with 53.8% of this group being males and 46.2% females (Figure 5). This interesting trend will have to be looked at in future surveys.

The educational experience of CCP's showed the overall highest percentage of respondents with a bachelor's degree at 58.3%, followed by a master's degree at 30.3%, and certificate or associates degree at 8.5% (Figure 6). This is expected because of past perfusion entry requirements into the profession and degree inflation. Comparing highest degree of education to years of experience as a CCP, the workforce with 21 years or more experience has the highest number of bachelor's degrees with 845 responses compared to only 219 that have a master's degree and 204 CCP's with 2 years of college with this level of experience (Figure 7). Conversely, we find that the CCP's that have a maximum of 10 years of experience or fewer have more of a balance in

the entry level into the perfusion profession with 432 CCP's attaining a master's degree compared to 425 CCP's with bachelor's degrees (Figure 7). The entry level into perfusion is an issue that is being debated on many levels of the profession and as the landscape continues to change, this issue will elicit future research and debate(1–5). The last education survey question focused on the CCP's educational experience. Although this was a very general survey question, CCP's overwhelmingly thought that their educational experience prepared them to enter the perfusion workforce (Figure 8).

Retirement questions have traditionally been one of the main focuses of a workforce survey. Past surveys and research by other groups have attempted to capture the trend in perfusion retirement, but these studies could not produce reliable results, mainly because of sampling size problems (1,6). Each year the ABCP

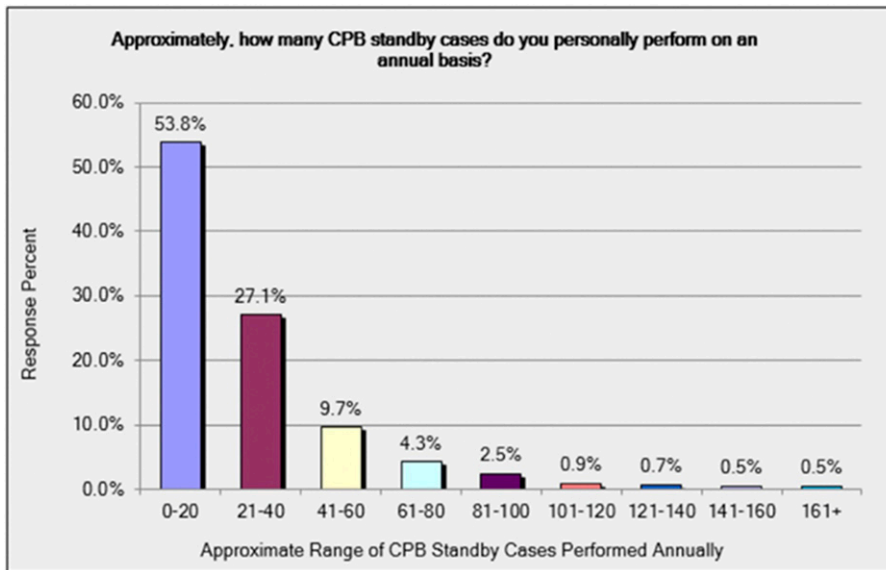


Figure 12. Anticipated range of CPB standby cases performed annually. CCPs were asked how many CPB standby cases each performs annually. The responses were as follows: 53.8% ($n = 1,639$) perform 0–20 CPB standby cases; 27.1% ($n = 825$) perform 21–40 CPB standby cases; 9.7% ($n = 296$) perform 41–60 CPB standby cases; 4.3% ($n = 131$) perform 61–80 CPB standby cases; 2.5% ($n = 75$) perform 81–100 CPB standby cases; .9% ($n = 27$) perform 101–120 CPB standby cases; 0.7% ($n = 21$) perform 121–140 CPB standby cases; .5% ($n = 14$) perform 141–160 CPB standby cases; and .5% ($n = 16$) perform 161 or more CPB standby cases.

