

# Physician Assistants: A Literature Review

Health Professions Regulatory Advisory  
Council (HPRAC)



**Ontario**

Health Professions Regulatory  
Advisory Council

Conseil consultatif de  
réglementation des professions  
de la santé

# A Literature Review on Physician Assistants

Prepared by the Planning Unit  
Health System Planning, Research &  
Analysis Branch  
Health System Strategy & Policy Division  
Ministry of Health and Long-Term Care  
August 2011

Health System Planning,  
Research, and Analysis Branch  
Contacts

Director (A) – [Alison Paprica, PhD](#)  
416-327-0951

Manager (A) – [Catia Creatura-Amelio](#)  
416-327-7948

Project Lead:  
[Andrea Proctor](#) 416-327-8535

Contributors:  
[Caroline Proctor, PhD](#) 416-314-4680  
[Nathan Harron](#) 416-212-4372

Please note that this Rapid Literature Review is a summary of information from other sources, not a representation of the policy position or goals of the Ministry of Health and Long-Term Care. If material in the review is to be referenced, please cite the original, primary source, rather than the review itself.

## OBJECTIVES

The requestor's stated objectives were to investigate 1) the impact of physician assistants on patient safety and risk of harm, 2) the degree of autonomy of practice granted to PAs, and 3) the degree to which PAs have been shown to collaborate with other practitioners in teams.

Due to the evolving nature of the physician assistant role since its inception, the content of this rapid literature review is focused on research published within the past ten years, though frequently cited papers from earlier years have been included.

A prior review – #114 A RLR on the Impact of Physician Assistants – may also be of relevance; section 1 (Safety) of this review is an update of a section from that review, and is based heavily on it.

## SEARCH METHODS FOR IDENTIFICATION OF STUDIES

Individual peer-reviewed articles and review articles were identified through the Ontario Ministry of Health and Long-Term Care's computerized library database, PubMed, and Google Scholar. Grey literature was identified through Google and relevant government websites. The search was limited to English sources and therefore may not capture the full extent of initiatives in non-English speaking countries.

The Medical Subject Heading (MeSH) term "Physician Assistants" was used in combination with the following keywords to identify relevant articles and documents for this review: "mid-level", "midlevel", "non-physician", "provider", "practitioner", "safety", "risk", "liability", "malpractice", "autonom\*", "scope of practice", "collaborat\*", "team", and "multidisciplinary"

A total of 66 references were identified and cited in this review: eight review articles, 51 original research papers from peer-reviewed journals, and seven documents from the grey literature. Table 2 in the Appendix consists of a summary table with details for each of the sources cited in the review. In total, the searching for relevant material and the writing of this review took approximately four weeks to complete by one person.

## SUMMARY OF MAIN FINDINGS

- The research literature on physician assistants (PAs) is sparse, and suffers from a series of limitations including small sample sizes, a lack of randomized controlled trials, and poor descriptions of study settings. This review therefore presents the best available research evidence, but given these limitations, caution should be taken in interpreting the findings.
- A large proportion of the identified articles (the majority of which originated from the US) grouped PAs together with nurse practitioners (NPs) and labelled them both mid-level providers (MLPs).

### Safety

- Several reviews and individual studies have predominantly found that care provided by PAs/MLPs is equivalent to that provided by physicians in terms of safety.

- The studies have generally shown that use of PAs is not associated with increases in mortality, complications, adverse event, readmissions, transfers to ICU, or malpractice claims, though there are a small number of studies that show worse outcomes with PAs/MLPs.

### Autonomy

- The information available suggests that autonomy of practice of PAs varies considerably, and can depend on jurisdiction, practice setting, experience, training, competence, and employers' requirements.
- In general, PAs provide a range of diagnostic and therapeutic services which vary by practice setting (e.g., surgery, emergency medicine, etc.). These include physical examination, diagnosing and treating illnesses, ordering and interpreting tests, counselling on preventive healthcare, assisting in surgery, writing prescriptions, education, research, and administrative services.

### Collaboration

- Few articles identified during the search for this rapid literature review contained details about collaborative relationships involving PAs.
- The most common form of collaboration is between a PA and a single supervising physician, or small group practice.
- In addition, several examples of multidisciplinary teams including PAs were identified in the literature; these varied greatly in terms of team make-up and practice setting, and are described in detail in Table 1 in the review.

## DESCRIPTION OF THE FINDINGS

### Limitations of the Literature

A number of limitations of the research literature were identified in this review. For example, a number of researchers have noted that there is surprisingly little research on the impact of physician assistants (PAs) on the quality of care and its outcomes (Laurant et al., 2010), that many studies are limited by methodological quality (Doan et al., 2011), and that more research is necessary (Laurant et al., 2009; Kleinpell et al., 2008; Wilson, 2008).

Generalizability was another limitation identified (Parekh & Roy, 2010); there are a number of problems with the research design of studies in the existing literature, including:

- Small sample sizes (Kleinpell et al., 2008)
- Lack of randomized controlled trials (Kleinpell et al., 2008)\*
- Limited populations of interest (Kleinpell et al., 2008)
- Use of selected settings (Kleinpell et al., 2008; Wilson, 2008)
- Short duration of outcome assessments (Kleinpell et al., 2008; Wilson, 2008)

The literature relevant to sections 2 and 3 (on PA autonomy and collaboration, respectively) is particularly sparse. As noted in one systematic review, studies “often lack a clear description of number of patients, physician assistants and physicians, the qualification of the physician

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\* For example, in their review of nurse practitioners (NPs) and PAs in the intensive care unit, Kleinpell et al. (2008) identified only two randomized controlled trials, neither of which concerned PAs.

assistants, and a precise account of the tasks and responsibilities of the professionals involved in a patient's care" (Laurant et al., 2010).

Finally, a large proportion of the identified articles grouped PAs together with nurse practitioners (NPs) and labelled them both mid-level providers (MLPs; also referred to as physician extenders, non-physician practitioners or non-physician clinicians) (e.g., Kleinpell et al., 2008; Tsai et al., 2010; Parekh & Roy, 2010, Laurent et al., 2010, Buch et al., 2008). This rapid literature review attempts to presents the best available research evidence on PAs, but given these limitations, caution should be taken in interpreting the findings presented.

## 1. Safety of PAs

Reviews of the literature have generally found that, according to some measures, care provided by PAs is equivalent to that provided by physicians in terms of safety (Ho et al., 2010; O'Connor & Hooker, 2007; Farmer et al., 2009). Similarly, a review on MLPs (PAs and NPs) found that their care led to outcomes equivalent to those of resident physicians (Kleinpell et al., 2008), while a review on the role and impact of MLPs in emergency department found that patients' outcomes were not negatively affected by the inclusion of PAs in trauma services (Doan et al., 2011).

Numerous individual studies investigating various care outcomes by PAs have been carried out; specific patient outcome findings included:

### A. Mortality

- One study examined the impact of replacing medical residents with supervised PAs in a community hospital, and found this was associated with a statistically significant decrease in all cause mortality (from 2.85% to 1.94%) and a decrease in two-year case mix index-adjusted<sup>†</sup> mortality (from .029 to .019) (Dhuper & Choski, 2009).
- Mains et al. (2009) found that when PAs were added to a trauma service consisting of in-house trauma surgeons, overall mortality decreased significantly (2.80% vs. 3.76%).
- Seven studies found no significant differences in mortality associated with PA (or MLP) care (Singh et al., 2011; Bevis et al., 2008; Roy et al., 2008; Oswanski et al., 2004; Dacey et al., 2007; Sanchez et al., 2006).
- In contrast, one study comparing outcomes of patients with five conditions (stroke, pneumonia, acute myocardial infarction, congestive heart failure, and gastrointestinal hemorrhage) found a significantly higher mortality rate among pneumonia cases being treated by PAs, but no differences in mortality for the other four conditions (Van Rhee et al., 2002).

### B. Complication Rates

- A two-year prospective study of surgical abortions performed by PAs found that abortion services performed by PAs were comparable in safety and efficacy (i.e., complication rates<sup>‡</sup>) to those provided by physicians (Goldman et al., 2004). An earlier study also found no differences between PAs and physicians in the rates of overall, delayed, or immediate

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<sup>†</sup> i.e., mortality rate adjusted according to the hospital's case mix index that year.

<sup>‡</sup> Complications considered were: incomplete abortion, failed abortion, ectopic/extruterine pregnancy, perforation, cervical laceration, infection, hemorrhage, and other complications including shock, coma, amniotic fluid embolism, anesthesia-related difficulties, and death.

- complications after surgical abortion (Freedman et al., 1986, as cited by Laurant et al., 2009). A more recent study<sup>§</sup> compared complication rates for 2,027 procedures by physicians and PAs and NPs from November 2000 through December 2002, and found that complication rates for all providers were very low (2.5 per 1,000)\*\* (Bowman et al., 2004 as cited by Joffe & Yannow, 2004).
- A study of 51 tube thoracostomies<sup>††</sup> performed either by MLPs or by trauma surgeons found no significant differences between the two groups in terms of insertion complications or complications requiring additional interventions; there was, however, a significantly smaller number of complications related to placement of the tube among MLPs than among surgeons (Bevis, et al., 2008).
  - A study comparing the outcomes of cardiac catheterizations performed by supervised PAs to those performed by supervised cardiology fellows-in-training found that the incidence of major complications<sup>‡‡</sup> within 24 hours did not differ significantly between the two groups (0.54% for PAs, 0.58% for fellows) (Krasuski et al., 2003).

### C. Adverse Events, Readmissions and Transfers to the Intensive Care Unit:

- Dhuper and Choski (2009) found no differences in the rates of adverse events or readmissions (within 30 days of discharge) between patients cared for by PAs (supervised by hospitalists) and medical residents in a community hospital.
- A study comparing care provided by PAs (supervised by hospitalists) and traditional house staff<sup>§§</sup> found no differences in transfers to the intensive care unit (ICU) or in readmissions (Roy et al., 2008).
- A study comparing care provided by a hospitalist-PA team to that provided by residents found that risk of readmission<sup>\*\*\*</sup> did not significantly differ between the teams, though length of stay was 6.73% longer for PA-hospitalist patients (Singh et al., 2011).
- The introduction of a PA-led rapid response team at one hospital led to a reduction in the number of cardiac arrests (from 7.6 per 1,000 discharges per month to 3.0), and a reduction in the number of unplanned ICU admissions (from 45% to 29%) (Dacey et al., 2007).
- Sanchez et al. (2006) found no difference in the revisit rate after the implementation of a MLP-led fast-track program in an emergency department (ED).
- Carzoli et al. (1994) found no difference in the incidence of adverse events when comparing charts of neonatal intensive care unit patients cared for by an MLP team compared to a physician team.

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<sup>§</sup> The study was unpublished as of 2004.

<sup>\*\*</sup> Joffe and Yannow (2004) did not state whether there were any differences in complication rates between providers.

<sup>††</sup> A surgically created opening into the chest cavity for drainage ([PubMed](#)).

<sup>‡‡</sup> Complications considered included: myocardial infarction, stroke, arrhythmia requiring defibrillation or pacemaker placement, pulmonary edema requiring intubation, and vascular complications.

<sup>§§</sup> House staff teams have traditionally been composed of one attending physician, one junior or senior resident physician, two interns, and one or two medical students.

<sup>\*\*\*</sup> At seven, 14 and 30 days.

#### D. Other Patient Outcomes

- A study of 9,500 flexible sigmoidoscopy screenings<sup>†††</sup> found that the MLPs were able to perform the procedure with similar accuracy and safety as the gastroenterologists, but at a lower cost. No major complications were observed in examinations provided by the MLPs; there were no differences in the rates of detection of polyps, and no clinically significant differences in the depth of insertion (Horton et al., 2001).
- In a study evaluating acute asthma care, Tsai et al. (2010) found that supervised MLPs provided care similar to that of physicians, but that unsupervised MLPs were less likely to meet three of 12 processes-of-care guidelines than physicians. However, patients cared for by unsupervised MLPs were less likely to be admitted to the hospital and had an ED length of stay that was approximately one hour shorter than that of patients cared for by physicians or supervised MLPs.

#### E. Liability and Risk

Two related studies examined 17 years of data on malpractice incidence, payment amount, and other measures of liability among physicians, PAs, and advanced practice nurses (APNs) and found that:

- The overall incidence of and ratio of malpractice claims per provider was no greater for PAs and APNs than for physicians (Nicholson, 2008).
- The ratio of malpractice payments per total number of active PAs in 2006 was 1:563; which was lower than that for physicians (1:62), but higher than that of APNs (1:1,016) (Hooker et al., 2009).
- Over the 17-year period, on average, there was one malpractice payment for every 32.5 active PAs; which was lower than that for physicians (one for every 2.7 active providers) but higher than that for APNs (one for every 65.8 active providers) (Hooker, et al., 2009).
- The reasons for disciplinary actions against PAs were similar to those for APNs and physicians (Nicholson, 2008).

The authors of one of the studies concluded that “there were no observations or trends to suggest that PAs and APNs increase liability” (Hooker et al., 2009).

#### 2. Autonomy of PAs

From the limited information available, the autonomy of practice of PAs appears to be variable across jurisdictions and settings. Wilson (2008) notes that recent US state laws and regulations have allowed more autonomy and practice privileges for MLPs, and that while PAs and NPs must still collaborate with a physician or work under a physician’s supervision, “the meaning of “collaboration” and “supervision” in practice is wide open.” Cooper and Stoflet (2004) similarly point out that among US states, the required frequency of direct contact with a physician varies from daily (in most states), to weekly (in 12 states), to 30-day intervals (in seven states), and in three states physicians are required to review only 10–15% of the PA’s charts.

