

A Report of Perfusion Staffing Survey: Decision Factors That Influence Staffing of Perfusion Teams

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Abstract: Health care organizations are becoming increasingly aware of the issues surrounding safe staffing because it affects all of us: the patient, public, profession, policy makers, and employers. The conduct of perfusion has been researched, but environmental factors surrounding perfusion have not. The intent of this study was to identify the current perfusion staff to case ratio, the decision factors used to make staffing decisions, and the relative importance of the factors to staff requirements. A survey instrument was constructed. The questionnaire contained four sections: Hospital Information, Perfusionist Information, Staffing Information, and Additional Feedback. Questionnaires were electronically mailed to American Society of Extracorporeal Society (AmSECT) members who were registered on Perflist. Response rate was monitored, and a follow-up survey was sent. Unfortunately, respondents were not compared statistically with the population on like characteristics, because AmSECT does not currently have information regarding the characteristics of their Perflist members. The staff to perfusion case ratio for 2006 was 120 ± 46 (SD) cases. The top three factors used by perfu-

sionists to determine the number of staff to hire were the number of heart cases, on-call requirements, and the number of operating rooms. The reported use and importance of the decision factors did not differ significantly when reported by chief perfusionists, clinical perfusionists, or those who reported being involved in staffing. On-call requirements were reported to be used significantly more by chief perfusionists and by high activity perfusion teams when determining the number of staff to hire. Small hospitals tended to use staff experience, medium-sized hospitals reported using the number of operating rooms more often, and larger hospitals used the number of hospitals covered to determine staff requirements. Staffing a perfusion team is a difficult task, and many factors need to be considered. This survey provided a description of the current managerial staffing environment and practice. Further research surrounding the application of these factors to staff scheduling is needed. **Keywords:** medical staffing, number of employees, perfusion surveys, perfusionist staffing. *JECT. 2007;39:249–253*

Staffing in health care has become a global issue. In 2006, The World Health Organization (WHO) released a report focusing on health human resources, which considered issues of staffing. Health care organizations are becoming increasingly aware of the issues surrounding safe staffing because it affects all of us; the patient, public, profession, policy makers, and employers. However, there are many factors to consider when applying safe staffing principles such as the patients' condition, and the staff's education, experience and expertise (1).

The consequences of inadequate staffing are too great

to ignore. Because there is no current literature based on perfusion staffing much of the speculations and assumptions were based on extensive nursing research conducted on the staffing of nurses. However, staffing and patient care is an important issue that needs to be addressed in our profession as well.

According to the Institute of Medicine, inadequate nurse staffing is associated with increased infections, bleeding, cardiac, and respiratory failure (1). In addition to unanticipated patient outcomes, inadequate staffing leads to stress and higher turnover resulting in higher hospital costs. Ensuring adequate staffing benefits all parties involved. For example, patients and the public are assured safe care, employers are exposed to less risk and incur lower costs, regulators have fewer cases to investigate, professional associations can concentrate on providing services to support competence, and health care employees have greater career satisfaction, self-image, and pro-

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professional growth (1). Safe staffing is the center of safe patient care and satisfying careers.

According to the Association of Perioperative Registered Nurses (AORN), an effective staffing plan is “flexible and responsive to short-term and long-term patient and organizational demands. Effective planning involves determining staffing needs, planning for the appropriate staffing mix and number of staff members, budgeting for personnel costs, and scheduling personnel” (2). However, there is currently no published literature on the subject of how perfusion managers determine the number of staff to hire. Staffing has been exhausted in other allied health professions such as nursing but not perfusion.

Many other allied health professions have staffing guidelines, which serve as a gatekeeper function for assuring clinical standards for practice. Guidelines or policies can help provide safe and effective patient care; individual health care organizations should have staffing policies and procedures relevant to individual practice settings. However, while the conduct of cardiopulmonary bypass is fairly well standardized with protocols, the staffing of perfusionists is not.