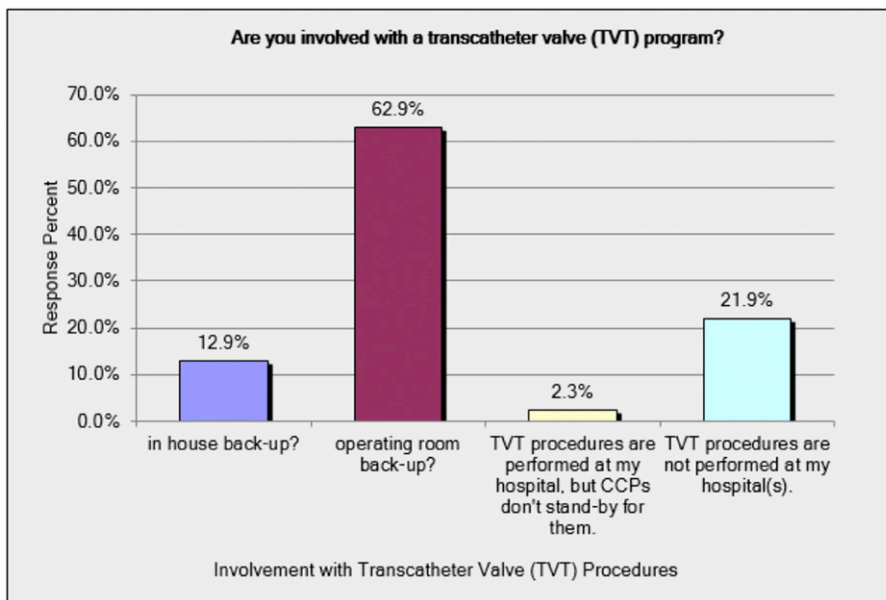
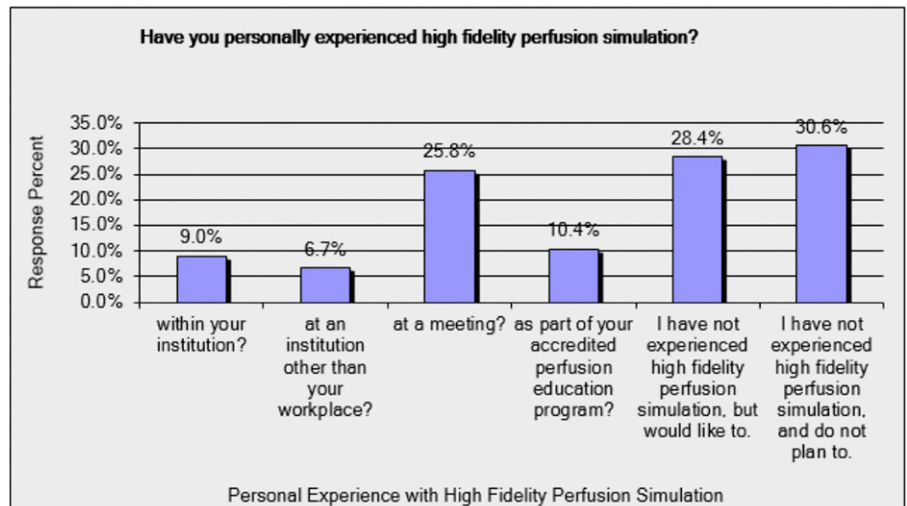


Figure 13. Involvement with TVT procedures. CCPs were asked to specify their involvement with a TVT program. Forty-five indicated in the “other” response that they are not involved, whereas 307 skipped this question which may indicate that they are not involved with a TVT program. Figure 13 shows that of the 2,749 respondents who answered the question, 12.9% ($n = 354$) indicated that their involvement is in house back-up, 62.9% ($n = 1,730$) indicated that their involvement is operating room back-up, 2.3% ($n = 62$) indicated that TVT procedures are performed at their hospital but CCPs do not standby for them, and 21.9% ($n = 603$) indicated that TVT procedures are not performed at their hospital.

