

Original Article

Master's Education for Perfusion: Is It Needed? Is It Important to Future Sub-specialization?

Phillip L. Syracuse, MS, Philip D. Beckley, PhD, CCP

Circulation Technology Division, School of Allied Medical Professions, The Ohio State University, Columbus, Ohio

Presented at the American Society of Extra-Corporeal Technology 31st International Conference, February 26 - March 1, 1993, Dallas, Texas

Keywords: cardiopulmonary bypass, perfusion, circulation, opinion, demographics, education

ABSTRACT

This survey research measured the opinions of practicing perfusionists on the perceived need for a master's level perfusion degree, specialization within the field, attractors and barriers to education, and employer support for a master's degree. Descriptive and correlational analyses (including ANOVA) were performed upon 224 questionnaires received from the membership of The American Society of Extra-Corporeal Technology (AmSECT). A majority of the AmSECT population (58%) feels there is a need to recognize areas of specialization within perfusion. The top five choices for specialties are: pediatrics, support devices-pacemakers, perfusion education, physiology-hematology, and advanced perfusion study. The AmSECT practicing perfusionist membership's opinion on new entries into the perfusion field strongly favors baccalaureate level education (79%). This conclusion is supported by a majority of perfusionists regardless of their perfusion training. Of the respondents, 35% agreed there is a need for a master's degree, while 58% agreed there is a need to recognize areas of specialization within perfusion. This mixed support exists across demographic categories without respect to age, gender, years of practice, education, job title, number of cases a facility performs per year, or employment. Support for the degree arises from the belief it will: provide continuing education, benefit one's career, help establish specialty recognition, and provide personal and professional knowledge.

Address correspondence to:
Phillip L. Syracuse
5742 Alberta Drive
Lyndhurst, OH 44124

INTRODUCTION

In most allied health disciplines, a master's degree indicates the bearer of the degree has studied beyond the basic entry requirements of their chosen profession. The master's degree connotes a familiarity with management, education, research, and/or specialization within the field. Many health professions require education beyond a baccalaureate degree for entry into their profession for growth and/or advancement (1). Newer medical professions struggle to gain this sense of self identity and external recognition.

The current population of practicing perfusionists have been educated in a variety of ways. They are a mixture of: on the job trained, one-year program, associate degree, certificate, and baccalaureate degree program graduates. This mixture of experience and education provides the basis for growth required by any new profession. Perfusion knowledge and methods continue to rapidly increase. This has created a continually increasing demand for a higher level of education for entrants into the perfusion field.

Educational centers are looking ahead to provide more specialized opportunities with a Master's of Science in Perfusion. Some are considering the master's level for entry into the profession or using the master's as a vehicle for specialization. However, practicing perfusionists must feel the need for those skills, specialization, and opportunities a Master's of Science Degree would offer them, or they will not likely feel a need for the degree. They must also evaluate what educational entry level should be required for their profession. Typically, the personnel within the field have the best experience to define their academic standards. Questions which are likely to be asked by the universities with perfusion programs include: does the experience of practicing perfusionists indicate a need for a Master's of Science within their profession; is it time for the development of a master's level degree for specialization within the perfusion industry; what special problems do practicing perfusionists face should they pursue a master's degree?

Like most health disciplines, hospital facilities require more from an individual perfusionist than performing perfusion related procedures. Each employee must be able to contribute to the department's daily and future operations in ways that their health care education is unlikely to address. These skills may include the abilities to do purchasing, research, equipment evaluation, student education and evaluation, personnel education and evaluation, management of personnel, and other responsibilities which now must be acquired at the job site. A master's degree could prepare perfusion students by providing the special tools needed to make these additional contributions to their new department.

To date there has been no formal research measuring the opinions of the population of practicing perfusionists on the perceived need for a master's level perfusion degree or graduate specialization for the profession.