According to Adams and Bond (3), increased frustration concerning staffing in healthcare is beginning to be expressed because historical precedent rather than empirical research continues to play a major role in staffing decisions. This study may help managers by determining the factors that affect staffing numbers and decrease the frustration associated with staffing procedures. These relationships are critical for policy makers, managed care companies, and managers, because staffing levels have the potential to affect both the cost and the quality of treatment (4). The purpose for this research is to examine various influences on staffing patterns in perfusion operating room teams. Understanding the current factors perfusion managers use to determine the staff requirements of a specific cardiac operating room (OR) is the first step in developing standardized guidelines. This study provides a solid foundation for this line of inquiry by identifying various factors that influence staffing levels in perfusion operating teams.

MATERIALS AND METHODS

Population Selection

Members of the American Society of Extracorporeal Technology (AmSECT) were requested to participate in this study. The members are listed on the AmSECT Internet list for public access through Perflist (www.perflist.com). The members of AmSECT were assured that the study was voluntary and confidentiality was ensured. The frame included ~3,050 perfusionists, perfusion students, and perfusion assistants. The frame included all members who were registered on Perflist because detailed member

information was not available to selectively send out the survey to a specific group.

Survey Construction

The method for collecting data was a survey instrument. The questionnaire used fixed questions, Likert scale and open-ended questions for data collection. The questionnaire contained four sections which included the following dimensions: Hospital Information, Perfusionist Information, Staffing Information, and Additional Feedback.

The online survey was conducted through Survey Monkey (www.surveymonkey.com). This is a website that is specifically designed to obtain data through the collection of surveys. Confidentiality was maintained through four distinct areas within the program, which include physical, network, hardware, and software features.

This study focused on different factors that may influence staffing decisions. A Likert scale was chosen to determine each of the factors currently being used and their relative importance to staffing decisions.

Many of the items that made up the questionnaire were products of previous perfusion survey research, based primarily in other areas of interest. In addition, the item construction was also based on professional knowledge and experience of the researcher and colleagues. The factors that were selected for the survey were selected based on current literature concerning medical staffing.

Content validity, face validity, and clarity of this instrument were verified by clinical perfusionists currently involved in perfusion staffing. The experts reviewed each of the items in the questionnaire and identified whether they were appropriate.

Survey Administration and Data Collection

Before sending the electronic survey, the research received approval from The Ohio State University Office for Responsible Research Institutional Review Board on January 22, 2007. An electronic mail survey along with a cover letter was sent to all registered AmSECT members on Perflist. The cover letter explained the purpose of the survey and assured respondents of confidentiality. The initial cover letter and questionnaire was mailed on January 25, 2007. The same cover letter and questionnaire were sent as a follow-up mailing on February 11, 2007, but with a different greeting on the Perflist e-mail. The follow up mailing was determined to be sent on February 11, 2007 because the response rate had reached a plateau.

Statistical Analysis

Descriptive statistics using Statistical Package for Social Sciences (Version 15.0; SPSS, Chicago, IL) was used for the results including the frequency with which each factor was stated, means, and SDs. To avoid misinterpretation the total responses within any subgroups was shown within

the table. Associations among factors and demographic variables were tested using analysis of variance (ANOVA) and Pearson correlation coefficient. The level of significance was set a priori at 0.05. In addition, the caseloads reported were divided into terciles to examine small, medium, and large hospital sizes in relation to the decision factors. The open-ended question was examined for recurrent themes.

RESULTS

Respondent Characteristics

From the respondents who answered the question, what type of open heart procedures are performed at your hospital; 69.3% reported performing adult procedures and 5.2% pediatric procedures and 25.5% conducted both adult and pediatric procedures. Of the respondents who indicated their position; 35.6% were chief perfusionists and 64.4% were clinical perfusionists. Of the respondents who answered the question how would they classify their employer; 63.6% were employed by the hospital, 26.1% were employed by a private perfusion group, 10.2% were employed by surgeons, and only 1% reported being self-employed. From those who answered the question concerning their clinical experience in perfusion 2.6% had 1 year or less, 22.5% had 2–10 years, 40.0% had 11–20 years, 24.0% had 21–30 years, and 10.9% had 30 or more years of experience.

Principle Findings

The results of the survey revealed that the current perfusionist to case ratio for 2006 was 120 ± 46 . The most reported used factors were the same as the reported most important factors when considering the number of staff to hire. Table 1 shows the ranking of the most reported used

Table 1. A ranking of the current factors used to determine the number of staff to hire and their valid percentage in relation to the number of responses to that question.