reports in its Annual Report the rate of CCP's losing their CCP due to retirement or other reasons. The loss of CCP rate has remained constant at around 1.98% for the last 5 years (ABCP 2015 Annual report) (7). However, this is retrospective data when looking at the CCP workforce. A valid means to guide the future of the perfusion workforce, its educational leaders and certification partners is greatly needed. Establishing the ABCP survey during the recertification period is a valid means to capture this data. Current survey data show us that 15.3% (Figure 3) of CCP's in this survey are more

than 60 years old. In addition, this workforce survey suggests that 38.2% (Figures 9 and 10) of the perfusion workforce will retire within the next 10 years. Although health-care workforce markets can be affected by many factors, the findings of this perfusion workforce survey tend to be in agreement with other health-care workforce studies in that the current health-care workforce is aging, heading to retirement. The uniqueness of the perfusion specialty has the potential to be a constrained resource that cannot be easily replaced. In addition, due to its own aging population and disease demographics,

Figure 14. Personal experience with high fidelity perfusion simulation. CCPs were asked whether they have personally experienced HFPS, and if so, to specify where. Eight indicated in the “other” response that they not experienced HFPS, whereas 118 skipped this question which may indicate that they have not experienced HFPS. Of the 2,938 CCPs who answered this question, 9.0% ($n = 263$) have experienced HFPS within their institution; 6.7% ($n = 196$) experienced HFPS at an institution other than their workplace; 25.8% ($n = 758$) experienced HFPS at a meeting; and 10.4% ($n = 307$) experienced HFPS as part of their accredited perfusion education program. Of the respondents, 28.4% ($n = 835$) have not experienced HFPS but would like to and 30.6% ($n = 898$) have not experienced HFPS and do not plan to do so.



the general population is increasing its demand for health-care workers (2,8).

The survey requested annual workplace cardiopulmonary bypass (CPB) caseload, standby caseload, and information on transcatheter valve therapies (TVTs). The majority of CCP's, 19.7% (Figure 11) reported a caseload of 81–100 on CPB cases. This was closely followed by 19.1% (Figure 11) CCP performing 101–120 cases on CPB; 9.3% (Figure 11) of reporting CCP's perform a heavier load with more than 161 on CPB cases annually. Standby case survey data were reported with 53.8% (Figure 12) of CCP's standing by for 0–20 cases followed by 27.1% (Figure 12) standing by for 21–40 cases. TVT is evolving in many clinical settings. Out of 2,749 CCP's that answered this question, 2,146 have acknowledged that TVT is being performed at their institutions. The majority of CCP's 62.9% (Figure 13) responded that they actively standby in the operating room for these cases. Also, 12.9% (Figure 13) provide in house coverage and 2.3% do not provide any support for these cases with 648 CCP's responding that they do not perform TVT cases at their institution. However, a significant number of CCP's skipped this question ($n = 307$), which may indicate that they are not involved with these cases. Another problem that occurred with this caseload question is that the definition of a standby case and TVT question could be ambiguous and therefore problematic.

High Fidelity Perfusion Simulation (HFPS) is becoming an important perfusion educational tool not only for perfusion students but also for experienced CCP's and cardiac surgery teams (9). Since the use of HFPS is developing, the ABCP survey queried HFPS experience for the current CCP's. Overall, 59% (Figure 14) of CCP's responding to this survey have not