The objectives of this study are four fold. First, to deter-

mine if practicing personnel within the perfusion field believe there is a need for a Master's of Science in perfusion for specialization and/or for entry into the profession. Second, to determine the most critical areas of specialization within the field. Third, to correlate the perfusionists' opinions of perceived needs with: their years of experience, type of perfusion training, job position currently held, number of procedures performed by the hospital, type of procedures performed, type of employing organization, age, sex, and responsibilities performed in addition to perfusion. Fourth, to correlate the perfusionists' opinions of each of the perceived needs and desired specialties to each other.

MATERIALS AND METHODS

A representative sample of practicing perfusionists was chosen from the membership rolls of the American Society of Extra-Corporeal Technology (AmSECT). While this limits the target population to membership, this membership list is the most complete listing available at this time. Representiveness of the population was addressed by comparing five demographics of the respondents to five similar demographics supplied from AmSECT's national database (731 of the 1764 active AmSECT members or 41.44 %). The raw data on the five demographic categories of: age, gender, perfusion training, highest educational level achieved, and employer type was delivered to and summarized by these researchers. The category percentages of the AmSECT database was compared to the matching category percentages of the survey data. A variance of plus or minus 5% was considered acceptable.

The membership of AmSECT totals approximately 2400. The number of practicing perfusionists who are also active members of AmSECT totals 1764 (target population). The study sample (400) was derived from this practicing perfusionist population (1764) and was randomly chosen using the National Education Associations guidelines for estimated population and sample sizes (2). AmSECT delivered only the membership numbers to the researchers. A number from 1 to 1764 was listed next to the membership number. A random number generator was used to select 400 numbers from 1 to 1764. Any duplicate numbers were eliminated. These eliminated numbers were replaced by further selection by the random number generator. The random number generator chose numbers from 1 to 1764 so that each number still had the same chance of being selected. This process was repeated until 400 different numbers had been randomly selected from 1 to 1764. This use of the replacement concept increased the representativeness of the sample and guaranteed true random selection.

STUDY LIMITATIONS

The population database for the study was the AmSECT membership of practicing perfusionists. Since, the AmSECT membership does not include all the personnel within the industry (estimated at 3000), the results of this study only represent the

opinions of the practicing membership (1764 as of April 23, 1992). The conditions under which mail surveys, including this survey, are performed are always uncontrolled.

RESEARCH DESIGN

The first two sections of the questionnaire were developed by the authors as no other existing questionnaires were appropriately adaptable to perfusion. The third section is an adaptation of part of a survey performed by Lusk, Disch, and Barkauskas, measuring "Barriers to Advanced Education for Occupational Health Nurses" (3).

The questionnaire consisted of four basic sections. The sections utilized a weighted Likert scale (Table 1), and yes/no questions to survey perceived need, specialization, and potential aids and barriers to a master's education. The Likert scale used ranged from one to five with an answer of five indicating strong agreement with or high importance placed upon the question. A one represented strong disagreement or very low importance to the question while a response of three represented a neutral reaction. The final section collected data on demographics with a forced choice format. This allowed the correlation of demographics on practicing United States perfusionists who are AmSECT members (target population) to their opinions on the need for a Master's of Science in perfusion and specialty importance for perfusion. Correlation strength was evaluated as follows: No correlation ($r = \pm 0.0$ to ± 0.249); Mild correlation ($r = \pm 0.25$ to ± 0.499); Moderate correlation ($r = \pm 0.50$ to ± 0.749); Strong correlation ($r = \pm 0.75$ to ± 0.899). Values where $r \geq \pm 0.9$ may be due to a spurious correlation or may result from question design. In such instances the data should be examined to explain such an occurrence.

OUTCOME MEASURES

The content validity of the questionnaire was reviewed by the research committee and by a five person panel of survey experts to minimize test bias. A pilot test was performed on a randomly selected representative sample of graduates from The Ohio State University's Circulation Technology Program. Minor changes were made to the document allowing for clarification and missing items. The practicing AmSECT membership was then sent the initial mailing.

