

# Nuclear Pharmacy

## Background

Nuclear pharmacy was the first pharmacy specialty established by the Board of Pharmaceutical Specialties (BPS) in 1978. This specialty area is involved with the preparation of radioactive materials to improve and promote health through the safe and effective use of radioactive drugs to diagnose and treat specific disease states.

There are two main types of environments where nuclear pharmacists are employed. Institutional nuclear pharmacy is usually linked to a major medical center/hospital where preparations are made on-site. This is in contrast to the commercial centralized nuclear pharmacy where radiopharmaceuticals are prepared and then delivered to the hospital and/or clinic. While the quantity of radiopharmaceuticals used is relatively small in both settings, nuclear pharmacists must complete additional training in radiation safety regarding the compounding, preparation, and delivery of radioactive materials.

Because nuclear pharmacy is a unique field, this profile offers a non-inclusive list of responsibilities encountered by pharmacists in this career. This list is provided by APhA's Nuclear Pharmacy Practice group.

- Ordering, receiving, storing, and controlling inventory of radioactive drugs (radiopharmaceuticals), other drugs used in nuclear medicine, and related supplies.
- Preparing radiopharmaceuticals by combining radioisotopes with reagent kits and compounding radiopharmaceuticals that are not commercially available.
- Performing functional checks of instruments, equipment, and devices and determining radiopharmaceutical quality and purity.
- Filling prescription orders.
- Packaging, labeling, and transporting radiopharmaceuticals.
- Properly handling hazardous chemicals and biological specimens.
- Communicating radiopharmaceutical-related information to others.
- Ensuring that patients receive proper preparation before radiopharmaceutical administration and trouble-shooting unanticipated outcomes.
- Laboratory testing of new radiopharmaceuticals, new compounding procedures, and quality control methods and participating in clinical trials.

As one can see in the above list, nuclear pharmacists have diverse responsibilities. Thirty-three percent of their time is spent on medication preparation/compounding. Twenty-three percent is spent on business/department management, followed by 12% on medication dispensing (including associated patient counseling), and the remainder split across a variety of other functions.

A respondent from Tennessee stated that there are a “variety of duties within nuclear pharmacy [including] radiation safety officer, manager, staffing, sales....” Another pharmacist from Pennsylvania reinforced this statement when noting a “variety in job duties, which provides the ability to function as a true specialist in the field of pharmacy.”

## **Characteristics**

One hundred twelve pharmacists responded to the 2007 *APhA Career Pathway Evaluation Program* survey. Among the respondents, 90% had earned an entry-level pharmacy degree, with 24% having the PharmD degree. Thirteen percent had earned an advanced degree (MS or MBA). Six percent had completed a residency, 47% had earned a certificate, and 27% had taken other training.

The mean age of respondents was 41 years old. Sixty-eight percent were male. Almost two thirds (60%) identified themselves as being in management.

Twenty-one percent of these pharmacists reported that they earn between \$80,000–\$100,000 per year. The remaining 79% reported an annual income in excess of \$100,000, with 2% indicating they earn \$170,000 or more. Nuclear pharmacists work an average of 44 hours per week. Respondents represented 33 states.

Fifty-nine percent reported that they are “extremely satisfied” with their job, with the remaining 38% indicating they are “somewhat satisfied” with their work. Similarly, 38% report being “extremely challenged” with their work and the remaining 55% reported “somewhat challenged.”

A California respondent stated, “Nuclear pharmacy provides constant challenge and a professional work environment.” A respondent from Texas added, “The challenges that we face daily—keeps your mind agile,” while a pharmacist from New York indicated there are “different challenges on a daily basis.”

Finally, a Pennsylvania nuclear pharmacist summed up the thoughts of many when stating that there are “...new challenges every day. The field is ever-changing with new PET modalities on the horizon and regulations constantly in flux.”

## **Insider’s Perspective**

### **What aspects of the job are most appealing?**

Two specific areas stood out in the comments provided by this group of nuclear pharmacists. Twenty-one percent of the respondents indicated that the most appealing aspect of their work was the hours/schedule. A New York respondent stated the appeal of “working different shift hours.” Another respondent from Nebraska liked the “flexibility in hours (schedule changes), close by 5 PM on weekdays.”