Factor	Total Number of Respondents to Question	Reported Used Response Frequency	Valid Percentage Used
Number of heart cases	261	235	90.0
On-call requirements	260	229	88.1
Number of operating rooms	258	212	82.2
Vacation and sick days	258	210	81.4
Job responsibilities	257	196	76.3
Number of cardiac surgeons	261	176	67.4
Financial constraints	256	164	64.1
Types of procedures	257	153	59.5
Technological demand	250	136	54.4
Staff experience	255	138	54.1
Number of hospitals covered	255	116	45.5
Length of cases	254	109	42.9
Patient population severity	256	76	29.7
Available perfusion assistant	249	34	13.7

factors. Table 2 shows the factors ranked by reported importance. The top three decision factors were the number of heart cases, on-call requirements, and the number of operating rooms. In addition, there was no significant difference between the reported used or important factors compared with the reported responses by clinical perfusionists, chief perfusionists, or those who reported being involved in staff scheduling.

However, chief perfusionists and high activity perfusion teams were more likely to use on-call requirements when determining staff requirements. Vacation and sick days were reported to be used by both respondents and those involved in staff scheduling; however, this decision factor was rated much lower on the scale of importance.

The statistical analysis also revealed that smaller hospitals, which were defined as completing 300 or fewer open heart procedures a year, were more likely to use the decision factor of staff experience compared with other sized hospitals to determine staff requirements. Medium sized hospitals, which were defined as completing 300–600 open heart procedures a year, were more likely to use the number of operating rooms more than other sized hospitals to determine staff requirements. Larger-sized hospitals, which were defined as completing 600 or more heart procedures a year, were more likely to use the number of hospitals covered compared with other sized hospitals to determine staff requirements.

DISCUSSION

Of the respondents who answered the question of whether they currently have a staffing protocol, 51.5% answered yes and 48.5% answered no. It would be interesting to investigate what type of written staffing protocol they have and to what extent does it include a work call schedule that considers the effect of long work hours on patient safety and the staff members' welfare (2). From those that answered no to having a written staffing protocol, only 57.0% reported that they would like having a written staffing protocol. The reasoning could be that the operating room environment, especially perfusion, can be unpredictable, and the complexity involved in staff scheduling can sometimes be difficult for developing long-term schedules.

A perfusion team with a wide scope of practice was more likely to place greater importance on call-requirements when determining the number of staff to hire. This is realistic because the perfusion staff will most likely be called in more often because they are involved in more activities throughout the hospital. A study conducted by Sistino (5), revealed that only 1% of hospitals in the study reported that they had no new activities within the hospital from 1990 to 2000. Therefore, the increase in scope of practice is currently being considered by perfu-

Table 2. Relative importance of the current factors used to determine the number of staff to hire and their valid percentage in relation the number of responses to that question.

Factor	Total Number of Respondents to Question	Valid Percentage Reported Not Important	Valid Percentage Reported Somewhat Important	Valid Percentage Reported Important	Valid Percentage Reported Extremely Important
On-call requirements	254	4.3	9.8	37.8	48.0
Number of heart cases	255	3.5	12.9	36.5	47.1
Number of operating rooms	254	10.2	13.0	40.9	35.8
Job responsibilities	255	7.8	14.9	46.3	31.0
Number of cardiac surgeons	254	13.0	16.5	42.9	27.6
Number of hospitals covered	253	40.3	6.7	25.7	27.3
Vacation and sick days	253	6.3	19.4	52.6	21.7
Types of procedures	255	16.9	25.5	38.0	19.6
Financial constraints	253	17.0	28.1	36.0	19.0
Technological demand	253	21.3	28.1	32.4	18.2
Staff experience	255	11.4	32.5	41.2	14.9
Length of cases	254	24.4	32.3	31.9	11.4
Patient population severity	254	27.6	37.4	27.6	7.5
Available perfusion assistant	253	76.3	13.0	9.9	0.8

sion managers especially when scheduling on-call requirements.