DATA COLLECTION

Three weeks after the initial mailing, a follow up mailing was made to all of the sample group whose questionnaires had not yet been received. Any first or second mailing questionnaires not returned within the three week period following the second mailing were considered non-respondents.

Anonymity was maintained by numbering the questionnaires on the inside front cover. This cover was removed upon receipt of the questionnaire, separating the subject's answers

Table 1
Weighted Values for Responses

Response	Response	Weighted Value
Strongly Agree	Very Important	5
Agree	Important	4
Neutral	Moderately Important	3
Disagree	Slightly Important	2
Strongly Disagree	Not Important	1

from their identification. Then the separated return cover was matched to the mailing list to verify return of the questionnaire. This provided follow-up capability while keeping answers anonymous.

Analysis was performed upon 224 (54.8%) on-time returned questionnaires. Percentage analysis, means, variances, standard deviations, and ANOVA (Analysis of Variance) were performed on the opinions, specialization data, barriers to gaining the degree, advantages to the degree, employer support, demographics, procedures, and responsibility data when appropriate. The alpha level of significance was set at $p < 0.05$.

RESULTS

DEMOGRAPHIC DATA

This study's demographic categories were compared to the database AmSECT provided on five demographic measures. The measures were age, training, education, employment, and gender. At no time did the percentage difference between these two categories vary by more than 4.1%. To further compare the survey data to the AmSECT database, each category answer was assigned a numerical value. From this data a pooled t-test was calculated at a 95 % confidence level ($p < 0.05$). We were unable to statistically prove any difference between the survey sample and the AmSECT database (See Table 2). These steps established representativeness of the sample to the target population to the limits available at this time.

Types of cases performed are highly varied. For ease of comparison the types of cases are placed into basic groups. The case type groups performed by AmSECT membership are as follows: adult 54.1%, adult and pediatric 9.4%, adult and transplants 13.3%, and adult, pediatric, and transplants 23.2%. Non-perfusion responsibilities are similarly grouped: management 40.6% educational 2.2%, both management and educational 53.6%, and no additional responsibilities 3.6%. Educational responsibilities involved: in hospital presentations (68.2%), clinical education of employees (51.6%) and students (43.8%), student evaluation (36.6%), and classroom lectures (37.9%). In addition, 33% of the respondents are involved with some form of

Table 2

Comparison of AmSECT Database and Survey

Demographic	Category	AmSECT Data	Percents Research Results	Difference
Gender	Male	68.5	72.3	3.8
	Female	31.5	27.7	3.8
Training	Formal Schooling	70.9	74.3	3.4
	On the Job	29.1	25.7	3.4
Employment	Hospital	44.8	42.5	2.3
	Group	31.9	29.0	2.9
	Surgeon	15.1	16.3	1.2
	Independent	5.6	8.1	2.5
	Other	2.6	4.1	1.5
Age	20-34	32.6	30.4	2.2
	35-49	61.8	64.7	2.9
	50-64	5.5	4.9	0.6
	65 and over	0.1	0.0	0.1
Education	High School	10.8	7.1	3.7
	Associate	13.8	17.9	4.1
	Bachelor	66.4	66.5	0.1
	Master's	3.7	6.7	3.0
	Other	5.3	1.8	3.5

research.

AmSECT members were polled on the types of perfusion procedures they performed. Virtually all of the AmSECT practicing respondents perform adult perfusion, while 32.6% perform pediatric perfusion with 25.4% performing neonatal perfusion. Nearly all performed support procedures on bypass grafts and valve replacements. Left heart bypass was performed by 82.5%. Transplants were performed by less than 34%. ECMO was performed by 40.2% with VAD (ventricular assist devices) being performed by nearly 80%. Ancillary procedures were also examined. AmSECT members are more involved with implantable defibrillators (46.4%) than pacemakers (19.2%). Emergency cardiopulmonary support (CPS) was performed by more respondents than prophylactic CPS, yet each were utilized by more than 50%. A large majority (92.4%) utilize cell savers. Autologous transfusion was used by fewer respondents (66.1%) and plasma sequestration was only utilized by 31.3%. Intra-aortic balloon pumps (IABP) were used widely at 84.8%.