experienced HFPS, whereas 51.9% (Figure 14) of CCP's have experienced HFPS. Approximately a third of all respondents (30.6%) (Figure 14) currently have not experienced HFPS and do not plan on experiencing HFPS. Less than a third of all respondents 28.4% (Figure 14) have not experienced HFPS but seemed to keep an open mind about experiencing HFPS. The majority of respondents experiencing HFPS performed the simulation exercise at a perfusion-related meeting (25.8%) (Figure 14). One general assumption is that veteran CCP's are more reluctant or do not have the accessibility to experience HFPS. When comparing CCP years of experience and HFPS experience, 56.5% (Figure 15) of CCP's with greater than 21 years' experience have not experienced HFPS. A more focused view of the cohort with less than 10 years of CCP experience shows 61.1% (Figure 15) have experienced HFPS. The majority of this demographic of CCP's shows 40.8% (Figure 15) had experienced HFPS as part of their educational training. This finding indicates that HFPS is being introduced as part of the educational process and is becoming a more acceptable educational modality for CCP's. Continued research and debate regarding this learning method should be encouraged. The HFPS questions had a high rate of no response ($n = 118$). A problem with surveying HFPS is the general misunderstanding of the definition HFPS and the difference between HFPS and “low fidelity” perfusion simulation. This misunderstanding of HFPS could be one of the reasons why 118 CCP's did not answer this question.

It is important for the ABCP to monitor and connect with the perfusion community about issues such as recertification clinical cases and professional activity. This survey asked several introspective questions to assess whether recent revisions to the recertification