This was followed by 13% who listed “no insurance” as one of the most appealing aspects. A South Dakota nuclear pharmacist stated “no insurance, billing hassles” has its appeal.

An additional 9% liked the management/business aspects of their work. The following aspects were each listed by 6% of the respondents: diversity of work, low stress, and no public contact. Five percent of the respondents also listed that they liked the compounding and specialized training. A Florida pharmacist summed up this by stating an appealing aspect of the work includes “the opportunity to manage the pharmacy location including

financials, compounding, customer support, and managing employees.”

**What aspects of the job are least appealing?**

Interestingly, the most appealing aspect listed above was also listed as the least appealing aspect of the work: 34% of the respondents indicated that the hours/schedule were the least appealing aspect. The range of comments included early hours, nightshift hours, long hours, and schedule rotation. A Missouri respondent indicated concern about “the work hours, three different shifts in one week.” An Ohio nuclear pharmacist stated, “There is most often a rotating night shift.”

Eleven percent indicated that the “on call” aspect of the position was a least appealing aspect. Seven percent cited the lack of patient contact as a concern. Finally 5% indicated both salary and human resources/personnel issues as least appealing aspects. A nuclear pharmacist from Louisiana stated that one of the least appealing aspects is the “on call” requirement.

**What advice should students and practitioners consider when selecting the option of working in nuclear pharmacy?**

Advice was across the spectrum of suggestions from the most appealing to least appealing aspects already listed. In addition, many of the respondents suggested that those interested in this area of the profession look into rotations and other types of experiences in nuclear pharmacy to gain a better understanding of the required roles and responsibilities. Others suggested that pharmacists interested in nuclear pharmacy must look at the overall picture of extra training and schedules to make sure that they fit their lifestyle when considering a career in this field.

## Critical Factor Ratings

### **Interaction With Patients**

Respondents rated this factor in the low range at 1.8. Not having interactions with patients was listed as one of the least appealing aspects of the work.

$$= 1.8$$
$$\sigma = 1.3$$



### **Conducting Physical Assessments**

As noted in the above factor, respondents have little contact with patients, which corresponds with little to no opportunities for conducting physical assessments. This factor was rated as the lowest factor in the profile.

$$= 1.6$$
$$\sigma = 1.6$$



### **Interpreting Laboratory Values**

In comparison to the above factor, nuclear pharmacists at times interpret laboratory values to ensure the radiopharmaceuticals will be properly utilized.

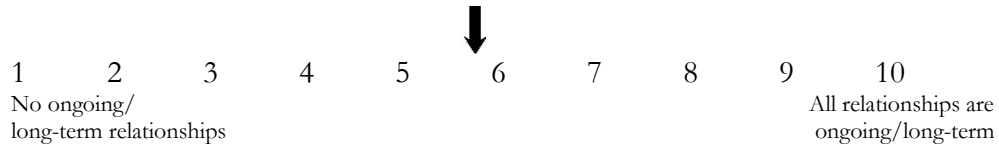
$$= 2.1$$
$$\sigma = 1.4$$



### **Continuity of Relationships**

Nuclear pharmacists tend to have ongoing relationships. This rating is more related to the relationships that nuclear pharmacists have with technicians and other health care providers versus patients.

$$= 5.7$$
$$\sigma = 4.0$$



### Helping People

Nuclear pharmacists see more of an indirect effect on helping people because many times they work behind the scenes to get the medications prepared for the diagnostic or treatment.

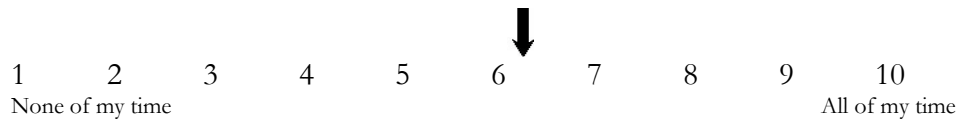
= 3.6  
 $\sigma = 2.7$



### Collaboration With Other Professionals

Collaboration with other professionals ranked in the upper mid-range with a 6.2 rating. While communication with physicians in a nuclear pharmacy is often limited to new prescription orders via the telephone and fax, this collaboration is face-to-face when available. Often both the pharmacy and the physician's office are engaged in longer discussions with each other, thereby allowing the physician, nurse, and pharmacist to communicate accurately and concisely to ensure the patient gets optimal therapy.

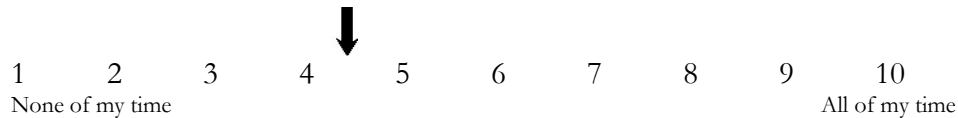
= 6.2  
 $\sigma = 2.5$



### Educating Other Professionals

Typically, nuclear pharmacists engage in educating other professionals when they provide in-service education. Some pharmacies choose to educate physicians, nurses, and other related staff about the importance in handling the radiopharmaceuticals to ensure that guidelines are followed.

= 4.4  
 $\sigma = 2.0$



### Variety of Daily Activities

As mentioned earlier in the background section, respondents are involved in a number of different roles. The challenges often arise in resolving therapy and other prescription-related problems. Nonetheless, respondents indicated that they tend to engage in some repetitive activities.

= 4.7  
 $\sigma = 2.3$



### Multiple Task Handling

In order to ensure the timely and accurate dispensing of prescriptions in a pharmacy, especially in nuclear pharmacy, a pharmacist is often required to handle multiple tasks at once. This could include answering questions from staff, addressing nurses' and physicians' concerns, checking filled prescription orders, and tracking the medication. Respondents indicated that they tend to work on multiple tasks at one time.

= 7.0  
 $\sigma = 2.1$



### Problem Solving

The problems are often complex in many situations taking into account the physiological changes in a diverse patient population. With a rating of 4.6, nuclear pharmacists indicated that they tend to use both tried-and-true and untested solutions to address problems.

= 4.6  
 $\sigma = 1.9$



### Focus of Expertise

Respondents rated this factor in the high range, indicating that they require a specialized knowledge base. Nuclear pharmacists rated this factor the highest across all other groups.

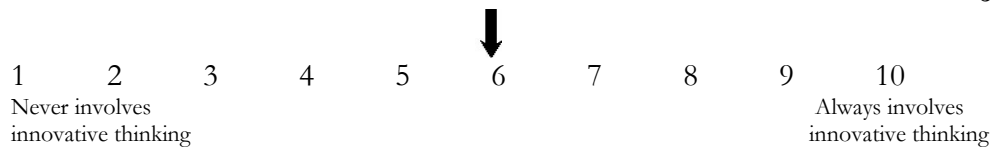
= 8.4  
 $\sigma = 1.8$



### Innovative Thinking

In response to the question, "To what extent does your practice involve generating new ideas (innovative thinking) pertaining to pharmacy?" respondents rated the factor at 5.9, indicating that their practice is split regarding innovative thinking. Opportunities for idea generating in nuclear pharmacy may include the tailoring of therapy for the patient using radiopharmaceuticals for treatment verses diagnosis.

= 5.9  
 $\sigma = 2.1$



### Applying Scientific Knowledge

Applying scientific knowledge received an upper mid-range rating of 7.5. The application of scientific knowledge is applied in determining dosage ranges and adjustments necessary taking into account some of the pharmacokinetic considerations that need to be incorporated for the patient.

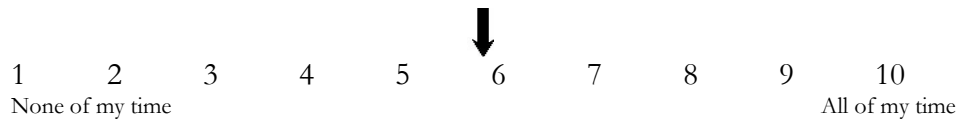
= 7.5  
 $\sigma = 1.9$



### Applying Medical Knowledge

Applying medical knowledge received a lower rating (5.8) than the previous factor. Because of the nature of the work that nuclear pharmacists perform, it is understandable that they apply more scientific versus medical knowledge.