PART 1: OPINIONS OF PERFUSIONISTS

AmSECT members are relatively divided on their perceived need for a master's in their medical profession. Forty-four

percent (44%) of respondents disagree or strongly disagree there is a need for the degree, 21% were neutral, and 35% agree or strongly agree there is a need. Correlational analysis indicates the opinions of those who support the master's degree also believe it will: aid continuing education, gain them personal and professional knowledge, help establish areas of specialization within perfusion, and benefit their careers.

When asked at what educational entry level a new perfusionist should enter the field, the AmSECT practicing perfusionist respondents replied: 78.7% baccalaureate, 12.7% associate, 6.3% certificate, and 2.3% master's level. None chose the option of Ph.D. for entry into the profession. Examination of entry level preference according to the demographic of perfusion training is displayed in Figure 1. The baccalaureate education level is preferred by the majority of perfusionists regardless of perfusion training.

PART 2: SPECIALIZATION

Specializations were rated from very important to not important. The percentages below combine the important and very important response categories. The mean scores refer to the mean weighted value of the Likert scale. The top five ranked need specialties are: Pediatrics (mean 4.1, 77% important), Support Devices/Pacemakers (mean 4.0, 79% important), Perfusion Education (mean 4.0, 75% important), Physiology/Hematology (mean 3.9, 74% important), and Advanced Perfusion Study (mean 3.8, 70% important). The lowest ranked specialty was Chemotherapeutic Perfusion with an importance rating of 47% and a mean of 3.3. The remaining specialties all had a favorable agree rating above 50%. They are: Blood Conservation Techniques, Organ Transplants, Equipment, and Management and Administration.

ANALYSIS OF VARIABLES

A one factor ANOVA (one sided analysis of variance) was utilized to associate the collected demographics to the opinions of AmSECT member practicing perfusionists. Following a significant ANOVA, a Scheffe F-test was then performed to determine if there was a significant difference between the opinions of each demographic subgroup (example: male vs. female). A 95% confidence level was required to indicate statistical significance.

The differences between the demographic sub-groups in association with the opinions of the AmSECT practicing perfusionist respondents were examined. There were no statistically significant differences in opinion based on age, gender, years of practice, number of cases per year performed at the institution, type of employer, procedures performed, or responsibilities other

than performing perfusion.

ANOVA was performed on the differences between demographic groups to associate those demographics with types of specialization needed according to the opinions of the AmSECT practicing perfusionist respondents. There were no statistically significant differences in needed specialties based on age, gender, years of practice, education, perfusion training, current title, number of cases per year performed at the institution, type of employer, or responsibilities other than performing perfusion. Those who participate in some combination of transplant, adult,

and pediatric perfusion felt a statistically greater need for a specialty in pediatric perfusion over those practicing perfusionists who only perform adult procedures.

Baccalaureate trained perfusionists agreed that a master's would be useful in their planning for future advancement by comparison to pre-baccalaureate trained perfusionists who were neutral on this topic. Owner-partners disagree that a master's was useful to their plans for advancement when compared to those holding the job titles of perfusionist, assistant to the department head, and chief or department head. Pre-baccalaureate trained perfusionists somewhat disagree that a master's would gain them an increase in income. This opinion differed in a statistically significant way to post-baccalaureate trained perfusionists who felt a master's degree would gain them an increase in income.

CORRELATIONAL ANALYSES

The opinions of AmSECT practicing perfusionists who responded to the questionnaire were compared by correlational analysis for Part 1: Opinions, and Part 2: Specialization.