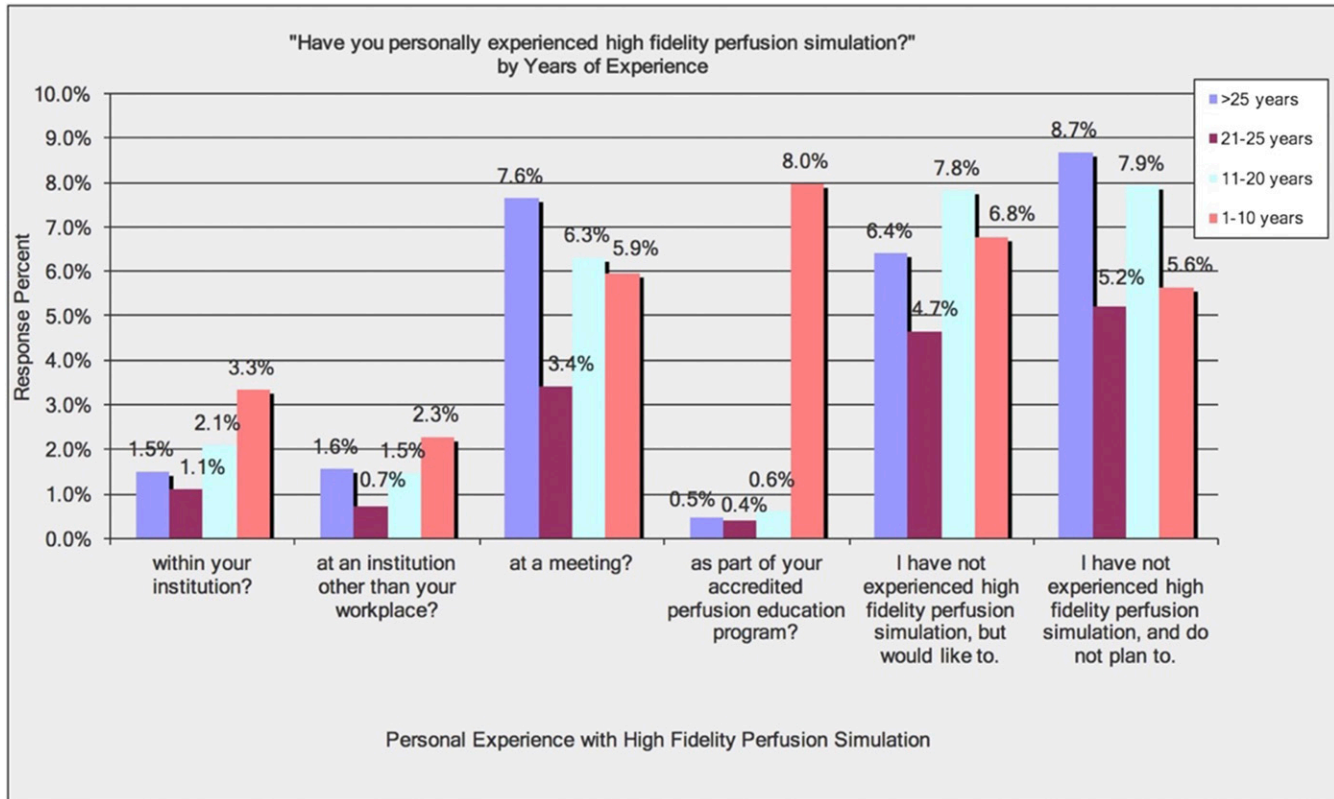


Figure 15. Personal experience with high fidelity perfusion simulation by years of experience. When comparing personal experience with HFPS by years of experience, 8.0% ($n = 261$) of the CCPs who responded gained personal experience with from within their institution, and of that group, 3.3% ($n = 108$) have 1–10 years of experience, 2.1% ($n = 68$) have 11–20 years of experience, 1.1% ($n = 36$) have 21–25 years of experience, and 1.5% ($n = 49$) have greater than 25 years of experience; 6.1% ($n = 196$) of the CCPs who responded gained personal experience from an institution other than their workplace, and of that group, 2.3% ($n = 74$) have 1–10 years of experience, 1.5% ($n = 48$) have 11–20 years of experience, 0.7% ($n = 23$) have 21–25 years of experience, and 1.6% ($n = 51$) have greater than 25 years of experience; 23.2% ($n = 757$) of the CCPs who responded gained personal experience at a meeting, and of that group, 5.9% ($n = 193$) have 1–10 years of experience, 6.3% ($n = 205$) have 11–20 years of experience, 3.4% ($n = 111$) have 21–25 years of experience, and 7.6% ($n = 248$) have greater than 25 years of experience; 9.5% ($n = 307$) of the CCPs who responded gained personal experience as part of an accredited perfusion education program, and of that group, 8.0% ($n = 259$) have 1–10 years of experience, .6% ($n = 20$) have 11–20 years of experience, .4% ($n = 13$) have 21–25 years of experience, and .5% ($n = 15$) have greater than 25 years of experience; 25.7% ($n = 833$) of the CCPs who responded have not experienced HFPS but would like to do so, and of that group, 6.8% ($n = 220$) have 1–10 years of experience, 7.8% ($n = 254$) have 11–20 years of experience, 4.7% ($n = 151$) have 21–25 years of experience, and 6.4% ($n = 208$) have greater than 25 years of experience; 27.4% ($n = 891$) of the CCPs who responded have not experienced HFPS and do not plan to do so, and of that group, 5.6% ($n = 183$) have 1–10 years of experience, 7.9% ($n = 257$) have 11–20 years of experience, 5.2% ($n = 169$) have 21–25 years of experience, and 8.7% ($n = 282$) have greater than 25 years of experience.

requirements which accommodate technological advancements have assisted CCP's with clinical case limitations. Of responding CCP's, 92.4% (Figure 16) agreed that the ABCP has made necessary revisions to recertification requirements. However, comments posted to this question were mainly pro/con concerning the 40 case volume requirement in a changing cardiac surgery environment. Next, survey respondents were asked if professional activity continuing educational units (CEU) are easily attainable. Of responding CCP's, 90% (Figure 17) agreed that CEU's for professional activity are easily attainable. However, many comments posted with this question raised concern about expenses and getting time

off to attend a live meeting and urged for more online or webinar education.