The literature suggests that the amount of autonomy PAs have in practicing is dependent on various factors including:

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<sup>†††</sup> Flexible sigmoidoscopy is a procedure used to see inside the sigmoid colon and rectum; it differs from colonoscopy in that it enables the doctor to see only the sigmoid colon, whereas colonoscopy allows the doctor to see the entire colon ([National Digestive Diseases Information Clearinghouse](#), 2008)

- their experience (Henry et al. 2011; Morgan et al., 2008; Kimball et al., 2008),
- their training (Kimball et al., 2008; Horton et al., 2001),
- their competence (Henry et al. 2011; Morgan et al., 2008; Horton et al., 2001),
- the requirements of their employers (Ho et al., 2010; Morgan et al., 2008; Kimball et al., 2008),
- the setting in which they practice (e.g., urban vs. rural) (Henry et al. 2011; Kimball et al., 2008).

In general, PAs provide a range of diagnostic and therapeutic services which vary by practice setting (the most common setting and their associated PA services are discussed in the sections below). In general, services that PAs perform include physical examination, diagnosing and treating illnesses, ordering and interpreting tests, counselling on preventive healthcare, assisting in surgery, writing prescriptions, education, research, and administrative services (Legler et al., 2007)<sup>‡‡</sup>. Parekh and Roy (2010) noted that it may take a significant amount of time for PAs to develop autonomy and efficiency in an inpatient setting, but that PAs develop greater autonomy and efficiency than house staff when they are employed in specialty inpatient areas (e.g., hematology/oncology, bone marrow transplant) which allow them to develop expertise in a specialized area.

#### A. PA Autonomy in the Surgical Setting

A recent review of the role and safety of PAs in the surgical setting found that “within the doctor-PA relationship, PAs exercise autonomy in medical decision making and provide a broad range of diagnostic and therapeutic services”, but the review noted that the actual specific roles of PAs depend on the employer’s or team’s requirements (Ho et al., 2010). The review identified several services provided by PAs in a trauma setting, which are presented below. A survey of 246 directors of major trauma centres by Nyberg et al. (2010) also identified a series of services provided by MLPs in trauma settings, and established the proportion of trauma centres that used MLPs in that role. PA/MLP services identified by the survey and the review include:

- Conducting history and physical examinations (Ho et al., 2010);
  - over 50% of facilities used MLPs in these roles (Nyberg et al., 2010)
- Recording daily progress notes (Ho et al., 2010)
- Dictating discharge summaries (Ho et al., 2010);
  - over 50% of facilities used MLPs in this role (Nyberg, et al., 2010)
- Providing outpatient surgical care (Ho et al., 2010)
- Performing procedures such as central venous catheter placement, chest tube insertion, diagnostic peritoneal lavage, arterial line placement, pulmonary artery catheter placement wound evaluation and treatment (Ho et al., 2010);

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<sup>‡‡</sup> In Ontario, the Physician Assistant Competency Profile requires that a PA is able to perform the following roles: obtain health history; conduct physical assessments and interpret findings; use assessment results to formulate a diagnosis and determine if further clinical investigation is required; order and complete preliminary interpretation of necessary diagnostic tests (e.g., serology, urinalysis, peak flow, X-ray); perform certain diagnostic procedures (e.g., ECG, pap smear); collect samples (e.g., blood, secretions and body fluids); formulate a treatment and management plan, implement certain interventions (e.g., basic life support, immobilization of fractures, suturing); provide pharmacological therapy; and monitor patient progress and response to treatment (Mikhael et al., 2007).

- 37% of facilities used MLPs for central venous catheter placement, 38% used MLPs for chest tube placement, 31% used MLPs for arterial line placement (Nyberg et al., 2010)
- Resuscitation of trauma patients (Ho et al., 2010);
  - over 50% of facilities used MLPs to assist with this role (Nyberg et al., 2010)

## B. PA Autonomy in the Emergency Department (ED)

A review of the literature on the role of PAs in the ED notes that the types of cases seen by PAs are determined by the individual PA's scope of practice, which is agreed upon by the PA and the supervising physician (Smith et al., 2005). Aspects of the PA role in the ED identified by the review included:

- history taking and physical examination
- ordering diagnostic tests (e.g., radiographs, ultrasound, or computed tomography (CT) scans), and interpreting the results
- administering the necessary treatments: prescribing medications, suturing, splinting, minor surgical procedures (e.g., foreign body removal, incision and drainage of abscesses), resuscitation (including central line placement, intubation, inserting chest tubes, and arterial lines)
- Discharging, or admitting patients, or referring them to a specialist.

An Ontario study on the integration of NPs and PAs in six EDs found that the specific duties of each PA varied by site (Ducharme et al., 2009).

An analysis of 10 years of emergency medicine data<sup>§§§</sup> found that PAs were the provider of record for 5.7% of emergency visits (physicians accounted for 92.6%, and NPs for 1.7%) during the period studied, and that the percentage of visits covered by a PA had doubled over the same period (from 3.5% in 1995 to 7.9% in 2004) (Hooker et al., 2008). Another analysis of the same database for the years 1993-2005 found that PAs saw 2.1% of emergency visits over the study period without any evidence of physician involvement and that visits seen by mid-level providers without documented physician involvement increased four-fold, from 1.2% in 1995 to 4.8% in 2005 (Ginde et al., 2008).

## C. PA Autonomy in Rural Settings

A 2009 survey found that individuals from rural locations were more likely to use MLPs as their primary care provider than individuals from metropolitan or micropolitan<sup>\*\*\*\*</sup> areas (Everett, 2009), while a survey of 119 hospitals in Iowa (a predominantly rural state) found that 38.7% of Iowan EDs use PAs or NPs in solo coverage (House & DeRoo, 2009).

A recent systematic review of the literature included two studies that indicated that PAs practicing in rural settings spent less time with their supervising physician and had a broader scope of practice than their urban counterparts (Larson et al., 1994, as cited by Henry et al., 2011), and had

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<sup>§§§</sup> The authors analyzed the National Hospital Ambulatory Medical Care Survey of over 1 billion "weighted" emergency visits for 1995-2004. It should be noted that an assessment of this database found that it likely underestimates the visits to NPs and PAs (Morgan et al., 2007).

<sup>\*\*\*\*</sup> Metropolitan areas were defined as those having a population of over 50,000 in their urban core; micropolitan areas were defined as those having a population of over 10,000, but under 50,000 in their urban core.

more patients for whom they were the principle provider (Martin, 2000, as cited by Henry et al., 2011). Rural PAs were found to:

- Commonly perform prenatal/postnatal care, house and night calls, nursing home rounds and athletic team coverage
- Also perform follow-up care, routine administrative duties, the ordering of routine laboratory test and radiological studies, the recording of patient histories, patient education and counselling, routine physical exams, the diagnosis of common illnesses, and minor surgical procedures
- Within rural hospitals, to provide services in emergency departments, surgeries, and during inpatient rounds, and have admitting/discharge privileges (Henry et al. 2011).

A 2002 survey of 34 rural hospital administrators in Montana found that only 7.5% of PAs were required to have direct physician supervision, while the other 92.5% met their supervision requirements through site inspections and telephone communication. In the most autonomous scenario in that state, a PA operating in a remote site may be granted the authority to maintain an office separate from the supervising physician, and the physician would be required to inspect the remote site and review patient records and office procedures at least once every 30 days (Larsson & Zulkowski, 2002).<sup>††††</sup>

A third study included in the above-mentioned review found that PAs practicing in rural settings rated skills specific to women's health (e.g., cervical cytology smears, breast examination) as among both the important and most commonly used skills that they possessed (Asprey, 2006).

Hutchinson et al. (2001) describe a family medicine clinic located in an underserved rural region of Michigan that is routinely staffed by an APN and a PA. These MLPs provide medical care for the entire range of outpatient conditions (e.g., checkups, emergency treatment of myocardial infarctions and surgical conditions before transport to hospital). A general practice doctor is on site for a day and a half each week and otherwise available for consultation via email and telephone.

#### D. PA Autonomy in Other Settings

The search for this rapid literature review identified articles describing PA autonomy of practice in other settings, including primary care, endoscopy, and interventional radiology.

##### Primary care

A 2002 survey of 1,363 primary care physicians examined the use of MLPs as providers of cancer prevention and screening services (Oliveria et al., 2002). PAs were employed in 382 (28%) of these practices. Overall, among the practices that employed them, it was reported that PAs performed:

- complete body skin exams in 78.3% of practices
- digital rectal exams in 86.9% of practices
- clinical breast exams in 84.8% of practices
- Papanicolaou (i.e. "Pap") testing in 82.7% of practices

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<sup>††††</sup> Or another interval specified by the Board of Medical Examiners.

### Intermediate Care Service

Sole et al. (2001) describe an intermediate care service (ICS) designed to facilitate the management and long-term placement of trauma patients who are recovering from their injuries, but no longer require intensive care. The ICS is staffed by a PA and an acute care NP, who each manage four to six patients, on average. Upon admittance to the ICS, the MLP conducts an in-depth evaluation of the patient (including re-evaluation of injuries, reviewing diagnostic test results), identifies issues (e.g., physical, cognitive, social) that may affect recovery and discharge to rehabilitation, conducts an in-depth history and physical examination and writes orders focused on rehabilitation and discharge planning. A trauma surgeon/surgical intensivist<sup>###</sup> makes weekly rounds and is available for questions on a daily basis. More information about this service is provided in Table 1, below.

### Pediatric Intensive Care Unit

Mathur et al. (2005) describe the use of PAs in a six-bed pediatric intensive care unit (PICU). In this model, after a training period lasting from six months to one year, PAs are assigned to an independent but supervised patient care role, in which they perform tasks and activities similar to those performed by residents (e.g., presenting patients on rounds, carrying out care plans). The PAs also support nursing and respiratory therapy functions, and collaborate directly with other subspecialty and consulting attending physicians. At any given time, the PICU is covered by one PA and one resident, each of whom is generally responsible for the management of one to three PICU patients; the orders written by the PAs for their patients must be co-signed by a physician within 24 hours.

### Endoscopy

Horton et al. (2001) describe one medical group's use of MLPs in the independent provision of flexible sigmoidoscopies. Before being permitted to perform the procedure independently, the PAs and NPs undergo hands-on training at the direction of gastroenterologists. The training progresses along a continuum of graded responsibility and reduced supervision, and a minimum of 100 supervised examinations must be performed during the training period. Once the MLP has completed the requisite number of procedures and has demonstrated an ability to perform them with minimal discomfort to the patient, and within a reasonable period of time, the MLP is permitted to perform the procedure independently (though a gastroenterologist must be available on-site whenever an MLP is performing the procedure). MLPs are also responsible for discussing results of colonic biopsies with patients and assisting the physician with scheduling patients for future procedures. An evaluation of this model (previously discussed in section 1D above) found that the trained MLPs performed flexible sigmoidoscopies with similar accuracy and safety as gastroenterologists, but at a lower cost (Horton et al. 2001).

### Interventional Radiology

Stecker et al. (2004) describe the use of PAs in an interventional radiology practice at an Indiana hospital. In addition to participating in daily rounds, monitoring all charts, and facilitating referrals, the PAs have made large contributions to outpatient care.<sup>§§§§</sup> Qualified PAs are also involved in the

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<sup>###</sup> The term surgical intensivist refers to the individual who practices intensive care in the surgical intensive care unit ([Eachempati et al., 2003](#))

<sup>§§§§</sup> Outpatient services provided by the PAs include: scheduling initial patient consultations, obtaining histories, performing physical examinations, discussing the case and developing a treatment plan with the physician,

management of dialysis fistulas and grafts, and became the primary providers for temporary venous access (e.g., sonographically guided peripherally inserted central catheters, internal jugular central venous lines). Before being allowed to apply for the privilege to perform a given procedure without supervision, a PA must perform the procedure a requisite number of times<sup>\*\*\*\*</sup> under direct supervision (Stecker et al., 2004).

### 3. PAs and Collaboration

Few articles identified during the search for this rapid literature review contained details about collaborative relationships involving PAs. According to the authors of one systematic review on the use of MLPs in the ICU, “a limited number of publications share strategies for role implementation and development. Information on successful multidisciplinary models of care is needed to promote optimal use of NPs and PAs in the ICU setting” (Kleinpell et al., 2008). Hooker et al. (2008) similarly point out that the literature on collaborative efforts is sparse.

The most common form of collaboration is between a PA and a single supervising physician (Henry et al., 2011; Hooker, 2006), or small group practice (Henry et al., 2011). In addition, several examples of multidisciplinary teams including PAs were identified in the literature; these varied greatly in terms of team make-up and practice setting, and are described in more detail in Table 1. Practice settings where PAs functioned in collaborative roles included:

- The emergency department, working with NPs and an emergency physician (Dunlop, 2011); or a registered nurse (RN) or licensed practical nurse and an attending emergency physician (Ganapathy & Zwemer, 2003).
- Surgical service, working with a surgeon, a dedicated nursing team, and an anaesthesiologist (Bohm et al., 2010); a general surgery team composed of NPs, residents, and an in-house senior resident (Buch et al., 2008); or a surgical service composed of residents, a chief resident, and attending staff (Victorino & Organ, 2003).
- An intermediate care service,<sup>††††</sup> with an acute care nurse practitioner and a trauma surgeon/surgical intensivist (Sole et al., 2001).
- Inpatient general medicine, working with a hospitalist, a senior resident/medical subspecialty fellow, nurses, a care coordinator, and a pharmacist (Roy et al., 2008; Sehgal et al., 2008).
- Interventional radiology, working with radiologists and house staff (Stecker et al., 2004).
- Orthopedics, working with NPs and physicians (Dower & Christian, 2009).
- Gastroenterology, working with gastroenterologists/physicians and NPs (Dower & Christian, 2009).
- Dermatology, working with dermatologists and NPs (Dower & Christian, 2009).