On-call requirements and the number of heart cases were the top two factors both in use and importance. On-call requirements are extremely important to consider when creating a staff schedule because a manager must consider the effects of long work hours on patient safety and the staff members' welfare (6). The number of heart cases was another top factor because it is closely related to many other factors within the list. As mentioned in the comments section of the survey, the number of heart cases is closely related to the number of surgeons and number of operating rooms, which were in the top five of the most commonly used and important factors. However, the number of heart cases needs to be examined further because the speed and efficiency of the cases is also an important aspect of the environmental picture and practice specific to each hospital.

When reviewing the open-ended question concerning if there was another factor not mentioned in the survey that the respondents felt was important when determining the number of staff required to operate their perfusion team, a few themes appeared. Other factors that could affect staffing that were not mentioned in the survey were the availability of anesthesiologists, the number of off-pump standby cases, high-risk catheterization laboratory standby, the perfusionists' involvement in extra-corporeal membrane oxygenation, platelet-rich plasma, staff research, teaching responsibilities, administrative duties such as in-services, and the number of heart lung machines available.

Other common themes mentioned in the open-ended questions were the efficiency of the surgeons or length of the cases and the availability of a perfusion assistant. Many respondents indicated a concern for basing the number of staff on the number of heart cases performed at an

institution. This is directly related to the length of the cases, efficiency of the surgeon and operating room team, and complexity of the cases. In addition, respondents indicated the decreased need for perfusion assistants because of their inability to perform perfusion tasks. However, some respondents did mention perfusion assistants being helpful at larger institutions.

The survey findings were consistent in relation to the open-ended questions in that they indicated that the availability of a perfusion assistant was the least important and was the least likely used factor when considering the number of staff to hire. This is probably because of the fact that when there is a need for an additional perfusionist, institutions tend to hire a new perfusionist rather than a perfusion assistant. However, hiring a perfusion assistant to help assist perfusionists who are involved in cases could decrease costs.

There are many limitations that are caused simply by the use of a survey to gather descriptive data. The population sampled and the results should reflect the "standard of care" currently used in the practice of perfusion management. However, the low response rate poses a threat to the application of the results, especially concerning the non-respondents to the survey. The answers to the survey should be accurately reported by the perfusionists through voluntary participation; therefore, response bias could interfere with the accuracy of the results.

Any of the speculations and assumptions were based on extensive nursing research conducted on the staffing of nurses. Therefore, the factors chosen were from current literature not necessarily from perfusion. In conclusion, the methods in which to retrieve subject selection will lead to bias because all the networks in which to distribute the survey are a source of self selected memberships, like AmSECT. This leads to the inability to randomize and small sample sizes, which ultimately leads to the difficulty

in making inferences regarding the results. However, to increase the information revealed from the survey a larger sample was used included clinical perfusionists as well. The distinction was made within the survey by asking them their specific position within the hospital and whether or not they were involved in staffing.

CONCLUSIONS

Determining the number of perfusion staff to hire at a new hospital can be challenging because there is not a single parameter that determines the number. For example, a perfusion staffing plan must include provisions for unplanned, urgent, or emergent procedures and how to provide care for patients whose procedures run over scheduled time. Therefore, this survey only provides a general overview of the factors used by perfusion manag-

ers. It would be interesting to research how managers are applying these factors to their staff scheduling plan.

REFERENCES

1. Oulton JA. Safe staffing-a shared responsibility. *Int Nurs Rev.* 2006; 53:11.
2. AORN. AORN guidance statement perioperative staffing. *AORN.* 2005;81:1059-66.
3. Adams A, Bond S. Staffing in acute hospital wards: part 1. The relationship between number of nurses and ward organizational environment. *J Nurs Manag.* 2003;11:287-92.
4. Lemak CH, Alexander JA. Factors that influence staffing of outpatient substance abuse treatment programs. *Psychiatr Serv.* 2005;56: 934-9.
5. Sistino JJ. Expanding the role of perfusionists in the era of new treatment options for cardiovascular disease. *Perfusion.* 2003;18: 253-6.
6. AORN. AORN guidance statement safe on-call practices in perioperative settings. *AORN.* 2005;81:1054-7.

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