SUMMARY

The ABCP workforce survey is the first of its kind completed on this scale for the perfusion community. This survey had a strong CCP response rate of 78.9%. Through the recertification process the ABCP has the unique ability to electronically capture valid perfusion professional information on demographics, workforce trends and clinical routines. The ABCP has an opportunity to better understand the needs of

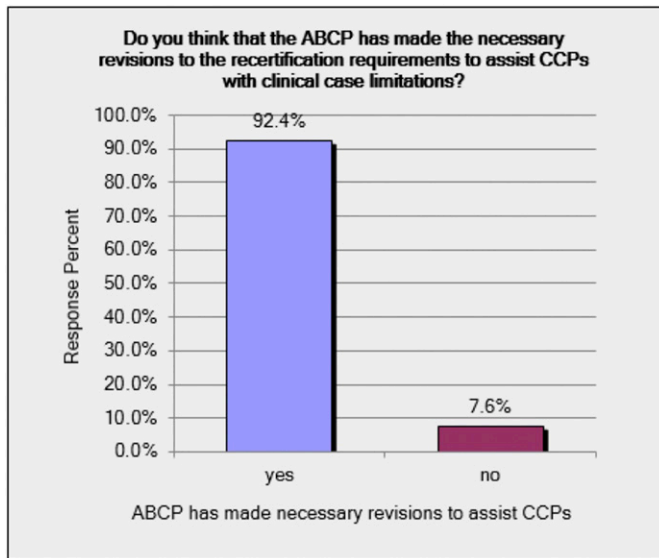


Figure 16. Perception that ABCP has made necessary revisions to assist CCPs. When asked if CCPs think that ABCP has made the necessary revisions to the recertification requirements to assist CCPs with clinical case limitations, 92.4% ($n = 2,721$) said yes and 7.6% ($n = 224$) said no.

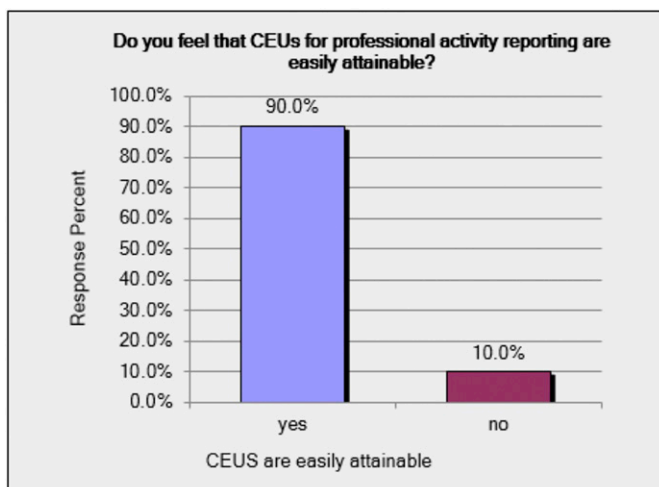


Figure 17. Perception that CEUs for professional activity reporting are easily attainable. CCPs were asked whether they feel that CEUs for professional activity reporting are easily attainable, 90.0% ($n = 2,718$) said yes and 10.0% ($n = 301$) said no.

the profession and communicate this information to the perfusion community. The ABCP is committed to partnering with the perfusion community in developing future survey questions. Documenting the current perfusion workforce through surveying strengthens the certification process and provides valid information to guide the perfusion workforce.