= 5.8  
 $\sigma = 1.2$



### Creating New Knowledge by Conducting Research

Nuclear pharmacy is a setting designed mostly for the application of learned knowledge. There are some opportunities to conduct research in the nuclear pharmacy setting; however, for the most part, this setting is where knowledge is applied.

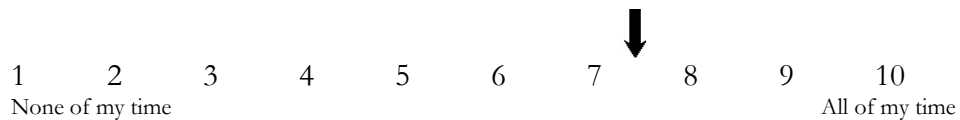
= 2.5  
 $\sigma = 1.6$



### Management/Supervision of Others

Nuclear pharmacists rated this factor the highest across all profiles. The upper mid-range score of 7.4, indicates that they tend to spend a higher amount of time supervising others.

= 7.4  
 $\sigma = 2.0$



### Management/Supervision of a Business

Nuclear pharmacists also rated this factor the highest across all profiles. At the mid-range score of 6.6, they tend to spend a higher amount of time in business management than other career profiles. This reinforces the amount of time listed in the characteristics section spent on business-related activities.

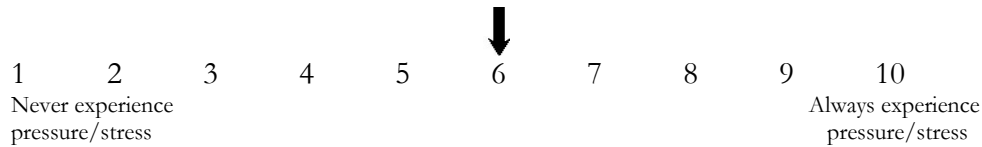
$$= 6.6$$
$$\sigma = 2.7$$



### Pressure/Stress

Although some of the respondents indicated in the open question fields that there was low stress in their work, as a group nuclear pharmacists rated this factor in the mid-range.

$$= 6.0$$
$$\sigma = 2.2$$



### Work Schedule

Respondents indicated that they were equally divided across the continuum with a rating of 5.7. The variability on this factor may be caused by the type of work environment and the size of the pharmacy where the respondents work. It is interesting to note that the response is split considering that hours/schedule were listed as both a most and least appealing aspect of the practice.

$$= 5.7$$
$$\sigma = 3.0$$



### Part-Time Opportunities

Respondents indicated that there are some opportunities for part-time work in the field. Perhaps part of the discussion here is the need for someone with a special knowledge base being available for a position.

$$= 4.1$$
$$\sigma = 2.7$$





### Job-Sharing Opportunities

Nuclear pharmacists indicated a low range response to job-sharing at a rating of 3.4.

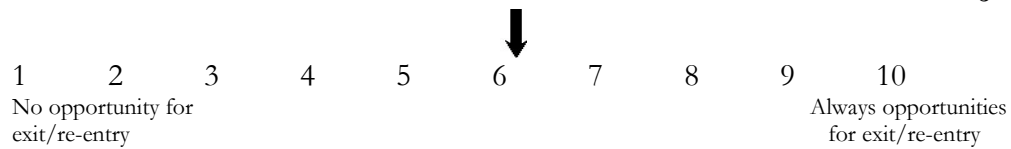
= 3.4  
 $\sigma = 2.5$



### Exit/Re-entry Opportunities

Opportunities do exist for exit/re-entry in the field. The difficulty here is being able to re-enter the same position.

= 6.1  
 $\sigma = 2.8$



### Parental Leave Opportunities

Many nuclear pharmacies are part of larger organizations, which offer parental leave as a benefit. Respondents rated this factor in the upper mid-range at 7.2.

= 7.2  
 $\sigma = 2.9$



### Leisure/Family Time

Respondents rated this factor at 6.9, indicating that many feel they have time available for leisure activities and family.

= 6.9  
 $\sigma = 2.3$



### Job Security

Job security was rated in the high range area by these pharmacists. With the specialized knowledge necessary and the continued shortage in some areas, nuclear pharmacists indicated a high sense of job security.

= 8.5  
 $\sigma = 1.3$



### Opportunities for Advancement

Respondents rated this factor in the upper mid-range with respect to opportunities for advancement. Career advancement can often be limited by the size of the organization and the size of the pharmacy. In a larger company, they may have more versatility to choose the corporate ladder approach in their career.