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implementing the treatment plan, ensuring that the appropriate preprocedural testing and evaluation has been obtained, and providing appropriate documentation for billing.

<sup>\*\*\*\*</sup> Initially, because the PAs did not have experience with venous access, they began learning to place peripherally inserted central catheters, which pose less risk than internal jugular catheter placement. The PA was required to place this type of catheter 30 times under direct supervision before being allowed to apply for the institutional privilege to perform it unsupervised, but it was later determined that ten directly supervised internal jugular central venous catheter placements procedures were sufficient before privileges could be requested.

<sup>††††</sup> for trauma patients no longer requiring intensive care, but who have yet to be released for rehabilitation



**Table 1. Descriptions of Collaborative Teams Including PAs**

Description of Collaborative Model	Reference
<p><b>Seven Oaks General Hospital, Winnipeg, Manitoba</b> At this hospital, emergency department patients are treated by a multidisciplinary team in a patient-centred collaborative practice model consisting of NPs and PAs, working with an emergency physician. The NP and PA roles are distinct, with NPs' primary role being the care of patients who require minor treatment (in the two lowest triage categories), and PAs' primary role being the care of acutely ill patients (including patients who are likely to need a longer visit, or who have more urgent needs). The team has a "patient first" and "no wait" culture; when patient numbers are high, PAs (or the emergency physician) will see patients within the NPs' scope of practice. Despite the fact that the patient population that has increased at least 30% since 2008, wait times, length of stay and "left, not seen" rates have declined. With assistance from the PAs, emergency physicians are able to focus on patients with the most acute needs, and have more time to consult with team members. Patients rate their overall care experience highly.</p>	<p>Dunlop, 2011</p>
<p><b>Concordia Joint Replacement Group, Winnipeg, Manitoba</b> The addition of PAs to the Concordia Joint Replacement Group team has allowed a single surgeon to run two rooms during a single operating day. Each of the two operating rooms uses one PA, and has its own dedicated nursing team and anaesthesiologist. Under the model used by this group, the surgeon operates in one room with assistance from the first physician assistant, the second physician assistant helps to position, prepare and drape the next patient in the second room. On completion of the first operation, the surgeon leaves the first room to immediately start operating in the second room. When the surgeon leaves the first room, the first physician assistant closes the incision, completes the paperwork and assists with room changeover. The use of the double operating room model facilitated by PAs increased the surgical throughput of primary hip and knee replacements by 42%, and median wait times decreased from 44 weeks to 30 weeks compared with the preceding year. The PAs saved their supervising physicians approximately 204 hours per year, are regarded as important members of the health care team by surgeons, nurses, orthopedic residents and patients, and were found to be essentially cost neutral.</p>	<p>Bohm et al., 2010</p>
<p><b>The Mount Sinai Surgical Residency, New York, New York</b> The surgical residency program recognizes the important role that physician assistants and nurse practitioners play in resident education. The specific responsibilities of the surgical MLPs include managing preoperative and postoperative patients, assisting in procedures and the operating room (depending on the service), performing surgical consultations, participating in discharge planning, promoting wellness and patient education, and communicating with the entire surgical team. A daytime PA is assigned to each general surgery team. The PA works together with the residents to provide all inpatient floor work, see consults, and complete discharges. When residents on the team are scrubbed into the operating room, the PA will answer all forwarded pages. If a case in the operating room cannot be covered by the residents, the PA is available to assist. The general surgery teams are covered at night by a junior resident or an NP. An in-house senior resident always is on call for support. The subspecialty services all use their MLPs slightly differently, with some working jointly with only one physician and some practicing in the outpatient setting. Patient care decisions are made collaboratively by residents and MLPs. MLPs contribute more to the junior residents' education in direct clinical teaching (e.g., nasogastric tube insertion or arterial catheter placement) and to all residents' patient coordination education (e.g., how to expedite a physical therapy consult or home nursing services request).</p>	<p>Buch et al., 2008</p>

<p><b>Brigham &amp; Women's Hospital, Boston, Massachusetts</b> The inpatient general medicine service recently switched from a traditional house staff service to a service staffed with six full time equivalent PAs and supervised by hospitalists, referred to as the Physician Assistant/Clinician Educator service. The PACE service consisted of 15 beds localized to two adjacent inpatient "pods," staffed by a single cadre of nurses and medically staffed by one hospitalist and two physician assistants from 7:00 AM to 7:00 PM on weekdays and by one hospitalist, one physician assistant, and one moonlighter from 7:00 AM to 7:00 PM on weekends. A moonlighter, typically a senior resident or medical subspecialty fellow, admitted patients and covered nights on the service from 7:00 PM to 7:00 AM seven days a week. The service accepted admissions 24 hours per day, seven days per week, whenever beds were available. Daily morning rounds included the hospitalist, physician assistants, nurses, a care coordinator, and a pharmacist. The PACE service did not have triage guidelines related to diagnosis, complexity, or acuity, but only accepted patients via the emergency department or via a primary care physician's office, and did not accept patients transferred from outside hospitals or from the intensive care units. All of the physician assistants on the PACE service had prior inpatient medicine experience, ranging from six months to five years. Their clinical responsibilities were similar to those of interns at the study hospital, and included taking histories and performing physical examinations, writing notes and orders, reviewing and assimilating data, creating and updating patient signouts, completing discharge summaries, consulting other services as needed, and communicating with nurses and family members. An evaluation of the PACE service in comparison to the traditional house staff service found that total cost of care was marginally lower on the study service (adjusted costs 3.9% lower) but LOS was not significantly different as compared with house staff services. No difference was seen in inpatient mortality, ICU transfers, readmissions (within 72 hours, 14 days or 30 days), or patient satisfaction.</p>	<p>Roy et al., 2008  Sehgal et al., 2008</p>
<p><b>Department of Radiology, Indiana University Hospital, Indianapolis, Indiana</b> The subspecialty of interventional radiology (IR) involves a large amount of patient care, though as practices become busier, there is less time for radiologists to spend with individual patients. This radiology department has sought to use PAs to improve clinical patient care. PAs participate in inpatient and outpatient care. They are involved in daily morning inpatient rounds with the fellows and residents rotating on the hospital's service. In this capacity, they evaluate abscess, drainage catheters and monitor patient progress. They also perform and monitor compliant chart documentation for all inpatients being followed by the IR service. In conjunction with the house staff, the PAs will communicate with referring services as needed and help triage queries and consultation requests that may be brought to their attention during these rounds. The PAs have made a large contribution to the implementation of IR outpatient services and establishment of an outpatient office, which operates two half-days per week. Outpatient service duties include scheduling initial patient consultations, obtaining histories and performing physical examinations, discussing the case with the IR physician, developing a treatment plan for the patient in conjunction with the IR, implementing the plan, and providing appropriate documentation for billing. The PA also ensures that any appropriate preprocedural testing and evaluation has been obtained. In these capacities, the PAs help to ensure a smooth transition for the patient from initial consultation through postprocedural discharge and follow-up. The PAs had also recently become involved in the management of dialysis fistulas and grafts, and had become the primary providers for temporary central venous access; they are involved in all aspects of these procedures, from assessment of appropriateness of the initial request, to patient evaluation, obtaining informed consent, placing the device, and troubleshooting subsequent malfunctions.</p>	<p>Stecker et al., 2004</p>
<p><b>Department of Surgery, University of California, San Francisco, East Bay</b> Funding for a PA position on each of four surgical services was approved, and one PA was assigned to each surgical service. The PAs were fully incorporated into the surgical team and functioned at the level of a postgraduate year one or postgraduate year two resident. The PAs are under the direct supervision of the chief resident or attending staff. Each PA worked four ten-hour shifts per week, usually 7 AM to 5 PM on Mondays, Tuesdays, Wednesdays, and Fridays. Thursdays are set aside for teaching conferences. The PAs rotated between services every three months, in order to provide a varied work experience and prevent the PAs from becoming too dominant on a service. As a result of the addition of PAs to surgical teams, surgery resident hours were significantly decreased by the fourth, fifth, and sixth months after PAs joined, though 60% of surveyed residents believed that the PAs had no influence on the amount of time they spent in the hospital. The majority of surveyed residents did, however think that the PAs decreased stress levels and helped to improve morale (60% in both cases).</p>	<p>Victorino &amp; Organ, 2003</p>

<p>Department of Emergency Medicine, Strong Memorial Hospital, Rochester, New York As a response to crowding in the emergency department, the department of emergency medicine developed a role for MLPs in which they could provide “back-end” work for patients awaiting inpatient beds. After initial physician evaluation, patients without ready inpatient beds were grouped in the ED and their care was transferred to the transition team (TT). The TT consisted of an MLP (nurse practitioner or physician assistant) and a registered nurse or licensed practical nurse, all reporting to ED supervisors. The TT was present 24 hours per day and accepted patients from the acute-care areas of the ED. A patient was eligible for management by the TT only if the attending physician in the ED had seen the patient and determined the patient’s ED disposition. Two types of patients were transferred to the TT: (1) admitted patients awaiting an inpatient bed; and (2) patients scheduled for a test or consultation that would determine disposition. The TT MLP was expected to see each patient, confirm a care plan and disposition for the patient, monitor the patient’s clinical care, document these items, and note the time of transfer of medical responsibility for the patient from the ED to the inpatient services. Medical responsibility for patients managed by the TT continued to be that of the attending ED physician until the hospital’s inpatient services assumed care of the patient. The TT provided all patient care until a patient was seen by the admitting inpatient service or until the patient left for an inpatient unit. The major TT objectives were a reduction of EM physician work in caring for inpatients, and improved patient care; the TT did assume a significant patient load, but this did not improve patient satisfaction.</p>	<p>Ganapathy &amp; Zwemer, 2003</p>
<p>Intermediate Care Services, Orlando Regional Medical Center, Orlando, Florida The Intermediate Care Service was designed to facilitate the management and long-term placement of trauma patients who no longer require intensive care while recovering from their injuries by having MLPs coordinate care for ongoing trauma patient services. Under the supervision of a trauma surgeon/ surgical intensivist, two nonphysician providers—an acute care nurse practitioner (ACNP) and a PA—manage trauma patients whose injuries have been stabilized. Patients who either no longer require treatment in the ICU, do not have acute surgical problems, or are likely to need extensive rehabilitation and long-term hospitalization for their injuries are transferred to the ICS by the admitting trauma team. Once a patient is transferred to ICS, either the ACNP or PA assumes responsibility for patient care management. On average, they each manage four to six patients. The trauma surgeon/surgical intensivist makes weekly rounds on the patients and is available on a daily basis as needed when questions arise. When a new patient is accepted to the ICS, the MLP conducts an in-depth evaluation of the patient, including a detailed chart review; reviews progress reports, diagnostic test results, and notes written by members of the multidisciplinary team (nursing, physical therapy, occupational therapy, speech therapy, social work, dietary); reviews data to identify physical, cognitive, social, financial, and other issues that may affect recovery and discharge to rehabilitation; conducts an in-depth history and complete physical examination of the patient; and writes orders based on the initial evaluation of the patient, with a focus on rehabilitation and discharge planning. An evaluation of the model found that of 93 cases reviewed, all survived, and none required a higher level of care (e.g., transfer back to the ICU for treatment). The authors of the evaluation suggested that the ICS represents a unique and valuable model for the collaborative management of complex trauma patients.</p>	<p>Sole et al. 2001</p>
<p>Kaiser Permanente Fontana Medical Center, Orthopedic department , Fontana, California The Kaiser Fontana Medical Center Orthopedic Department relies on 13 PAs and one NP to provide a broad range of out- and inpatient services, including “first call” for all orthopedic consult requests from urgent care, primary care, emergency, or inpatient services. PAs conduct all initial evaluations and fully handle an estimated 80%-90% of patient cases, with the remainder—such as fractures that are not reducible and may require surgery—referred to physicians. PAs order and read imaging studies and other tests, apply casts, set bones such as wrists, prescribe medications (except schedule II drugs at discharge), and provide most other orthopedic treatment. Fourteen physicians supervise the PAs. A team of four rotating PAs works essentially as PA hospitalists to support inpatient care and work closely with three internist physicians. The NP works in podiatric surgery.</p>	<p>Dower &amp; Christian, 2009</p>