The need for a master's of science degree strongly relates to practicing perfusionists' need for continuing education ($r=0.74$). Perfusionists who support a master's degree relate the degree to aiding their careers ($r=0.64$), the attainment of personal and professional knowledge ($r=0.56$), and the belief that the degree will gain recognition for perfusion specialties ($r=0.53$). Other factors associated with the need for the degree include: counting master's classes toward continuing education credits ($r=0.39$) and the need for specialty recognition in perfusion ($r=0.27$). The specialties which perfusionists relate to the need for the master's

Figure 1

Percentage (%) Favoring Baccalaureate Entry Level by Category of Perfusion Training

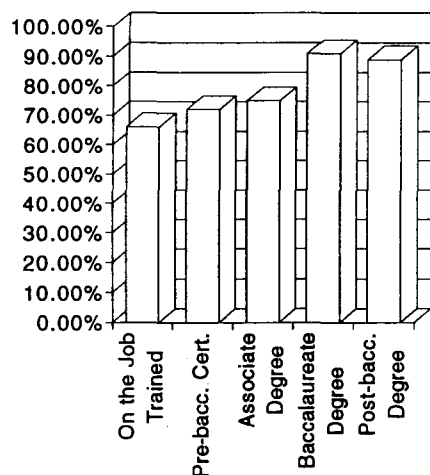
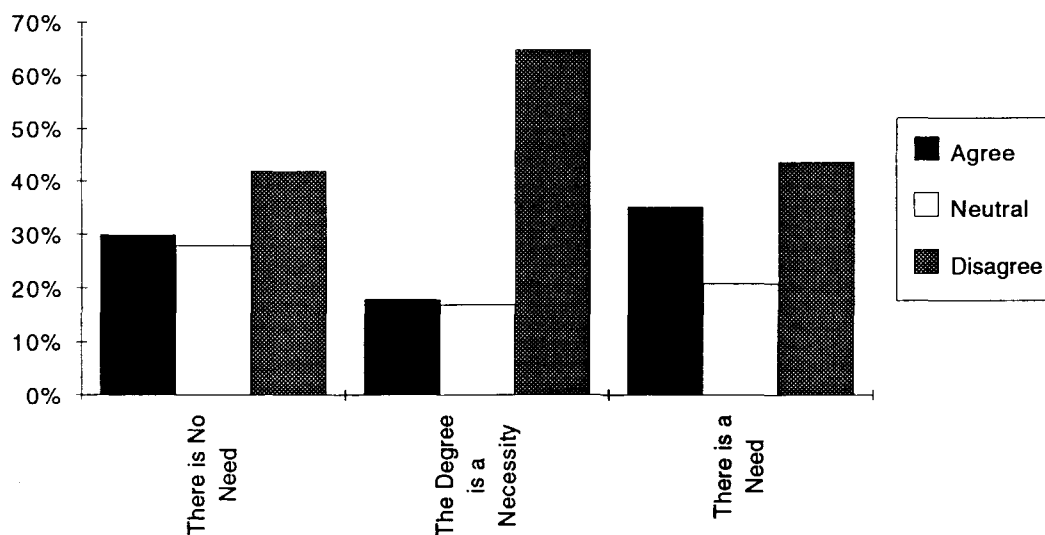


Figure 2

Response to Questions on the Need for a Master's Degree.

The full questions were: "There is no need for a Master's of Science Degree for perfusion; A Master's of Science Degree in perfusion is a necessity; and A Master's of Science Degree in perfusion is needed for the field."



degree are: advanced perfusion study ($r=0.25$), support devices and pacemakers ($r=0.26$), pediatric perfusion ($r=0.32$), organ transplants ($r=0.29$), management and administration ($r=0.41$), and chemotherapeutic perfusion ($r=0.32$). Perfusionists who perform organ transplants as well as pediatric and chemotherapeutic perfusion perceive a greater need for recognition of perfusion specialties than those who only perform organ transplants.