= 7.2  
 $\sigma = 2.2$



### Opportunities for Leadership Development

Nuclear pharmacists see a similar opportunity for leadership development as they do for advancement.

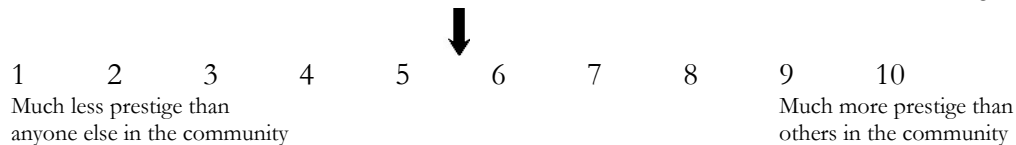
= 7.5  
 $\sigma = 2.0$



### Community Prestige

Respondents rated this factor a score of 5.6. Pharmacists can become well known in their community for helping individuals with health care.

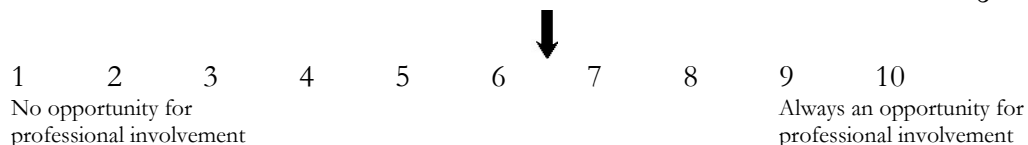
= 5.6  
 $\sigma = 2.3$



### Professional Involvement

Professional involvement of individual pharmacists is critical to the development of the profession as a whole, and pharmacists need to communicate with each other so that the profession can continue to advance in providing optimum health care for the public. Nuclear pharmacists rated this factor mid-range at 6.5.

= 6.5  
 $\sigma = 2.6$



### Income

Respondents indicated that they tend to feel properly compensated for the work they perform.

= 7.0  
 $\sigma = 2.5$



### Benefits (vacation, health, retirement)

Tied for the second-highest rating of a factor in the profile, respondents indicated that the overall benefits package is good.

= 8.7  
 $\sigma = 1.5$



### Geographic Location

Geographic location was rated in the upper range at 8.1. Nuclear pharmacists have great opportunity to relocate almost anywhere in the United States.

= 8.1  
 $\sigma = 2.0$



### Autonomy

Autonomy in a nuclear pharmacy, in general, can depend on whether the pharmacist works alone or always works with another pharmacist or supervisor. In most cases, the nuclear pharmacist is highly autonomous.

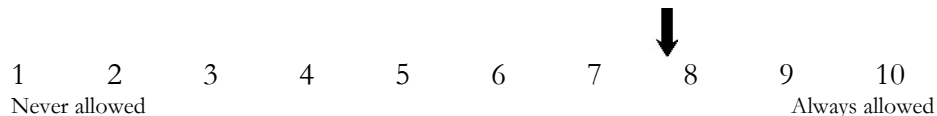
= 7.0  
 $\sigma = 2.2$



### Self-Worth

As stated earlier, nuclear pharmacy is involved with the preparation of radioactive materials to improve and promote health through the safe and effective use of radioactive drugs to both diagnose and treat specific disease states. Intrinsically, this act creates a great deal of self-worth and the feeling of accomplishment in the pharmacist's daily work.

= 7.7  
 $\sigma = 1.8$



### Future Focus

The diagnostics and treatments involved with radiopharmaceuticals tend to lean toward the focus on the patient's future health.

$$= 6.8$$
$$\sigma = 1.9$$



### Professional Prestige

Professional prestige is related to the earlier rating on collaboration with other professionals. Nuclear pharmacists' rating of 6.2 indicates that they feel the opportunity exists for professional prestige.

$$= 6.2$$
$$\sigma = 2.2$$



### Unique Practice Environment

This factor received both the highest rating in all profiles as well as this specific profile. Nuclear pharmacists indicate that they have an extremely unique practice environment.