<p>St. John's Clinic—Orthopedic Specialists, Springfield Missouri This clinic provides a full range of orthopedic services within an integrated health care system. Approximately 13 PAs work with 16 orthopedic physicians providing both in- and outpatient clinical care. Outpatient services provided by the PAs include seeing and evaluating patients, applying and removing casts, prescribing medications (except narcotics), ordering and interpreting tests, and delivering joint injections. Physicians and PAs usually work together in teams of two, though some physicians in the group do not work with any PAs. With the one-on-one team approach, PAs always have access to a physician and receive both direct and general supervision. The practice experimented with allowing experienced PAs to see some new patients but modified its policy due to concerns from some community primary care physicians. Now, all new patients see a physician in addition to a PA. Patients are seen exclusively by PAs for many follow-up visits, although physicians emphasize to PAs during their orientation and training that they must continuously sharpen their skills regarding patient satisfaction and assess whether a patient may want to see a physician instead of, or in addition to, the PA.</p>	<p>Dower &amp; Christian, 2009</p>
<p>Division of gastroenterology, hepatology, and nutrition, University of Florida - Gainesville At this top-ranked unit, a team of 14 medical doctors, four PAs, and three NPs work to meet extremely high-volume demands for GI services ranging from basic assessments to liver transplants. Physician assistants and nurse practitioners focus on outpatient needs and function similarly to medical fellows or junior attending physicians. Working collaboratively with the physicians, the PAs and NPs have broad scopes of responsibility and competence. The unit stresses communication among all clinicians and works to ensure that PAs and NPs have access to physicians whenever needed. Specific responsibilities vary.</p>	<p>Dower &amp; Christian, 2009</p>
<p>Digestive Health Specialists, Federal Way, Washington This specialty group of medical doctors and non-physician clinical staff works at nine gastroenterology outpatient clinics and four endoscopy centers in and around Tacoma, Washington. Collectively, eight PAs and five NPs complement a team of about 20 gastroenterologist physicians to provide care in outpatient settings and at several affiliated local hospitals for inpatient services. Although specific duties and responsibilities may vary, the PAs and NPs work fairly independently and provide a full range of medical care except high-level diagnoses and procedures such as endoscopy and colonoscopy.</p>	<p>Dower &amp; Christian, 2009</p>
<p>Dermatology Clinic, P. C., Salem, Oregon This private group practice is composed of four dermatology physicians and three PAs. Each PA has his or her own patient caseload, which is generally equal to the physician caseloads. Compared with physicians, PAs for the most part provide a similar scope of clinical services. Exceptions include some complicated surgeries and diagnostically complex patients, whom the physicians handle. PAs see patients, write treatment plans, prescribe medication, perform biopsies for skin cancer, make incisions, and provide some laser treatments. PAs work collaboratively with physicians on-site, requiring minimal supervision but under a rigorous monitoring policy. PAs do not see patients without a physician on-site. All new patients are seen by a physician and a PA at their first visit. PAs may see the patients on their own for follow-up visits when there is no change in treatment plans; if any questions arise, the PA consults with the physician to resolve the question, reevaluate the patient, and/or re-establish a treatment plan. If any new problems arise, the patient sees the physician. All PAs work with all physicians and interact regularly throughout the day.</p>	<p>Dower &amp; Christian, 2009</p>
<p>Central Carolina Dermatology Clinic Inc., High Point, North Carolina This six-physician dermatology group employs one PA who sees 25-40 patients per day. He does evaluations, orders laboratory tests, orders ultraviolet light treatment, and performs biopsies and excisional surgeries (though not flaps, grafts, or Mohs surgeries). He has prescriptive authority but no Drug Enforcement Agency number, by choice, so he does not prescribe narcotics. He has worked with this practice for five years and previously was at another dermatology practice for seven years.</p>	<p>Dower &amp; Christian, 2009</p>

Please take the time to complete an anonymous two-minute [Literature Review Survey](#) to inform us how this review met, or did not meet, your needs.

## APPENDIX

Table 2 – Articles on the Safety, Autonomy, and Collaboration of Physician Assistants<sup>####</sup>

No.	Description	Reference
<b>Review Articles</b>		
1	<p>This systematic review describes the role and impact of physician assistants (PAs) in the ED. It includes reports of surveys, retrospective and prospective studies as well as guidelines and reviews. Seven hundred and twelve studies were identified of which only 66 were included, and many of these studies were limited by methodological quality. Generally the use of PAs in the ED is modest with 13–18% of US EDs having PAs although academic medical centres report PA use in 65–68% of EDs. The evidence indicates that PAs are reliable in assessing certain medical complaints and performing procedures, and are well accepted by ED staff and patients alike. Specifically, four studies compared PAs' skills in performing procedures, and PAs appear equally capable of performing procedures if adequately trained and supervised. Methodological quality among these studies was moderate to strong. There was no study of the outcome of patients treated by PAs in the ED, although two studies of trauma services (likely inpatient) were reviewed. A 1998 study by Rudy et al. compared the outcomes of patients treated by 14 NPs and PAs versus 16 resident physicians over a one-month period from two academic centres. They found no significant differences, but were unable to control for important differences such as age and level of acuity in patient characteristics between the two groups. A more recent retrospective chart review (see entry on Mains et al, 17, below) at a large hospital compared patient outcomes treated by three different in-house trauma teams, including a team composed of trauma surgeons with PAs; the patients treated by that group resulted in significant lower adjusted odds ratio for mortality and shorter length of stay (LOS) (decreased by less than half a day). These studies were not sufficiently powered to determine equivalence; however, they suggested that patients' outcomes were 'not negatively affected' by the implementation of PA on trauma services. There is limited evidence as to whether PAs improve ED flow or are cost-effective. Future studies on work processes, cost-effectiveness, unfamiliar patients' willingness to be treated by non-physician providers, and ED physicians' acceptability of PAs are needed to inform and guide the integration of PAs into EDs.</p>	<p>Doan, Q., Sabhaney, V., Kisson, N., Sheps, S., &amp; Singer, J. (2011). A systematic review: The role and impact of the physician assistant in the emergency department. <i>Emergency Medicine Australasia</i>, 23, 7-15.</p>

<sup>####</sup> Please note the studies, programs, and findings presented in this table may originate from jurisdictions with health systems that are significantly different from Ontario's. If there is intent to draw heavily from one or more sources presented in this table, we recommend that you contact the lead author of this review for assistance with evaluating the local applicability.

No.	Description	Reference
2	<p>Purpose: A literature review was performed to assess the role of physician assistants (PAs) in rural health care. Four categories were examined: scope of practice, physician perceptions, community perceptions, and retention/recruitment. Methods: A search of the literature from 1974 to 2008 was undertaken by probing the electronic bibliographic databases of English language literature. Criterion for inclusion was original data published on rural PAs. Each paper was assessed and assigned to the four categories. Findings: A total of 51 papers were identified; 28 papers had a primary focus on research and specified PAs in a rural setting. Generally, the literature suggests that PAs provide cost-efficient and supplemental medical services to underserved rural populations and that these services are valued. It also appears that rural PAs possess a larger scope of practice than urban PAs. This broad range of skills and procedures may be necessary to match the extensive health care needs of underserved rural populations. The experience and competency of the PA helps to define the scope of practice. Eleven papers discussed PA scope of practice in rural areas. Generally, there is consensus within the literature regarding the autonomy and scope of practice for rural PAs. Larson and associates observed that Medex-trained PA graduates from rural Washington State spent less time with their supervising physician and had a broader scope of practice than their urban cohorts. Martin validated Larson's work studying Pennsylvania PAs. He found that compared to urban PAs, rural PAs spent more time with patients clinically, saw more patients on a daily basis, and had more patients for whom they were the principal provider. The authors thought that the PAs profiled were more likely to work in underserved areas than their urban counterparts. The most common type of practice for a rural PA is primary care. The most represented practice settings in these studies were a solo physician's private practice or a small group practice clinic. The federal government also employs rural PAs. Typical government-sponsored sites included community health centers, migrant health centers, Indian health centers, and prison systems. Krein's study of northern states indicated that more than 50% of rural hospitals utilized PAs. Within these hospitals, most PAs provided services in emergency departments, surgeries, and during inpatient rounds, and they had admitting/discharge privileges. The literature identified many tasks performed by rural PAs. The most common duties observed included prenatal/postpartum care, house calls, night calls, nursing home rounds, and athletic team coverage. Other activities noted involved follow-up care for patients, routine administrative duties, ordering routine laboratory tests and radiological studies, recording patient histories, patient education, counseling, routine physical exams, diagnosing common illnesses, and performing minor surgical procedures. Historically, the illnesses and procedures attended to by rural PAs were generally considered commonplace and not critical. Over a 35-year period of examination, the literature improved in numbers of PAs studied and the quality of research. However, the lack of longitudinal studies was considered a shortcoming of rural health PA observational research. Conclusions: Through this review, some insights about the role of PAs emerged. Overall, they seem well adapted to rural health. Important issues regarding the recruitment and retention of PAs to rural populations also emerged. Improvement in enabling legislation contributes to the utilization of PAs in America.</p>	<p>Henry, L. R., Hooker, R. S., &amp; Yates, K. L. (2011). The role of physician assistants in rural health care: A systematic review of the literature. <i>The Journal of Rural Health, 27</i>(2), 220-229.</p>

No.	Description	Reference
3	<p>Background: The Australia health workforce productivity Commission Research Report in 2005 identified workforce shortages. One of the recommendations is that new models of health care be established. As a result South Australia is trialling United States trained physician assistants in a pilot program. This paper summaries the review of literature of the physician assistant role and safety in the surgical setting. Methods: A literature search using Medline and Pubmed from 1966 until 2009 with key words: physician assistants, midlevel providers, surgery. The references of the results were also searched for suitable articles. The Google search engine was also used with the above keywords to search for latest developments from non-traditional sources. Results: There were over 200 suitable articles relating to the quality and safety of physician assistants. The overwhelming majority of the articles originate from the United States and these vary in quality. There were 13 published studies identified that documented physician assistants in the surgical setting. As part of their comprehensive capabilities, PAs are able to obtain medical histories, conduct physical exams, formulate diagnoses, establish or implement treatment plans, order and interpret tests, counsel on preventive health care, provide patient education, assist in surgery and write prescriptions in all states of America. Within the doctor-PA relationship, PAs exercise autonomy in medical decision making and provide a broad range of diagnostic and therapeutic services. A PAs practice may also include education, research and administrative services. Initially PAs were projected to be working in the primary health-care setting but over time it has become evident that their flexibility of function can be extended to fill the gaps in the running of surgical units. There are various models on the role of the PA within the surgical units. In some centres the PA is part of a team with other surgical residents and in other mostly more rural centres the PA collaborates only with the consultant. As mentioned before the actual specific role carried out by PA depends on the employer/teams requirements. In the trauma setting, PAs have provided a service evaluating patients in the emergency department for traumatic and surgical problems. They conduct history/physical examinations, record daily progress notes, discharge summaries, outpatient surgical care and performed procedures such as CVC placement, chest tube insertion, diagnostic peritoneal lavage, arterial line placement, pulmonary artery catheter placement, wound evaluation and treatment and resuscitation of trauma patients. Conclusion: From the published data physician assistants have been shown to provide safe and provide high quality care in surgical units. It is important that prior to their commencement their role is defined to alleviate conflict and confusion in the team. Continued auditing should be conducted to monitor progress and impact.</p>	<p>Ho, P., Pesicka, D., Schafer, A., &amp; Maddern, G. (2010). Physician assistants: Trialling a new surgical health professional in Australia. <i>NAZ Journal of Surgery</i>, 80(6), 430-437.</p>

No.	Description	Reference
4	<p>Background: Developed countries face major challenges due to rising demand for healthcare, unacceptable variations in service access and quality, pressure to contain costs and medical workforce shortages. A common response has been to extend the role of non-physician clinicians into areas that were previously the domain of physicians. Non-physician clinicians play an increasingly prominent role in the provision of clinical patient care. The expectation is that such revision of roles will improve healthcare effectiveness and efficiency. But does it? Ideally, role revision should be governed by research-based evidence of how skills may best be distributed among different healthcare professionals (both non-physician clinicians and physicians) in order to optimise the cost-effectiveness of health service delivery and to improve the quality of patient care. However, the evidence base for role revision is generally not robust and has lagged behind service developments. Objective: The authors undertook a structured literature review to address the following question: what is the impact of professional role revision on quality of care and outcomes? Type of role revision: In this report the authors are concerned with the subset of revisions in which non-physician clinicians take on defined tasks that were previously the domain of physicians. There are two conceptually different approaches to role revision in this context. The first is to deploy non-physician clinicians as 'supplements' for physicians. Non-physician clinicians working in this way provide additional services that are intended to complement or extend those provided by physicians. The aim is generally to improve the quality of care and extend the range of services available to patients. The second approach is to deploy nonphysician clinicians as 'substitutes' for physicians. Non-physician clinicians working in this way provide the same services as physicians in order to reduce physician workload, increase service capacity and/or reduce costs. Gains in service efficiency may be achieved if physicians give up providing the services that are transferred to non-physicians, and instead invest their time in activities that only physicians can perform. A single role revision may combine elements of both supplementation and substitution; the authors define this as 'mixture'. Findings: Overall, the evidence available to answer the research question is sparse, with the exception of nurse–physician role revision. In total they included 28 systematic reviews and three original studies. The methodological quality of systematic reviews varied as follows: 'good' (n=16), 'moderate' (n=7) and 'poor' (n=5). However, a number of the authors of these reviews described the methodological quality of the original studies they included as 'poor' or 'insufficient'. Only a minority of the authors reported that the methodological quality of the original studies was moderate or good (n=7). Evidence for physician assistant role revision Two reviews and three controlled observational studies reported the effectiveness of physician assistant role revision: two evaluated the effects of substitution, one studied the effects of supplementation and two were identified as a mixture of role revision. Physician assistants worked in various healthcare settings, predominantly in specialist roles; however, the clinical domain was not specified in the two reviews. The majority of the studies were conducted in the USA. The reviews often lack a clear description of number of patients, physician assistants and physicians, the qualification of the physician assistants, and a precise account of the tasks and responsibilities of the professionals involved in a patient's care. This information was reported in the three original studies. The findings suggest that both access to healthcare services and productivity of healthcare services increased. Furthermore, physician assistants reduced the workload of physicians. Despite these positive findings, one original study showed that in general physician assistants adhered less often to guideline recommendations in comparison with physicians working alone. There is some evidence that physician assistants gain similar clinical outcomes to physicians. One original study found that physician assistants were less likely to achieve the targeted outcome. This may be associated with non-adherence to guideline recommendations. Similar to care provided by nurses, patients seemed very satisfied with care provided by physician assistants. The two reviews concluded that the involvement of physician assistants in patient care resulted in cost savings. There is remarkably little evidence regarding the impact of physician assistants on quality of care and outcomes. The available evidence is largely based on non-experimental studies and narrative analysis of the data. The authors recommend more rigorous research in this area. On the basis of these two reviews and three original studies the authors conclude that, regardless of the healthcare setting and type of role revision, physician assistants provide the same quality of care and establish similar outcomes to physicians. However, they recommend more rigorous research before drawing firm conclusions.</p>	<p>Laurant, M., Harmsen, M., Faber, M., Wollersheim, H., Sibbald, B. &amp; Grol, R. (2010). Revision of professional roles and quality improvement: A review of the evidence. The Health Foundation, London, U.K.</p> <p>Available at:  <a href="http://www.health.org.uk/publications/research-reports/prof-roles-and-qi.html">http://www.health.org.uk/publications/research-reports/prof-roles-and-qi.html</a></p> <p>Last accessed: July 2011.</p>

No.	Description	Reference
5	<p>Health care is changing rapidly. Unacceptable variations in service access and quality of health care and pressures to contain costs have led to the redefinition of professional roles. The roles of nonphysician clinicians (nurses, physician assistants, and pharmacists) have been extended to the medical domain. It is expected that such revision of roles will improve health care effectiveness and efficiency. The evidence suggests that nonphysician clinicians working as substitutes or supplements for physicians in defined areas of care can maintain and often improve the quality of care and outcomes for patients. The effect on health care costs is mixed, with savings dependent on the context of care and specific nature of role revision. The evidence base underpinning these conclusions is strongest for nurses with a marked paucity of research into pharmacists and physician assistants. More robust evaluative studies into role revision are needed, particularly with regard to economic impacts, before definitive conclusions can be drawn. Though limited, the findings with respect to PAs were: <i>Effects on clinical outcomes</i>. One review reported that there was no difference in clinical outcomes between patients cared for by physician assistants or physicians (<math>n = 10</math>). Two out of the three original studies also found no differences between physician assistants and physicians with regard to overall complication rate and the rates of immediate or delayed complications following surgical abortion. The third original study (see entry #25, Ohman-Strickland et al. (2008), below), however, found that physician assistants were 32% less likely than physicians to have patients attain targeted low-density lipoprotein cholesterol (<math>p &lt; .001</math>). No significant differences were found with respect to targeted HbA1c or microalbumin levels. <i>Effects on patient outcomes</i>. Both systematic reviews reported that patients were very satisfied with physician assistants. Findings were chiefly drawn from the same original studies. None of the three original studies included other patient outcome measures. <i>Effects on process of care outcomes</i>. One study included in a review, showed that access to health care services improved. Transfer time to operating room decreased by 43% and to intensive care unit by 51%, with physician assistant care resulting in 4 to 5 hours saved each day. Ohman-Strickland et al. (2008) found that, despite guideline recommendations for diabetic care, physician assistants were 67% less likely to assess microalbumin levels when compared with physicians (<math>p &lt; .05</math>). There were no significant differences in the assessment of HbA1c, blood pressure, and lipids, although physician assistants tended to have lower assessment rates. <i>Effects on resource utilization</i>. Both reviews reported that physician assistants contributed to increased productivity. In addition, one 1998 study showed a decreased length of hospital stay in the physician assistant group. None of the original studies included resource utilization outcome measures. <i>Effects on costs and cost-effectiveness</i>. Both reviews reported that care provided by physician assistants was cheaper than care provided by physicians. There was a slight overlap in original studies (<math>n = 4</math>) on which this conclusion was based.</p>	<p>Laurant, M., Harmsen, M., Wollersheim, H., Grol, R., Faber, M., &amp; Sibbald, B. (2009). The impact of nonphysician clinicians: Do they improve the quality and cost-effectiveness of health care services? <i>Medical Care Research and Review</i>, 66(6), 36S-89S.</p>

No.	Description	Reference
6	<p>Background: Advanced practitioners including nurse practitioners (NPs) and physician assistants (PAs) are contributing to care for critically ill patients in the intensive care unit through their participation on the multidisciplinary team and in collaborative physician practice roles. However, the impact of nurse practitioners and physician assistants in the intensive care unit setting is not well known. Objectives: To identify published literature on the role of nurse practitioners and physician assistants in acute and critical care settings; to review the literature using nonquantitative methods and provide a summary of the results to date incorporating studies assessing the impact and outcomes of nurse practitioner and physician assistant providers in the intensive care unit; and to identify implications for critical care practice. Methods: The authors conducted a systematic search of the English language literature of publications on nurse practitioners and physician assistants utilizing Ovid MEDLINE, PubMed, and the Cumulative Index of Nursing and Allied Health Literature databases from 1996 through August 2007. Interventions: None. Results: Over 145 articles were reviewed on the role of the nurse practitioner and physician assistant in acute and critical care settings. A total of 31 research studies focused on the role and impact of these practitioners in the care of acute and critically ill patients. Of those, 20 were focused on nurse practitioner care, six focused on both nurse practitioner and physician assistant care, and five were focused on physician assistant care in acute and critical care settings. Fourteen focused on intensive care unit care, and 17 focused on acute care including emergency room, trauma, and management of patients with specific acute care conditions such as stroke, pneumonia, and congestive heart failure. Most studies used retrospective or prospective study designs and nonprobability sampling techniques. Only two randomized control trials were identified. The majority examined the impact of care on patient care management (n = 17), six focused on comparisons of care with physician care, five examined the impact of models of care including multidisciplinary and outcomes management models, and three assessed involvement and impact on reinforcement of practice guidelines, education, research, and quality improvement. Conclusions: Although existing research supports the use of nurse practitioners and physician assistants in acute and critical care settings, a low level of evidence was found with only two randomized control trials assessing the impact of nurse practitioner care. Overall, a limited number of studies have focused on the impact of NP and PA care in acute and critical care settings, and they are limited in their generalizability because of small sample sizes, use of selected settings, limited populations of interest, and short duration of outcome assessment. However, the existing research on NPs and PAs demonstrates that their integration in the ICU (intensive care unit) positively impacts patient care. NP and PA care has been demonstrated to enhance patient care flow and resident work hours without altering patient outcomes or direct hospital costs and that tasks, activities, and outcomes are similar to resident physicians. Further research that explores the impact of nurse practitioners and physician assistants in the intensive care unit setting on patient outcomes, including financial aspects of care is needed. In addition, ICU teams are effectively incorporating NPs and PAs, yet a limited number of publications share strategies for role implementation and development Information on successful multidisciplinary models of care, is needed to promote optimal use of NPs and PAs in the ICU setting.</p>	<p>Kleinpell, R. M., Ely, E. W. &amp; Grabenkort, R. (2008). Nurse practitioners and physician assistants in the intensive care unit: An evidence-based review. <i>Critical Care Medicine</i>, 36, 2888-2897.</p>

No.	Description	Reference
7	<p>The purpose of this paper was to demonstrate that the medical workforce shortage is an international phenomenon and to review one of the strategies developed in the USA in the late 1960s: the physician assistant model of health service provision. The authors consider whether this model could provide one strategy to help address the medical workforce shortage in Australia. A systematic review of the literature about medical workforce shortages, strategies used to address the medical workforce shortage, and the physician assistant role was undertaken. Literature used for the review covered the period 1967–2006. Physician assistants are health care professionals trained within the medical model of care and licensed to practise medicine under medical supervision. They undertake a range of medical tasks, including physical examination, diagnosing and treating illnesses, ordering and interpreting medical tests, assisting in surgery, writing prescriptions and providing preventive health care services. All these tasks are undertaken within a framework of delegated practice, with the physician assistant either co-located with a doctor or supervised at a distance by a medical officer. In the USA, physician assistants work in a broad range of settings and fields of medicine. The role of physician assistants includes procedural/technical activities, direct patient care, administration, research and medical education. Besides directly caring for patients, they also undertake patient education and health promotion. Those working in primary care fields cover family practice, paediatrics and women's health. The places where they work include private practices with family medicine doctors (equivalent to GP), or in a rural/remote practice associated with a supervising doctor who may be some distance away. Other settings include prison services, walk-in clinics in poorly resourced areas, hospital outpatients and occupational health positions. They also work in hospital and specialist settings. These include trauma centres, renal dialysis services, paediatrics, medical and surgical wards, and specialty units such as gastroenterology, urology, dermatology and cardiac services. Physician assistants provide safe, high-quality and cost-effective primary care services under the direction of a doctor and respond to workforce shortages in rural and remote areas, family practice medicine and hospital settings. According to the studies undertaken over 30 years in a range of clinical settings, the quality of care has not been eroded when physician assistants have been providing the care. Patient acceptance has been well demonstrated, and there have been cost-savings in employing physician assistants in medical practices. Hospitals found that they could substitute about 50–75% of a doctor's work with one physician assistant, with their broad based training enabling them to quickly function in a number of different clinical settings. This model of health care provision has been adopted in several other developed countries, including England, Scotland, the Netherlands and Canada. The physician assistant concept might provide Australia with a novel strategy for addressing its medical workforce shortage, particularly in rural and remote settings.</p>	<p>O'Connor, T. M. &amp; Hooker, R. S. (2007). Extending rural and remote medicine with a new type of health worker: Physician assistants. <i>Australian Journal of Rural Health, 15</i>, 346-351.</p>

No.	Description	Reference
8	<p>Physician assistants (PAs) have been an integral part of the emergency medicine team in the USA for the past 30 years. This review outlines the reasons why PAs can play a vital role in UK National Health Service (NHS). The scope of practice for PAs defines the role of a PA in a specific healthcare environment. Each PA and his or her supervisor agree upon a set of diagnostic and therapeutic modalities that the PA may employ with varying levels of supervision. The scope of practice allows for development and progression of skills of the PA. A key relationship is that of the PA and the supervising physician. It is a relationship built on experience, mutual trust, and reliance. The stronger the relationship the more positive the working environment is for both providers. The physician must feel comfortable delegating tasks to the PA, and the PA must know the physician is available when the complexity of a case or procedure exceeds his or her level of competence. The types of cases seen by a PA depend on the scope of practice and include minor and major illness or injuries, including resuscitation. Some aspects of the role are: history taking and physical examination, and ordering diagnostic tests including radiographs, ultrasound, or computed tomography (CT) scans as needed and interpreting the tests. The PA then administers the necessary treatments as indicated, from prescribing medications, suturing, splinting, minor surgical procedures such as foreign body removal and incision and drainage of abscesses to more invasive procedures such as resuscitation, including central line placement, intubation, inserting chest tubes, and arterial lines. Patient disposition may involve discharge, admission, or referral to a specialist. Another aspect of variability of PA practice in the USA is level of physician supervision. Most PAs practise with a supervising physician on site, although there are PAs in rural areas who treat patients with a supervising physician available for consultations by phone only. The experience of American PAs working in one NHS trust are discussed, highlighting the cultural differences in the environment of the emergency departments in the two countries that will influence the scope of practice of PAs in the UK.</p>	<p>Smith, J. S., Tevis, B., &amp; Murali, K. (2005). Commentary from the front lines: America physician assistants working in a United Kingdom emergency department. <i>Emergency Medicine Journal</i>, 22, 322-324.</p>
Articles in Peer-Reviewed Journals		

No.	Description	Reference
9	<p>This editorial describes a multidisciplinary team which operates in the emergency department at a hospital in Manitoba. At the Seven Oaks General Hospital (SOGH) in Winnipeg, patients presenting to the emergency department are cared for by a multidisciplinary team in a patient-centred collaborative practice model. This highly successful group includes NPs and PAs, who work side by side. Although NPs and PAs have distinct roles, some overlap does occur at times, when it has been determined that the overlap is appropriate. The primary role of the NP is to care for patients who require minor treatment and are in the two lowest triage categories. The primary role of the PA is to care for acutely ill patients. Patients who are likely to need a longer visit, or who have more urgent needs, are cared for on the acute side. When numbers are high, patients with needs that fall within the NP scope of practice may be seen by either the NP or the emergency physician (or PA). Those with needs outside the scope of practice of the NP are seen by the NP working in consultation or collaboration with the emergency physician, or they are referred to a physician (and seen by either the emergency physician or the PA). In the SOGH emergency department, each member of the team works toward their full scope and is supported by the other team members. The "patient first" and "no wait" culture enables the team to flex to meet patients' needs. The team is providing care to a patient population that has increased at least 30 per cent since 2008, yet wait times, length of stay and "left, not seen" rates have declined to enviable levels - all without a significant increase in baseline staffing. With assistance from PAs, emergency physicians can now focus on patients with the most acute needs, and they have more time for consultation with team members. NPs regard the opportunity to consult with emergency physicians and PAs as a key benefit of the current model. Bringing NPs and PAs into the model has been an extremely successful move. The author reports that patients like it, too, giving high ratings to their overall care experience. The authors states that she believes that these positive assessments are evidence of good care from a high-functioning team, and that the model maximizes the strength and efficiency of the team, which benefits from the contributions of all its members.</p>	<p>Dunlop, K. (2011). A team designed to meet patients' needs. <i>Canadian Nurse</i>, 107(1), 36.</p>