The need for recognition of areas of specialization within the perfusion industry relates to the perfusionists' perceptions that a master's degree will help establish recognition of specialties ($r=0.49$). Those specialties perfusionists associate with establishing specialization are: advanced perfusion study ($r=0.32$), support devices-pacemakers ($r=0.26$), blood conservation techniques ($r=0.26$), pediatric perfusion ($r=0.33$), organ transplants ($r=0.27$), chemotherapeutic perfusion ($r=0.29$), and management and administration ($r=0.27$). Motivational interpretation of this correlational research implies that clinical experience and the desire to utilize research for practical application is the likely stimulus for the need for perfusion specialties, while achieving recognition of specialization stimulates the need to include education, management, and ancillary procedures as areas of specialization.

The specialties themselves inter-correlate. The specialty of advanced perfusion is related to perfusionists' perceived need for more information on physiology-hematology ($r=0.68$), support devices-pacemakers ($r=0.53$), equipment ($r=0.61$), and blood conservation techniques ($r=0.60$). The need for a physiology-hematology specialty correlates to the specialties of: support devices-pacemakers ($r=0.54$), equipment ($r=0.72$), and blood conservation techniques ($r=0.64$). The support devices and pacemaker specialty overlaps the specialties of equipment ($r=0.56$), blood conservation techniques ($r=0.56$), and pediatric perfusion ($r=0.51$). The equipment specialty is strongly correlated to the specialty of blood conservation techniques ($r=0.76$) which, in turn, relates to chemotherapeutic perfusion ($r=0.49$). The pediatric perfusion specialty moderately relates to the organ transplant specialty ($r=0.69$). In turn, the organ transplant specialty has a moderate correlation to the chemotherapeutic specialty ($r=0.49$). The specialty of management and administration correlates moderately to the specialty of perfusion education ($r=0.51$) and mildly to the specialty of chemotherapeutic perfusion ($r=0.40$). Perfusion education also correlates mildly to chemotherapeutic perfusion ($r=0.49$). In fact, the perfusion education and the management and administrative specialties had mild correlation to all the other specialties. This illustrates how specialties interact in an near cascading effect in support of the practice of cardiovascular perfusion.

NEW PERFUSIONIST ENTRY LEVEL-

DEMOGRAPHIC ANALYSIS

Data was collected on new perfusionist entry level. The

question: "At what educational level should new personnel enter the perfusion profession?" requires further examination due to the discrete nature of its categories. A frequency distribution was calculated for each demographic category with respect to this question. Since baccalaureate level entry is the majority's choice, attention focused on possible trends pertaining to the baccalaureate category.

A trend appears with reference to the respondent age. The younger perfusionists tend to favor baccalaureate entry level more than older perfusionists (88% high for youngest group to 60% low for the oldest group). A percentage of older perfusionists lean more toward certificate and associate entry level (certificate 3% up to 29% and associate 7% up to 20%). This trend coincides with the years of practice data. Those perfusionists practicing fewer years (0-9 at 88% and 10-19 at 74%) tend to favor the baccalaureate degree more than perfusionist practicing over 20 years (20-29 at 63% and 30 and over at 67%). The baccalaureate entry is still favored by the majority of perfusionists within each of these categories.

The maximum educational level achieved shows that baccalaureate and graduate trained respondents favor baccalaureate entry over high school and associate degree trained personnel. The master's and Ph.D. categories were combined into the graduate trained category to include the few Ph.D. answers in the analysis.

As perfusionists' educational levels increased, preference for the baccalaureate entry level also increased (Figure 1). The majority of perfusionists from all levels of perfusion training favored baccalaureate entry into the profession.

DISCUSSION

The AmSECT practicing perfusionists are divided on the issue of the need for a master's of science in perfusion. They are also divided on whether or not a master's of science in perfusion is a necessity. Further complicating the issue are the responses to the statement: there is no need for a master's of science in perfusion. Only 35% feel there is a need for the master's degree. Asked if the degree was a necessity, an absolute value version of the same question, only 18% agree. It is apparent that forcing a master's degree upon the industry is not favorably viewed by the AmSECT membership. Yet, when asked if there was need, another absolute, but opposite question, 42% disagree (Figure 2). How to interpret these seemingly opposing opinions depends largely on the each questions' use of language. To help clarify the opinion, consideration was also given to the educational level required for new entry into the perfusion field where only 2% favor a master's entry level. The conclusion drawn is that many would like a master's of perfusion available, but most do not want the degree mandated. Many may be concerned such a degree would be made an across the board requirement to practice perfusion.