$$= 9.2$$
$$\sigma = 1.2$$



### Advanced Degree

Respondents rated this factor in the lower range indicating that advanced degrees are not typically required. The vast majority of pharmacists are able to complete their work with the initial degree they received and additional specialized training.

$$= 2.6$$
$$\sigma = 2.8$$



### Entrepreneurial Opportunity

There is limited entrepreneurial opportunity available in nuclear pharmacy.

$$= 4.3$$
$$\sigma = 2.7$$



### Additional Training

Respondents rated this factor the second highest across the entire profile. Certificate training programs are available in nuclear pharmacy along with other programs geared toward this specialty. A high range rating of 8.7 testifies to the importance of additional training to work with radiopharmaceuticals.

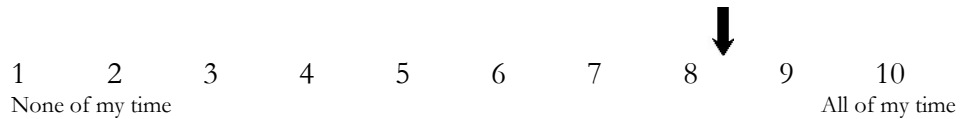
= 8.7  
 $\sigma = 2.1$



### Interacting With Colleagues

As one would suspect, respondents indicated that they interact with coworkers on a daily basis. Many commented about the opportunities to work with specialized technicians.

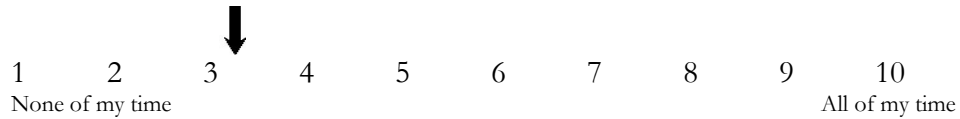
= 8.3  
 $\sigma = 1.7$



### Travel

Nuclear pharmacists tend to have limited travel for their day-to-day employment. However, some of the pharmacists who work for commercial companies may have to travel to assist with specific activities of the organization.

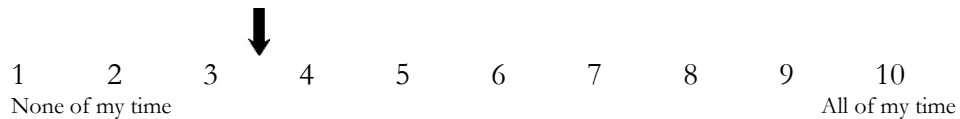
= 3.2  
 $\sigma = 1.8$



### Writing

Respondents were in the lower mid-range regarding writing, rating the factor at 3.5.

= 3.5  
 $\sigma = 2.2$



### Working With Teams

Respondents indicated they tended toward the middle with regard to working in teams, rating the factor at 5.8. This rating may take into account that the staff of some organizations work together and can communicate regularly when needed, whereas there are some pharmacists who may work alone in the pharmacy.

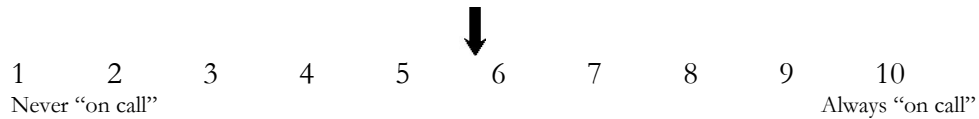
= 5.8  
 $\sigma = 2.6$



### “On Call”

Respondents indicated a mid-range “on call” need for the positions, with a rating of 5.8. To some this was a least appealing aspect of the work.

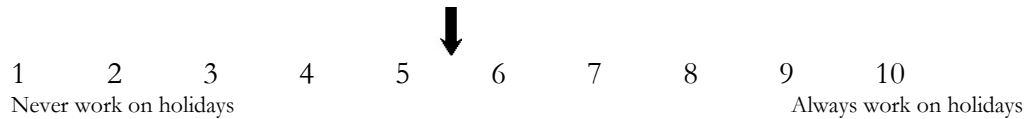
= 5.8  
 $\sigma = 2.4$



### Work on Holidays

Nuclear pharmacists indicated that they are exactly mid-range regarding working on holidays, giving this factor a rating of 5.5.

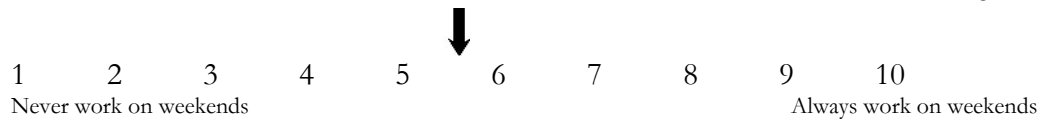
= 5.5  
 $\sigma = 2.8$



### Work on Weekends

Nuclear pharmacists indicated that they are at the mid-range regarding working on weekends with a rating of 5.6.

= 5.6  
 $\sigma = 2.7$



### Presentations

Nuclear pharmacists indicated that they spend little time giving presentations.

= 3.2  
 $\sigma = 1.9$



### Mean Scores for Critical Factors

1. Interaction With Patients	1.8
2. Conducting Physical Assessments	1.6
3. Interpreting Laboratory Values	2.1
4. Continuity of Relationships	5.7
5. Helping People	3.6
6. Collaboration With Other Professionals	6.2
7. Educating Other Professionals	4.4
8. Variety of Daily Activities	4.7
9. Multiple Task Handling	7.0
10. Problem Solving	4.6
11. Focus of Expertise	8.4
12. Innovative Thinking	5.9
13. Applying Scientific Knowledge	7.5
14. Applying Medical Knowledge	5.8
15. Creating New Knowledge by Conducting Research	2.5
16. Management/Supervision of Others	7.4
17. Management/Supervision of a Business	6.6
18. Pressure/Stress	6.0
19. Work Schedule	5.7
20. Part-Time Opportunities	4.1
21. Job-Sharing Opportunities	3.4
22. Exit/Re-entry Opportunities	6.1
23. Parental Leave Opportunities	7.2
24. Leisure/Family Time	6.9
25. Job Security	8.5
26. Opportunities for Advancement	7.2
27. Opportunities for Leadership Development	7.5
28. Community Prestige	5.6
29. Professional Involvement	6.5
30. Income	7.0
31. Benefits (vacation, health, retirement)	8.7
32. Geographic Location	8.1
33. Autonomy	7.0
34. Self-Worth	7.7
35. Future Focus	6.8
36. Professional Prestige	6.2
37. Unique Practice Environment	9.2
38. Advanced Degree	2.6
39. Entrepreneurial Opportunity	4.3
40. Additional Training	8.7
41. Interacting With Colleagues	8.3
42. Travel	3.2
43. Writing	3.5
44. Working With Teams	5.8
45. "On Call"	5.8
46. Work on Holidays	5.5
47. Work on Weekends	5.6
48. Presentations	3.2

## Reference

Schommer JC, Brown LM, Sogol EM. *Career Pathway Evaluation Program 2007 Pharmacist Profile Survey*. June 2007.

## Professional Organizations

American Association of Pharmaceutical Scientists (AAPS)  
2107 Wilson Blvd., Suite 700, Arlington, VA 22201  
Tel: 703-243-2800 Fax: 703-243-9650  
[www.aaps.org](http://www.aaps.org)

American Pharmacists Association (APhA)  
1100 15th Street NW, Suite 400, Washington, DC 20005  
Tel: 800-237-APhA Fax: 202-783-2351  
[www.pharmacist.com](http://www.pharmacist.com)

American Society of Health-System Pharmacists (ASHP)  
7272 Wisconsin Avenue, Bethesda, MD 20814  
Tel: 301-657-3000  
[www.ashp.org](http://www.ashp.org)

Board of Pharmaceutical Specialties (BPS)  
1100 15th Street NW, Suite 400, Washington, DC 20005  
Tel: 202-429-7591 Fax: 202-429-6304  
[www.bpsweb.org](http://www.bpsweb.org)

National Pharmaceutical Association (NPhA)  
107 Kilmayne Drive, Suite C, Cary, NC 27511  
Tel: 800-944-NPhA Fax: 919-469-5870  
[www.npha.net](http://www.npha.net)

NOTE: For further pharmacy organization information, please visit the American Association of Colleges of Pharmacy Web site at [www.aacp.org](http://www.aacp.org) and click on the “Related Pharmacy Organizations” link.