No.	Description	Reference
10	<p>In some sub-Saharan African countries non-physician clinicians have to perform major general surgery without medical officers and surgeons. The safety of this practice has not been established. The aim of this study was to evaluate the contribution of clinical officers (COs) to major general surgery at Zomba Central Hospital. Zomba Central Hospital is one of four central hospitals in Malawi and is a teaching hospital of the Malawi College of Health Sciences for Clinical Officers. It serves as the district hospital for the Zomba District including Zomba City (670,000 population) and as the referral hospital for the south-eastern zone. The total catchment population is 2.6 million people. During the study period the surgical section of the Department of Surgery and Orthopaedics was staffed with an average of one surgeon and four COs. There were no medical officers. Malawi is one of five sub-Saharan countries where non-physician clinicians (NPCs) perform major surgery. They are called clinical officers (COs) and undergo a three-year pre-service training period followed by a one-year internship. Their formal practical surgical training is limited to a three-month rotation in general surgery and obstetrics and gynaecology. After graduating they are able to perform minor surgical and obstetric procedures including caesarean sections. There is no postgraduate training programme which provides formal theoretical or academic surgical training. Thus, most of the COs' surgical skills are acquired through on-the-job instruction by supervisors with varying levels of surgical expertise. At central hospitals, COs work alongside specialists and make a significant contribution to all aspects of surgical care. The authors performed a retrospective five-year period study during 2003-2007. The perioperative outcome for three procedures was analysed. During the study 2931 major general surgical procedures were performed: 1437 (49%) by surgeons; 366 (12.5%) by COs assisted by surgeons; and 1128 (38.5%) by COs alone. COs performed 50% of prostatectomies, ventriculo-peritoneal-shuntings (VP-shunting) and strangulated hernia repairs with bowel resection alone. Baseline parameters and perioperative outcomes of the patients who underwent operations with surgeons present (as operator or assistant, 'surgeon group') or patients operated by COs alone ('CO group') were similar. For VP-shunting, postoperative mortality rates, wound infection rates, rates of early shunt revision and shunt removal were not statistically different between the two groups. The average postoperative hospital stay for the group as a whole was nine days (3-35) with a significantly shorter hospital stay in the surgeon group (8 versus 10 days, <math>P = 0.03</math>). Within the study period nine additional shunt revisions and six shunt explants were performed in patients who had been re-admitted to our institution. Of these, the number primarily operated by COs alone was not significantly different from those in which a surgeon was present during the VP-shunting (5 versus 4, <math>P = 0.74</math>, and 4 versus 2, <math>P = 0.44</math>, respectively). For patients with strangulated hernia who were undergoing hernia repair with bowel resection and anastomosis, the overall wound infection rate was 18.9%. Only one patient in the CO group developed an entero-cutaneous fistula which was successfully treated conservatively. In the group as a whole, three patients (5.7%) required re-operation for postoperative peritonitis (two) or bowel ischemia (one). Overall, the median postoperative hospital stay was 10 (5-60) days. The postoperative mortality rate was 3.8%. There was no statistically significant difference between the CO group and the surgeon group for any of the parameters measured. For patients who underwent transvesical prostatectomy for BPH, in the CO group, 19.5% of the patients received a perioperative blood transfusion, compared to only 9.9% in the surgeon group (<math>P = 0.06</math>). An analysis of the group as a whole revealed a high postoperative infection rate of 28.5%. Temporary urine leakage via the incision site was noted in 9.8% of the patients and 5.6% required re-operation, mostly for removal of intravesical blood clots or secondary bladder closure. The combined perioperative mortality rate was 4.2% (9/214). In cases operated by COs alone, postoperative hospital stay was slightly longer than in the group where a surgeon was present (16 versus 15 days, <math>P = 0.05</math>). No other perioperative outcome parameter differed between the two groups of operators. In a subgroup analysis of the surgeon group there was no significant difference in outcomes for any of the three procedures, whether the surgeon participated as operator or assistant to a CO. The authors conclude that COs can safely perform major general surgery when adequate training and supervision are provided.</p>	<p>Wilhelm, T. J., Thawe, I. K., Mwatibu, B., Mothes, H., &amp; Post, S. (2011). Efficacy of major general surgery performed by non-physician clinicians at a central hospital in Malawi. <i>Tropical Doctor</i>, 41, 71-75.</p>

No.	Description	Reference
11	<p>BACKGROUND: Residency reform in the form of work hour restrictions has forced academic medical centers to develop alternate models of care to provide inpatient care. One such model is the use of physician assistants (PAs) with hospitalists. However, these models of care have not been widely evaluated. OBJECTIVE: To compare the outcomes of inpatient care provided by a hospitalist-PA (H-PA) model with the traditional resident based model. The H-PA team consisted of an attending physician (always a hospitalist) paired with one PA; for some patients (about half), the attending served a supervisory role for the PA; the attending serves as the sole care provider for the remaining patients. Traditional resident teams consisted of an attending physician (a hospitalist, a non-hospitalist general internist, or a specialist) paired with a senior resident, two interns, and two to three medical students; the attending physician served an supervisory role for all patients. Both types of team received patients admitted through the emergency room, clinics, and other hospitals. DESIGN, SETTING and PATIENTS: We conducted a retrospective cohort study of 9681 general medical (GM) hospitalizations between January 2005 and December 2006 using a hospital administrative database. We used multivariable mixed models to adjust for a wide variety of potential confounders and account for multiple patient visits to the hospital to compare the outcomes of 2171 hospitalizations to H-PA teams with those of 7510 hospitalizations to resident teams (RES). MEASUREMENTS: Length of stay (LOS), charges, readmission within 7, 14, and 30 days and inpatient mortality. RESULTS: Inpatient care provided by H-PA teams was associated with a 6.73% longer LOS (<math>P= 0.005</math>) but charges, risk of readmission at 7, 14, and 30 days and inpatient mortality were similar to resident-based teams. The increase in LOS was dependent on the time of admission of the patients. CONCLUSIONS: H-PA team-based GM inpatient care was associated with a higher LOS but similar charges, readmission rates, and inpatient mortality to traditional resident-based teams, a finding that persisted in sensitivity analyses.</p>	<p>Singh, S., Fletcher, K. E., Schapira, M. M., Conti, M., Tarima, S., Biblo, L. A., &amp; Whittle, J. (2011). A comparison of outcomes of general medical inpatient care provided by a hospitalist-physician assistant model vs. a traditional resident-based model. <i>Journal of Hospital Medicine</i>, 6(3), 122-130.</p>

No.	Description	Reference
12	<p>Background: Recent increases in orthopedic surgical services in Canada have added further demand to an already stretched orthopedic workforce. Various initiatives have been undertaken across Canada to meet this demand. One successful model has been the use of physician assistants (PAs) within the Winnipeg Regional Health Authority (WRHA). This study documents the effect of PAs working in an arthroplasty practice from the perspective of patients and health care providers. The authors also describe the costs, time savings for surgeons and the effects on surgical throughput and waiting times. The addition of PAs to the Concordia Joint Replacement Group (CJRG) team has allowed a single surgeon to run two rooms during a single operating day, increasing the volume from three to seven primary joints per day. This was accomplished by using one physician assistant per room, with each room having its own dedicated nursing team and anesthesiologist. While the surgeon operates in one room with assistance from the first physician assistant, the second physician assistant helps to position, prepare and drape the next patient in the second room. On completion of the first operation, the surgeon leaves the first room to immediately start operating in the second room. When the surgeon leaves the first room, the first physician assistant closes the incision, completes the paperwork and assists with room changeover. Methods: The authors calculated time savings by the use of a daily diary kept by the PAs. Surgeons', residents', nurses' and patients' opinions about PAs were recorded by use of a self-administered questionnaire. They calculated costs using forgone general practitioner (GP) surgical assist fees and salary costs for PAs. They obtained information about surgical throughput and wait times from the WRHA waitlist database. Results: In this study, PAs "saved" their supervising physician about 204 hours per year; this time can be used for other clinical, administrative or research duties. Physician assistants are regarded as important members of the health care team by surgeons, nurses, orthopedic residents and patients. When the authors compared the billing costs with those that would have been generated by the use of GP surgical assists, PAs were essentially cost neutral. Furthermore, they potentially freed GPs from the operating room to spend more time delivering primary care. The authors found that use of the double operating room model facilitated by PAs increased the surgical throughput of primary hip and knee replacements by 42%, and median wait times decreased from 44 weeks to 30 weeks compared with the preceding year. Conclusion: Physician assistants integrate well into the care team and can increase surgical volumes to reduce wait times in a cost-effective manner.</p>	<p>Bohm, E. R., Dunbar, M., Pitman, D., Rhule, C. &amp; Araneta, J. (2010). Experience with physician assistants in a Canadian arthroplasty program. <i>Canadian Journal of Surgery</i>, 53(2), 103-108.</p>

No.	Description	Reference
13	<p>The existing literature on the use of mid-level providers (MLPs) in inpatient venues is quite limited, and a recent review, while suggesting that the existing literature does describe benefits of MLPs in the inpatient setting, also states that the overall quality of the evidence is quite poor and that many studies suffer from significant limitations, including small populations, limited patient mixes, use of selected settings, and short durations of outcome assessment. There have been other studies examining the use of MLPs in the inpatient setting in internal medicine. Some of these studies have suggested that MLP-based models result in equivalent outcomes and efficiency to traditional teaching or nonteaching physician-only models. There are two important caveats, however, that must be considered. The total resources required for such models may be quite high, especially taking into account the costs of 24/7 coverage and physician backup of the MLPs, and most importantly there is almost no literature that robustly examines ultimate clinical outcomes in these models. Notably, while the evidence base in internal medicine is not robust, many studies have described successful use of MLPs in non-internal medicine inpatient settings. The reasons for this success is debatable, but it may be that MLPs are more successful in settings where the care is either more protocol-driven or where there is less diagnostic and therapeutic complexity. Given the paucity of data, it is clear that further research is needed on the role of MLPs in hospital medicine. While waiting for such evidence to appear, it may be worthwhile to reflect on the recent experience of three major medical centers. A recent article (see entry XX, below) described five hospitalist models at major academic medical centers across the country. Two of the institutions described at the time (University of Michigan Health System, Ann Arbor, MI; and Brigham and Women's Hospital, Boston, MA) utilized MLPs as a major element of their staffing of nonresident hospitalist services while another had previously used MLPs as part of its model but phased them out about one year prior to publication of the article. Recently one of these institutions (Michigan) has chosen to phase out MLPs. At Michigan, a four-year experience with PAs on a general-medicine focused hospitalist service eventually led to the conclusion that continued use of PAs was not cost-effective. Significant barriers to success included a steep learning curve and the significant time required before PAs developed sufficient autonomy and efficiency in caring for a highly complex heterogeneous patient population. A key point is that in each institution, MLPs continue to play an important role in some specialty inpatient areas such as Hematology/ Oncology and Bone Marrow Transplant, which is where MLPs have traditionally found their niche in inpatient Internal Medicine. These "focus shops" allow MLPs to develop a niche and expertise in a specialized area, where they may become more autonomous and efficient than house staff. Thus these settings may be more appropriate for MLPs than a heterogeneous general medicine inpatient setting. The authors note they have some limited data from the Society of Hospital Medicine (SHM) annual survey that looks at MLPs in hospital medicine but the number of respondents for most data elements is less than 70, making generalizability difficult. Nonetheless, the data suggest that MLPs in hospital medicine average about 60% to 75% of the productivity of a physician when measured by encounters, although there is wide variability depending on the employment model (academic vs. multispecialty group). Importantly, the existing data do not provide any measure of how much physician input is provided to these MLPs but the authors suspect that in most models there is some physician time and input. If one presumes that the MLPs bill independently and collect 85% of the physician fee schedule for a Medicare population, then collections would be about 50% to 65% of a typical physician. Given that median total compensation including benefits from the SHM survey was \$120,000 for MLPs and \$216,000 for physicians—about a 55% ratio—this would argue for potential financial neutrality when substituting MLPs for physicians in a 2:1 ratio but only if one presumes they require no physician supervision, which in the authors' own experience is not likely in a general medicine population. The authors conclude that while some literature exists that suggests that MLPs can successfully be used in the inpatient internal medicine setting, it is important to note that the evidence is quite limited and cannot be generalized across all care settings and patient populations. There is an urgent need to gather more data and share our collective experiences to better inform our decision-making before we state that MLPs are the solution to workforce shortages in hospital medicine. In addition, existing data and experience suggest that MLPs may not be a cost-effective workforce solution for complex general medical patients who require significant physician input. The authors believe that redesigning the clinical training of MLPs to focus on inpatient skills may hold promise and encourage interested parties to consider developing partnerships with MLP training programs and hospital medicine groups, as a way to build a more robust and successful hospital medicine MLP workforce.</p>	<p>Parekh, V. I. &amp; Roy, C. L. (2010). Nonphysician providers in hospital medicine: Not so fast. <i>Journal of Hospital Medicine</i>, 5(2), 103-106.</p>

No.	Description	Reference
14	<p>Objective: The aim of this study was to evaluate the quality of care provided by physician assistants or nurse practitioners (i.e., midlevel providers [MLPs]) in acute asthma, as compared with that provided by physicians. Methods: The authors performed a secondary analysis of the asthma component of the National Emergency Department Safety Study. They identified emergency department (ED) visits for acute asthma in 63 urban EDs in 23 US states between 2003 and 2006. Quality of care was evaluated based on 12 guideline-recommended process-of-care measures, a composite guideline concordance score, and two outcome-of-care measures (admission and ED length of stay). Results: Of the 4,029 patients included in this analysis, 3,622 (90%) were seen by physicians only, 319 (8%) by MLPs supervised by physicians, and 88 (2%) by MLPs not supervised by physicians. Performance rates for supervised MLPs were generally similar to physicians' rates; however, performance rates for unsupervised MLPs were generally lower than physicians' rates. After adjustment for patient mix, unsupervised MLPs were less likely to administer inhaled <math>\beta</math>-agonists within 15 minutes of ED arrival (odds ratio [OR], 0.2; 95% confidence interval [CI], 0.1-0.7), less likely to prescribe systemic corticosteroids in the ED (OR, 0.4; 95% CI, 0.2-0.9), and were more likely to prescribe inappropriate antibiotics at discharge (OR, 2.1; 95% CI, 1.1-4.1), as compared with physicians. Overall, their composite guideline concordance score was lower than that of physicians (-6 points; 95% CI, -9 to -3 points). Patients cared for by unsupervised MLPs had a shorter ED length of stay and were less likely to be admitted, as compared with patients cared for by physicians or supervised MLPs. Supervised MLPs provided similar quality of care to that of physicians. Conclusions: The MLPs were involved in 10% of ED patients with acute asthma and provided independent care for two percent of these patients. Compared with care provided by physicians or by supervised MLPs, there are opportunities for improvement in unsupervised MLP care.</p>	<p>Tsai, C.-L., Sullivan, A. F., Ginde, A. A., Camargo, C. A. (2010). Quality of emergency care provided by physician assistants and nurse practitioners in acute asthma. <i>The American Journal of Emergency Medicine</i>, 28(4), 485-491.</p>

No.	Description	Reference
15	<p>Objective: Census data published by professional organizations indicate an upward trend in the number of physician assistants (PAs) working in many specialty fields, including the subspecialty of trauma surgery. As the role of hospital-based PAs and nurse practitioners (NPs) continues to evolve, greater understanding of these roles will help identify future employment trends for these professions. The purpose of this study is to determine the prevalence of PAs and NPs in US trauma centers, to document their roles, and to identify their potential future utilization by trauma centers. Methods: A survey was mailed to 464 directors of major trauma centers in the United States. The survey was designed to evaluate trauma centers' utilization of PAs/NPs. Respondents were asked to identify specific daily tasks of PAs/NPs and to indicate potential for their future utilization. Results: Two hundred forty-six (246) of 464 surveys were returned, for a response rate of 53%. Approximately one-third (34.6%) of respondents reported utilization of NPs and 32.9% reported utilization of PAs on their hospital trauma service. More American College of Surgeons (ACS)-verified trauma facilities utilized PAs/NPs than did nonverified facilities; and Level I trauma centers used significantly more PAs/NPs than did Level II trauma centers. Nineteen percent (19%) of respondents who did not currently utilize PAs/NPs indicated that they intended to do so in the future. The majority of facilities utilized PAs/NPs to assist with trauma resuscitation and in performing traditional tasks, including obtaining and dictating histories and physical findings, participating in rounds on the general medical floor, and dictating discharge summaries. Fewer than half of reporting facilities indicated that PAs/NPs performed more invasive procedures, such as inserting arterial lines, central lines, chest tubes, and intracranial pressure monitors. The majority of responding trauma centers utilized PAs/NPs in trauma resuscitation and in traditional tasks of a surgical PA/NP. A number of these facilities reported that PAs/NPs performed invasive procedures such as inserting chest tubes (38%), arterial lines (31%), central lines (37%), and intracranial pressure monitors (7%). In addition to caring for trauma patients, 55.2% of trauma PAs/NPs provided direct patient care to nontrauma, critical care patients. Only 7.5% of PAs/NPs utilized on responding trauma services functioned as members on other specialized rapid response teams (eg, code blue, sepsis, and stroke). Conclusions: PAs and NPs are increasingly utilized as clinicians in the surgical subspecialty of trauma. In most trauma centers, PAs/NPs are utilized to complete the traditional duties of a surgical PA/NP, with fewer performing invasive procedures. Finally, 19% of responding trauma centers who do not currently utilize PAs/NPs state that they intend to in the future, indicating the potential for continued job growth for PAs/NPs in trauma care. This evaluation of the utilization of PAs/NPs in direct care to trauma patients indicates acceptance of PAs/NPs in trauma staffing models.</p>	<p>Nyberg, S. M., Keuter, K. R., Berg, G. M., Helton, A. M., &amp; Johnston, A. D. (2010). A national survey: Acceptance of physician assistants and nurse practitioners in trauma centers. <i>Journal of the American Academy of Physician Assistants</i>, 23(1), 35-37, 41.</p>

No.	Description	Reference
16	<p>Objective: The authors sought to assess the impact of the integration of the new roles of primary health care nurse practitioners (NPs) and physician assistants (PAs) on patient flow, wait times and proportions of patients who left without being seen (LWBS) in six Ontario emergency departments (EDs). Physician assistants were introduced to Ontario through this project as an unregulated provider, and work without medical directives under the supervision of a registered physician who was responsible for all patient care. Unlike NPs, PAs are precluded from taking independent medical actions. The specific duties of each PA varied by site, but, in general, PAs saw patients with a wider range of acuity levels than NPs. Primary health care NPs are regulated health professionals registered with the College of Nurses of Ontario (CNO). As per CNO's directives, NPs practise autonomously for CTAS-IV and -V patients and work in conjunction with a physician to see CTAS-III or higher acuity patients. Physicians interacted with both NPs and PAs for interpreting any diagnostic imaging and for the management of CTAS-III or higher acuity patients. All members of the new staff were expected to comply with ED policies and guidelines. In some centres with higher volumes, an NP and PA occasionally worked simultaneously, although this was uncommon. Methods: The authors performed a retrospective review of health records data on patient arrival time, time of initial assessment by a physician, time of discharge from the ED and discharge status. Results: Whether a PA or NP was directly involved in the care of patients or indirectly involved by being on duty, the wait times, lengths of stay and proportion of patients who left without being seen were significantly reduced. After adjustment for hospitals, time of day and acuity, when a PA or NP were directly involved in patients' care, patients were 1.6 (95% confidence interval [CI] 1.3-2.1, <math>p &lt; 0.05</math>) and 2.1 (95% CI 1.6-2.8, <math>p &lt; 0.05</math>) times more likely to be seen within the wait time benchmarks, respectively. After adjustment, when a PA was on duty (but not being directly involved with the patients' care), the odds of a patient being assessed within the wait time benchmark were 1.9 times higher than when a PA was not on duty (95% CI 1.6-2.4, <math>p &lt; 0.01</math>). Lengths of stay were 30.3% (95% CI 21.6%-39.0%, <math>p &lt; 0.01</math>) and 48.8% (95% CI 35.0%-62.7%, <math>p &lt; 0.01</math>) lower when PAs and NPs, respectively, were involved; the mean LOS changed from 262.4 minutes to 182.9 minutes when a PA was involved. Although not as dramatic an effect, having a PA or NP on duty also had a statistically significant effect (PA: 95% CI 3.6% - 14.1% <math>p &lt; 0.01</math>; NP: 95% CI 4.6%-13.9%, <math>p &lt; 0.01</math>) on the mean LOS of patients. When a PA or an NP was on duty, the proportion of patients who left without being seen was significantly reduced. The absolute improvements, not controlling for hospital or acuity, were 24.6% for PAs (the LWBS rate decreased from 6.5% to 4.9%) and 17.6% for NPs (the LWBS rate dropped from 5.1% to 4.2%). When a PA was on duty, controlling for hospital, time of day and acuity, the likelihood that a patient left without being seen was less than half than when a PA was not on duty (44%, 95% CI 31% - 61%, <math>p &lt; 0.01</math>). Conclusion: The addition of PAs or NPs to the ED team can improve patient flow in medium-sized community hospital EDs. Given the ongoing shortage of physicians, use of alternative health care providers should be considered. These results require validation, as their generalizability to other locations or types of EDs is not known.</p>	<p>Ducharme, J., Alder, R. J., Pelletier, C., Murray, D. &amp; Tepper, J. (2009). The impact on patient flow after the integration of nurse practitioners and physician assistants in 6 Ontario emergency departments. <i>Canadian Journal of Emergency Medicine</i>, 11(5), 455-461.</p>

No.	Description	Reference
17	<p>Background: Optimizing human resources at trauma facilities may increase quality of care. The purpose of this study was to assess whether staffing changes within a Level I trauma center improved mortality and shortened length of stay (LOS) for trauma patients. Methods: Mortality, hospital LOS, and intensive care unit LOS were evaluated during three time periods: trauma service coverage by in-house general surgery residents and attendings ("group 1"), the creation of a core trauma panel with in-house trauma surgeons ("group 2"), and the addition of physician assistants (PAs) to the core trauma panel ("group 3"). Logistic regression and X<sup>2</sup> tests were used to compare mortalities, and multiple linear regression, t-tests, and median tests were used to compare LOS. Results: There were 15,297 adult patients with trauma included in the analysis. After adjustment for transfers-in, mechanism of injury, injury severity score, age, and head injury, the presence of in-house trauma surgeons (group 2) decreased the following compared with group 1: overall mortality (3.12% vs. 3.82%, p = 0.05), mortality in the severely injured (11.41% vs. 14.83%, p = 0.02), and median intensive care unit LOS (3.03 days vs. 3.40 days, p = 0.006). The introduction of PAs to the core trauma panel (group 3 vs. group 2) decreased overall mortality (2.80% vs. 3.76%, p = 0.05), and reduced mean and median hospital LOS (4.32 days vs. 4.69 days, p 0.05; and 3.74 days vs. 3.88 days, p 0.02, respectively). Conclusion: The presence of in-house core trauma surgeons and PAs improves management and outcome of critically injured trauma patients within a level I trauma center.</p>	<p>Mains, C., Scarborough, K., Bar-Or, R., Hawles, A., Huber, J., Bourg, P., &amp; Bar-Or, D. (2009). Staff commitment to trauma care improves mortality and length of stay at a level I trauma center. <i>The Journal of Trauma</i>, 66(5), 1315-1320.</p>
18	<p>Purpose: To identify characteristics and outcomes of patients who use physician assistants and nurse practitioners (PA/NPs) as a usual source of care. Methods: Cross sectional analysis using the telephone and mail surveys of the Wisconsin Longitudinal Study (WLS), a prospective cohort study of Wisconsin high school graduates and selected siblings (n = 6,803). Findings: Individuals from metropolitan (OR = 0.40, 95% CI = 0.29-0.54) and micropolitan (OR = 0.65, 95% CI = 0.44-0.95) areas were less likely to utilize PA/NPs than participants from rural locations. Participants without insurance or with public insurance other than Medicare were more likely than those with private insurance to utilize PA/NPs (OR = 1.71, 95% CI = 1.02-2.86). Patients of PA/NPs were more likely to be women (OR = 1.77, 95% CI = 1.34-2.34), younger (OR = 0.95, 95% CI = 0.92-0.98) and have lower extroversion scores (OR = 0.81, 95% CI = 0.68-0.96). Participants utilizing PA/NPs reported lower perceived access (<math>\beta</math> = -0.22, 95% CI = -0.35-0.09) than those utilizing doctors. PA/NP utilization was associated with an increased likelihood of chiropractor visits (OR = 1.57, 95% CI = 1.15-2.15) and decreased likelihood of a complete health exams (OR = 0.74, 95% CI = 0.55-0.99) or mammograms (OR = 0.65, 95% CI = 0.45-0.93). There were no significant differences in self-rated health or difficulties/delays in receiving care. Conclusions: Populations served by PA/NPs and doctors differ demographically but not in complexity. Though perceived access to care was lower for patients of PA/NPs, there were few differences in utilization and no differences in difficulties/delays in care or outcomes. This suggests that PA/NPs are acting as primary care providers to underserved patients with a range of disease severity, findings which have important implications for policy, including clinician workforce and reimbursement issues.</p>	<p>Everett, C. M., Schumacher, J. R., Wright, A., &amp; Smith, M. A. (2009). Physician assistants and nurse practitioners as a usual source of care. <i>The Journal of Rural Health</i>, 25(4), 407-414.</p>