REFERENCES

1. Toomasian JM, Searles B, Kurusz M. The evolution of perfusion education in America. *Perfusion*. 2003;18:257–65.

2. Sistino JJ. The case for a single entry level into the perfusion profession by 2020. *J ECT*. 2014;46:127–9.
3. Plunkett PF. Perfusion education in the USA. *Perfusion*. 1997;12:233–41.
4. Jon W. Austin, BA, Edward L. Evans, BBA, and Harry R. Hoerr, Jr, MS. Distributed perfusion educational model: A shift in perfusion economic realities. *J Extra Corpor Technol*. 2005;37:360–3.
5. Sistino JJ. Response to letter “a single entry level into the perfusion profession is not the solution” by Colligan and Patel. *J Extra Corpor Technol*. 2014;46:326–7.
6. 1998. Perfusion Benefits Survey. Available at: <http://www.perfusion.com/cgi-bin/absolutem/templates/articledisplay.asp?articleid=1477&zoneid=3#.WDxpFtrLIU>. Accessed June 13, 2017.
7. American Board of Cardiovascular Perfusion. Available at: <http://abcp.org>. Accessed June 13, 2017.
8. Dall TM, Gallo PD, Chakrabarti R, West T, Semilla AP, Storm MV. An aging population and growing disease burden will require a large and specialized health care workforce by 2025. *Health Aff (Millwood)*. 2013;32:2013–20.
9. Sistino JJ, Michaud NM, Sievert AN, Shackelford AG. Incorporating high fidelity simulation into perfusion education. *Perfusion*. 2011;26:390–4.
10. Brewer SL, Mongero LB. Women in perfusion: A survey of North American female perfusionists. *J Extra Corpor Technol*. 2013;45:173–7.

APPENDIX 1

Survey Questions

Thank you for participating in the 2016 American Board of Cardiovascular Perfusion (ABCP) Annual Survey. Your feedback is important. This short survey is designed to provide the ABCP with information relative to the needs of the perfusion community with regard to certification, recertification, and continuing professional education. Your cooperation is essential to determine, as accurately as possible, the actual conditions related to certification and recertification. Results will be made available once the survey period has been completed. Thank you for your time.

Welcome to the 2016 ABCP Annual Survey:

ABCP Annual Survey (Short Version) P Annual Survey (Short Version)

1. Gender
 - Female
 - Male
2. Age
 - 20–29
 - 30–39
 - 40–49
 - 50–59
 - 60–69
 - >70
3. Highest level of education
 - High school degree
 - Two years college/technical training/certificate

- Baccalaureate degree
 Master's degree
 Doctoral degree
 Other (please specify)
4. Do you think that your perfusion educational experience prepared you well enough to enter the perfusion marketplace?
 Yes, I graduated from an accredited school of perfusion, and it was a positive educational experience.
 No, I graduated from an accredited school of perfusion, and it was not a positive educational experience.
 Yes, I'm an on the job trained (OJT), and it was a positive educational experience.
 No, I'm an OJT, and it was not a positive educational experience.
5. Years as a Certified Clinical Perfusionist (CCP)
 1–5
 6–10
 11–15
 16–20
 21–25
 >25
6. How many more years do you anticipate working before retiring?
 1–4
 5–10
 11–15
 16–20
 21–25
 26–30
 31–35
 36–40
7. Approximately, how many on-bypass procedures do you personally perform annually?
 0–20
 21–40
 41–60
 61–80
 81–100
 101–120
 121–140
 141–160
 161+
8. Approximately, how many cardiopulmonary bypass standby cases do you personally perform on an annual basis?
 0–20
 21–40
 41–60
 61–80
 81–100
 101–120
 121–140
 141–160
 161+
 Other (please specify)
9. Are you involved with a transcatheter therapy (TVT) program? If so, is your involvement:
 In house back-up?
 Operating room back-up?
 TVT procedures are performed at my hospital, but CCPs don't stand-by for them.
 TVT procedures are not performed at my hospital(s).
 Other (please specify)
10. Have you personally experienced high fidelity perfusion simulation? If so, was it (Select all that apply.)
 Within your institution?
 At an institution other than your workplace?
 At a meeting?
 As part of your accredited perfusion education program?
 I have not experienced high fidelity perfusion simulation, but would like to.
 I have not experienced high fidelity perfusion simulation, and do not plan to.
 Comment:
11. Do you think that the ABCP has made the necessary revisions to the recertification requirements to assist CCPs with clinical case limitations?
 Yes
 No
 Comment:
12. Do you feel that continuing educational units for professional activity reporting are easily attainable?
 Yes
 No
 Comment: