The Impact of Nonphysician Providers on Diagnostic and Interventional Radiology Practices: Operational and Educational Implications

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Abstract

The numbers of nurse practitioners (NPs) and physician assistants (PAs) are increasing throughout the entire health care enterprise, and a similar expansion continues within radiology. The use of radiologist assistants is growing in some radiology practices as well. The increased volume of services rendered by this growing nonphysician provider subset of the health care workforce within and outside radiology departments warrants closer review, particularly with regard to their potential influence on radiology education and medical imaging resource utilization. In this article (the second in a two-part series), the authors review recent literature and offer recommendations for radiology practices regarding the impact NPs, PAs, and radiologist assistants may have on interventional and diagnostic radiology practices. Their potential impact on medical education is also discussed. Finally, staffing for radiology departments, as a result of an enlarging nonradiology NP and PA workforce ordering diagnostic imaging, is considered.

Key Words: Nurse practitioners, physician assistants, radiologist assistants, diagnostic radiology, interventional radiology, medical education

J Am Coll Radiol 2015;12:898-904. *Copyright © 2015 American College of Radiology*

INTRODUCTION

Nurse practitioners (NP) and physician assistants (PA) have been increasing in prevalence throughout radiology departments as well as the entire health care enterprise [1-10]. Also referred to as advanced practice providers, advanced practice clinicians, midlevel providers, and physician extenders, their scope of practice, prescription privileges, and ability to practice independently have increased but continue to vary widely among practices and states [11,12]. The prevalence of RAs in the workforce, as well of their scopes of practice, is much smaller, but this group of professionals has been embraced by many radiology groups.

NPs and PAs have garnered substantial recent attention in the academic literature and radiologist assistants (RAs) much less so. The full impact of the increasing prevalence of nonphysician providers in radiology departments remains unclear, and their impact on patient safety, practice revenue, and radiology education thus warrants review and critique. Additionally, as their prevalence outside radiology departments continues to increase, referral patterns and utilization of imaging resources may also be influenced [13].

The purpose of this two-part series is to evaluate the feasibility and practicality of incorporating NPs, PAs, and RAs into radiology practices, focusing particularly on patient safety, financial performance, and their impact on medical education. A secondary purpose is to evaluate the potential impact of an enlarging nonradiology NP and PA workforce on diagnostic radiology practices, particularly as NPs and PAs increasingly order diagnostic imaging as they assume roles of primary care service providers. In the previous first segment of this series, we discussed regulatory, billing, and compliance issues related to employing NPs, PAs, and RAs in radiology practices,

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This article has not been previously published, nor is it under consideration for publication in any other journal. All listed authors are qualified for authorship and participated in data gathering, analysis, and manuscript preparation. No conflict of interest, financial or other, exists. No funding was received to conduct this study.

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1546-1440/15/$36.00 ■ http://dx.doi.org/10.1016/j.jacr.2015.03.034

with a substantial focus on proper evaluation and management (E&M) coding practices [14]. In this second part of the two-part series, we review available literature regarding (1) the incorporation of NPs, PAs, and RAs into both interventional and diagnostic radiology practices; (2) potential changes in imaging resource utilization as a result of an enlarging nonradiology NP and PA workforce; and (3) how NPs, PAs, and RAs may affect medical education.

INTEGRATION OF NONPHYSICIAN PROVIDERS INTO INTERVENTIONAL RADIOLOGY PRACTICES

One of the most common ways NPs, PAs, and RAs have been incorporated into radiology departments is through their interventional practices. Percutaneous biopsies, central venous access procedures, paracenteses, thoracenteses, and percutaneous abscess drainages are examples of interventions that may be suitable for appropriately trained nonphysicians to perform. In addition to serving as proceduralists, NPs and PAs are uniquely able to support a clinical interventional radiology (IR) service by providing billable E&M and other clinical services in both the inpatient and outpatient settings.

Procedural Safety

The frequency with which NPs and PAs perform image-guided vascular and nonvascular procedures is increasing at the national level [15-17]. Such national validated data for RAs, however, are lacking. Given differences in training between physicians and nonphysician providers, patient safety concerns for patient care provided by such professionals have been raised and warrant consideration [18]. The economic and operational efficiencies realized by employing nonphysician providers should, of course, never trump patient safety.

Murphy et al [19] recently studied the safety of liver biopsies performed by NPs who received dedicated training in an academic radiology department and showed that 100% of liver biopsies performed by NPs were diagnostic, with only a 1.4% minor complication rate. In comparison, percutaneous liver biopsies performed by physicians were diagnostic 99.6% of the time, with a 0.7% minor complication rate. The differences were not statistically significant.

The safety of large-volume paracenteses performed by NPs and physicians was studied by Gilani et al [20]. Although not performed with imaging guidance, this series similarly identified no statistical significance between NPs and physicians with regard to the volume of ascites removed, postprocedural bleeding complications, or postprocedural infection rates.

The safety of subcutaneous chest port placement procedures performed by NPs, IR faculty members, and trainees was analyzed by Silas et al [21]. Once again, no significant difference in overall complication rates was noted between the groups. In their study, a total of 536 port placement procedures with documented follow-up were evaluated. NPs had an overall complication rate of 2%. In comparison, IR faculty members had a 1.3% overall complication rate, whereas IR fellows had an overall complication rate of 0.56%. A similar study evaluating the safety of a single RA performing central venous access procedures was performed by Benham et al [16]. In their study, the authors showed that their single RA had a 0.29% major complication rate and a 0.89% overall complication rate; these were not statistically different from the complication rates of attending physicians (major, 0%; overall, 1.71%) and IR fellows (major, 0.35%; overall, 1.06%). Of note, this study represents the only available literature rigorously analyzing the procedural safety of minimally invasive procedures performed by RAs.

Intra-arterial procedures performed by PAs have similarly been studied. In 2003, Krasuski et al [22] reported that PAs performed diagnostic coronary angiography faster ($P = .05$), with less fluoroscopy time ($P < .001$), and had similar major complication rates compared with supervised cardiology fellows. The authors concluded that under the supervision of attending cardiologists, appropriately trained PAs can safely perform diagnostic coronary angiography.

Although further rigorous comparative analyses of procedural safety of nonphysician providers versus physicians is likely forthcoming, existing literature supports outcomes similar to those of physicians when NPs, PAs, and RAs perform procedures within the limited scopes of practice for which they are appropriately trained.

Procedural Trends

Multiple trend studies using payer claims data indicate that NPs and PAs are rapidly being adopted into IR practices across the country.

The number of abdominal drainage procedures being performed by NPs and PAs has been increasing. Using Medicare claims data from 1994 through 2012, Duszak et al [15] recently demonstrated a 1,008% increase in abdominal drainage procedures performed by NPs and PAs with, an overall increase from 0.1% to 1.2% in the

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