Why do some perfusionists favor a master's of science in perfusion while others do not? Correlational and ANOVA analy-

sis were used to associate the aspects of opinion and specialties to the master's of perfusion question. Those in favor of the master's degree view the degree as: being needed for continuing education purposes, a way to benefit their careers, a way to help establish recognition of specialties in the perfusion field, and as a way to gain personal and professional knowledge. These opinions are mildly associated with the perceived need for specialization in: advanced perfusion study, support devices-pacemakers, pediatric perfusion, organ transplants, chemotherapeutic perfusion, and management and administration. Those perfusionists with both managerial and educational responsibilities, in addition to their perfusion duties, felt a greater need for a master's degree than those respondents with only additional managerial responsibilities.

The question which asks if there is no need for the degree negatively correlates (is directly opposite) to all the positive correlations mentioned in the prior paragraph. AmSECT practicing perfusion members not supporting the idea of a master's of perfusion either do not perceive the master's as providing the benefits they need or do not interpret the benefits as something they can utilize. These ideas are supported by the negative correlations associated with respondents' opinions on the different perfusionists' needs or the career position held by those negative respondents.

Negative respondents to the question on the need for a master's degree likely do not perceive the master's of science in perfusion as providing the benefits of: continuing education, recognition of specialties, or personal and professional knowledge. Another possibility is that these negative respondents are not in a career position to receive benefit from a master's degree. Perfusionists with a maximum of a high school or associate education, view these circumstances as barriers to gaining the degree. This is further supported by comparing those perfusionists of younger age and fewer years of practice with more experienced, older perfusionists. These younger perfusionists, with more formalized training, perceive the lack of credentials or prerequisites as less of a problem to obtaining the degree than older groups with more years of practice who did not have as many formal programs available during the time period in which they were trained.

Owners or partners in perfusion service companies did not see much use for a master's when planning for future advancement. This contrasted drastically to those with the job titles: perfusionist, assistant to the department head, chief perfusionist, or department head. This may be considered self evident when utilizing the point of view from each employment position. In other words, if you owned a perfusion service company, what benefits would you personally receive from obtaining a master's degree? This is an area for further examination.

Continuing education, as it applies to a master's of perfusion, is another complex issue. Only 36% of the AmSECT practicing perfusionists see a master's as needed for continuing education purposes. Seventy-eight percent (78%) are of the opinion that master's of perfusion classes should count toward

continuing education credits. Fifty percent (50%) feel that approved continuing education classes should count toward a master's degree. Some might interpret this as master's degree classes not being as useful as other types of continuing education. Yet, it might also simply be respondents not wanting to commit to the time and energy more formalized classes require. At the same time people want credit toward continuing education from master's degree work and master's degree credit from approved continuing education classes. Further study into these points of view may clarify the lack of support for a master's for continuing education coexisting with the strong support for receiving credit for such classes.

Fifty-eight percent (58%) of the AmSECT practicing perfusionists feel there is a need to recognize areas of specialization within perfusion. These perfusionists relate recognition of specialties to a master's degree aiding the recognition of specialties and the need for continuing education. There is a strong correlation to a master's of perfusion helping to establish recognition of specialties and a master's degree providing benefit to one's career. The top five needed specialties are: Pediatrics, Support Devices-Pacemakers, Perfusion Education, Physiology-Hematology, and Advanced Perfusion Study. Perfusionists involved in all three basic types of perfusion—adult, pediatric and transplant—strongly favor pediatrics and organ transplants as a specialty over those who perform only adult procedures. The equipment specialty strongly correlates to the blood conservation techniques specialty. Advanced perfusion study, physiology-hematology, support devices-pacemakers, blood conservation techniques, and equipment specialties all interrelate.

The top concern for AmSECT perfusionists relating to barriers to a master's degree was the need to maintain income. This is followed closely by concerns for: limited time, scheduling conflicts, family responsibilities and need to maintain fringe benefits. Mild concern was seen over the issues of the potentially long length of the education program, the distance from the educational institution, and cost of the program. The least concern was displayed over the need to maintain seniority, and the lack of necessary credentials and prerequisites.

Attractive points to obtaining a master's of perfusion were: the ability to maintain employment while taking classes, the short length of a program, and the person's plans for future development. The potential for increased income was of small concern and the least point of attraction was the master's degree's relevance to the perfusionist's currently held position. Employer support of perfusion personnel pursuing a degree would be varied. The type of employer support made most available are: partial tuition, time off without pay, and leave of absence. Holding the position open for the student was made available by one-third of the responding perfusionists' organizations.

At what educational level should new personnel enter the perfusion profession? The AmSECT membership favors baccalaureate entry by almost 4 to 1 over all the other potential entry levels available (79% baccalaureate to 21% combined certificate, associate, and master's). The younger the member, the more

in favor they were of baccalaureate entry. The same holds true of years of practice. The age group of 50 to 64 years of age favored baccalaureate entry 3 to 1 compared to either certificate or associate entry. Those perfusionists with 20 or more years of experience favored baccalaureate entry 3 to 1 over associate degree entry and by over 7 to 1 over certificate entry into the profession. While high school and associate educated personnel favored baccalaureate entry at above the 50% level, the baccalaureate and master's educated members favored baccalaureate entry at or above the 80% level. A definite trend also exists for support of the baccalaureate entry level regardless of perfusion training. Sixty-six percent (66%) of the on the job trained personnel favor baccalaureate entry. This opinion grows in strength to over 90% at the baccalaureate trained level.

CONCLUSION

A majority of the AmSECT population (58%) feels there is a need to recognize areas of specialization within perfusion. The top five choices for specialties are: pediatrics, support devices-pacemakers, perfusion education, physiology-hematology, and advanced perfusion study. However, the specialties of: blood conservation techniques, organ transplants, equipment, and management and administration all have favorable responses and should not be ignored.

Of special concern to AmSECT's practicing perfusionists in the pursuit of a master's of perfusion are: the need to maintain income, time limitations, scheduling conflicts, family responsibilities and the need to maintain fringe benefits. Attractive points to a program include: the ability to maintain employment while taking classes, a master's program of short length, and the person's plans for future development.

The AmSECT practicing perfusionist membership's opinion on entry into the perfusion field strongly favors a baccalaureate level education. This conclusion is supported by the majority of perfusionists at each level of training.

We can conclude that there is mixed support for a master's of science degree of perfusion at this time. While some view the master's of perfusion as a need to help the industry, many do not see it as a necessity. This mixed support exists across demographic categories without respect to age, gender, years of practice, education, current job title, number of cases facility performs per year, or how the perfusionist is employed. The only statistically significant difference occurred between pre-baccalaureate certified perfusionists, who did not favor the master's degree, and baccalaureate trained perfusionists who did favor the degree. Support for the degree arises from the belief it will: provide continuing education, benefit one's career, help establish specialty recognition, provide a way to gain personal and professional knowledge.

REFERENCES

1. Javornik NB. A profile of continuing education in allied health professional associations. MS thesis, The Ohio State University, 1981.
2. The National Education Association, Estimated population and sample sizes. in Orlich, Donald C, *Designing Sensible Surveys*. Redgrave Publishing Company; 1978: 89.
3. Lusk SL, Disch JM, Barkauskas VH. Barriers to advanced education for occupational health nurses. *AAOHN Journal*. 1988; 36: 457-46.