No.	Description	Reference
19	<p>This study describes a comparative analysis of replacing medical residents with physician assistants and hospitalists on patient outcomes in a community hospital. Thirty resident house staff and 9.5 full-time equivalent attending physicians were replaced by 23 PAs and 12.5 full-time equivalent attending physicians. As in the residency model, PAs were assigned to general medical floors, the medical ICU, the coronary care unit, the subacute/intermediate care unit, and monitored settings (telemetry unit) on a rotational basis. In contrast to the medical residency model, in which an attending physician was available on the medical floor for direct supervision of house staff during teaching rounds and for indirect supervision during off-hours, in the PA-hospitalist model, an attending physician was available for direct supervision of PAs for each team during regular hours, and an in-house attending physician was available during all off-hours and on weekends. There was no difference between the two models in ICU/coronary care unit coverage during the daytime. However, during off-hours on weekdays and on weekends, one subspecialty fellow/attending physician (not necessarily ICU trained) was available in house to supervise residents in the residency model versus an intensivist (critical care-trained physician) in the PA-hospitalist model. The PAs participated in all aspects of patient assessment, diagnostic testing, and therapy. They followed their assigned patients from admission to discharge from the medical service. All PA activities were supervised by hospitalists (internists and/or intensivists) who were available 24 hours a day, seven days a week. Hospitalists comprised academic faculty (licensed attending physicians) whose role was to provide didactic teaching and round-the-clock supervision of PAs in acute care medicine, a model not very different from the traditional medical residency training model. Physician assistants received attending-supervised training in invasive procedures (eg, central lines, arterial lines, Swan-Ganz catheterization, endotracheal intubation). Physician assistants participated in all cardiopulmonary resuscitation activities throughout the hospital under the direct supervision of an ICU attending. Prospective data during the physician assistants–hospitalists service for two years was compared with two years of retrospective data of the medical residents model. Outcome measures included mortality, adverse events, readmissions, and patient satisfaction. For physician assistants–hospitalists versus medical residents models, all cause and case mix index–adjusted mortality was 107/5508 (1.94%) and 0.019 versus 156/5458 (2.85%) and 0.029, respectively (<math>P \leq .001</math>). The adverse event cases were nine versus five (<math>P = .29</math>), and the readmission rate within 30 days was 64 versus 69 (<math>P = .34</math>). Patient satisfaction was 95% versus 96% (<math>P = .33</math>). Quality of care provided by the physician assistants–hospitalists model was equivalent. All-cause and case mix index–adjusted mortality was significantly lower during the physician assistants–hospitalists period. Although the application of these findings to other institutions requires further study, the authors found no intrinsic barriers that would impede implementation elsewhere.</p>	<p>Dhuper, S. &amp; Choski, S. (2009). Replacing an academic internal medicine residency program with a physician assistant-hospitalist model: A comparative analysis study. <i>American Journal of Medical Quality</i>, 1(2), 132-139.</p>

No.	Description	Reference
20	<p>The increasing use of physician assistants (PAs) in surgical settings is part of a continuing trend of PA specialization, and many graduate medical education (GME) programs in teaching hospitals have hired PAs to augment physician housestaff duties. PAs have been shown to be effective in these roles by contributing to the continuity of care and enhancement of resident educational experiences. The increasing use of PAs in hospital settings and on inpatient units comes as part of a larger trend of PA specialization. According to the American Academy of Physician Assistants census data, over 65% of the nation's estimated 73,000 PAs work in specialties and subspecialties, and their distribution reveals a declining percentage working in primary care, from 50% in 1997 to 34.5% in 2008. Increasingly popular specialties for PAs include general surgery/surgical subspecialties (25%), emergency medicine (10%), the subspecialties of internal medicine (11%), and dermatology (4%). More than 8% work in orthopedics; only 2% are in obstetrics/gynecology. The percentage of PAs working in the surgical subspecialties has increased steadily. The most recent 5-year PA primary work setting data trend reveals a gradual increase in the percentage of PAs who work in intensive care units (from 1.9% to 2.3%), inpatient units (from 9% to 10.3%), and other hospital units (from 1.2% to 1.4%), with a gradual decrease in the number of PAs working in operating rooms (from 6.9% to 6.4%). The declining use of PAs as intraoperative surgical assistants seems to confirm the notion that their use in surgical residency training settings enables residents to spend more time in the operating room while PAs primarily provide perioperative patient care with oversight by staff attending physicians. One strategy for educating and training specialty PAs to help augment perioperative surgical workforce needs for acute and critically ill patients is PA postgraduate training programs, which are typically offered as formal one year experiences following entry-level PA education and based on the GME model. Many academic health centers (AHCs) are well positioned to host such educational programs by collaborating with PA educators to develop additional surgical postgraduate training programs. The authors propose a model to produce an increased supply of specialty-trained PAs to serve as permanent hospital-based clinicians who could enable surgical residency training programs to meet critical resident education and operative experience needs by providing team-oriented and physician-supervised perioperative care.</p>	<p>Jones, P. E., &amp; Cawley, J. F. (2009). Workweek restrictions and specialty-trained physician assistants: Potential opportunities. <i>Journal of Surgical Education</i>, 66, 152-157.</p>

No.	Description	Reference
21	<p>The authors assessed whether physician assistant (PA) and nurse practitioner (NP) utilization increases liability. In total, 17 years of data compiled in the United States National Practitioner Data Bank (NPDB) was used to compare and analyze malpractice incidence, payment amount and other measures of liability among doctors, PAs and advanced practice nurses (APNs). From 1991 through 2007, 324,285 NPDB entries were logged, involving 273,693 providers of interest. Significant differences were found in liability reports among doctors, PAs and APNs. Physicians made, on average, malpractice payments twice that of PAs but less than that of APNs. During the study period the probability of making a malpractice payment was 12 times less for PAs and 24 times less for APNs. The rate and amount of malpractice payments was compared; a ratio of malpractice payments per total number of active providers in 2006 (the most recent year that demographic data was available for all provider groups) for each provider type was computed. There were 12,495 payments for 774,883 physicians, 113 payments for 63,609 PAs and 264 payments for 268,293 APNs. These ratios were 1:62, 1: 563 and 1:1,016, respectively. The number of malpractice payments during the 17-year period per average number of active providers within the 17-year study period was also calculated. There was one payment report for every 2.7 active physicians, one for every 32.5 active PAs and one for every 65.8 APNs (combined active and non-active). Assuming one malpractice payment per provider, 37 percent of physicians, 3.1 percent of PAs and at least 1.5 percent of APNs would have made a malpractice payment during the 17-year period. For all three providers, missed diagnosis was the leading reason for malpractice report, and female providers incurred higher payments than males. Trend analysis suggests that the rate of malpractice payments for physicians, PAs and APNs has been steady and consistent with the growth in the number of providers. There were no observations or trends to suggest that PAs and APNs increase liability. If anything, they may decrease the rate of reporting malpractice and adverse events. From a policy standpoint, it appears that the incorporation of PAs and APNs into American society has been a safe and beneficial undertaking, at least when compared to doctors.</p>	<p>Hooker, R. S., Nicholson, J. G., &amp; Le, T. (2009). Does the employment of physician assistants and nurse practitioners increase liability? <i>Journal of Medicine Licensure and Discipline</i>, 95(2), 6-16.</p>

No.	Description	Reference
22	<p>Study Objectives: The American College of Emergency Physicians (ACEP) endorses emergency medicine (EM) residency training as the only legitimate pathway to an EM career, yet the economic reality of Iowa's rural population will continue to support the hiring of non-board certified physicians. Rural communities struggle to support emergency physicians because of their smaller populations and inadequate patient volumes. This survey will determine the minimum population needed to support an emergency physician and examine the market forces that contribute to emergency department (ED) staffing with emergency physicians versus family physicians in Iowa. This project was supported by an ACEP Chapter Development Grant. Methods: The research team identified a member of the ED administration at all 119 Iowa hospitals and asked the following: 1. What are the qualifications of your emergency staff? a. Do you hire emergency physicians only? b. Do you hire family physicians only? c. Do you hire a combination of family and emergency physicians? 2. What area of the state do you provide emergency medical care to? 3. What are your reasons for hiring your choice of ED staff in question 1? The population of the catch area of each hospital was calculated to determine the minimum population that supports the ED categories listed in question 1. Results: 119 of 119 hospitals responded to this survey (100% response rate). It was found that only 14 (11.8%) of Iowa emergency departments exclusively utilize emergency physicians in order to staff their ED. 76 (63.9%) utilize a combination of emergency physicians and family physicians, while 27 (22.7%) of Iowa hospitals solely use family physicians in their ED. It was also found that 46 (38.7%) of Iowa emergency departments utilize physician's assistants or NP's in solo coverage. It was determined that the minimum population in the state of Iowa to support exclusive ACEP coverage is 25,136, with a mean population of 88,143. Also, the minimum population to support a combination (emergency physicians and family physicians) is 1465, with a mean population of 18,244. The most common reasons cited by emergency departments hiring only family physicians included recruiting difficulties of emergency physicians, the low patient census did not require emergency physician specialty training, and the hospital was satisfied with the quality of care provided by family physicians. Emergency departments that hired a combination of family physicians and emergency physicians cited factors that included the ability to increase recruiting of family physicians for local clinic with the incentive of no required ED coverage, less ED call increases time off for local physicians, and the care of patients in clinic increases with family physicians not being called away from clinic. Finally, emergency departments that hired only emergency physicians cited factors that included the quality of care provided by emergency physicians, high patient acuity best supported by emergency physicians, and a high patient census best supported by emergency physicians. Conclusion: Many emergency departments in Iowa, a predominantly rural state, remain staffed by family physicians. In fact, without the contribution of family physicians, large areas of the state would be unable to provide adequate emergency care. Emergency physicians remain concentrated in urban areas of the state, where patient volumes and acuity support their hiring.</p>	<p>House, H., Young, R., &amp; DeRoo, E. (2009). Penetration of board certified emergency physicians into rural emergency departments in Iowa. <i>Annals of Emergency Medicine</i>, 54, S64.</p>

No.	Description	Reference
23	<p>To understand trends in emergency medicine and interprofessional roles in delivering this care, we analyzed a 10-year period (1995 – 2004) by provider, patient characteristics, and diagnoses. The focus was on how doctors, physician assistants (PAs) and nurse practitioners (NPs) share emergency medicine visits. The National Hospital Ambulatory Medical Care Survey of over 1 billion “weighted” emergency room visits for 1995 to 2004 was analyzed. The majority of patients were female (53.2%); the mean age of all patients was 35.3 years old. By 2004, physicians were the provider of record for emergency visits at 92.6%, with PAs at 5.7% and NPs at 1.7%. Emergency visits increased for all three providers over the ten years with PA growth doubling during this same period (patients seen by PAs increased significantly over those seen by physicians or NPs, from 3.5% 7.9%). Medications were prescribed for three-quarters of the visits and were consistent in the mean number of prescriptions written across the three prescribers. No significant differences emerged when urban and rural settings were compared. Expansion of the roles and interprofessional care provided by NPs and PAs include increasing acceptance, clarification of legal and regulatory aspects of practice, shared roles, team approaches to shortages of fully-trained doctors, and the limitation of working hours of physician postgraduate trainees. The US forecast for emergency department visits is expected to outpace the growth of the population and the supply of emergency medicine providers. In view of an increasing emergency medical demand and a continuing shortage of physician personnel, policies are needed for workforce planning to meet the demand. The degree to which 110,000 or more NPs and PAs are utilized and work together as part of interprofessional teams is only now becoming understood. Interprofessional in this context means that more than one branch of knowledge (e.g., nursing and medicine) is integrated to the approach of emergency medicine services). In the US, PAs and NPs are increasingly used in roles traditionally dominated by doctors and produce services that both overlap and complement each other. A national study on hospital outpatient services found that PA/NPs produce about 10% of services compared to doctors in the same setting. Many of these visits involved working together with a doctor or another PA/NP in a collaborative role. Unfortunately the literature on these collaborative efforts is sparse and it has been demonstrated that national databases on provider services substantially underreport the role of PAs and NPs due to inherent problems with how the data is collected.</p>	<p>Hooker, R. S., Ciper, D. J., Cawley, J. F., Herrmann, D., &amp; Melson, J. (2008). Emergency medicine services: Interprofessional care trends. <i>Journal of Interprofessional Care</i>, 22(2), 167-178.</p>

No.	Description	Reference
24	<p>This article discusses changes in the delivery of primary care relating to nurse practitioners (NPs) and physician assistants (PAs). The author notes that, in recent years, state laws and regulations have allowed more autonomy and practice privileges for NPs and PAs. Both PAs and NPs have gained prescribing authority throughout the United States, although rules vary from state to state. Payers have also increased access to reimbursement— for instance, Medicare reimburses PA and NP services at 85% of the Physician Fee Schedule. Although by law, PAs and NPs must still collaborate with a physician or work under physician supervision, the meaning of “collaboration” and “supervision” in practice is wide open. The author discusses topics including: a) the rapid rise of PAs and NPs; b) the retail health clinic model; c) filling gaps in care, and then goes on to discuss the impact of PAs and NPs on quality. With respect to the body of literature on nonphysician care delivery, the author notes: Unfortunately, research is lacking or inconclusive on many aspects of care delivery differences between physicians and nonphysicians. Investigation is complicated by such factors as the setting in which care is administered, the scope of the conditions that can be cared for, and the experience of the provider, which may influence how PA- and NP-delivered health care differs from physician-delivered health care. A Cochrane review reported that the available literature was inadequate to determine whether appropriately trained nurses can produce equally high-quality care as that of primary care physicians and equally good health outcomes for patients. Many studies had methodological limitations: Patient follow-up was one year or less, in general, and only one study was powered to assess equivalence of care. Various studies have certainly demonstrated that nonphysician clinicians can produce equally high-quality outcomes as that of physicians. However, the strongest body of evidence is derived from studying uncomplicated levels of care or care that was provided under the umbrella of physicians, according to a 2004 study. It will be important to examine the care delivered by nonphysician clinicians at the “outer edge” of their practice privileges and under conditions that are free of physician oversight.</p>	<p>Wilson, J. F. (2008). Primary care delivery changes as nonphysician clinicians gain independence. <i>Annals of Internal Medicine</i>, 149(8), 597-600.</p>
25	<p><b>PURPOSE</b> The aim of this study was to assess whether the quality of diabetes care differs among practices employing nurse-practitioners (NPs), physician’s assistants (PAs), or neither, and which practice attributes contribute to any differences in care.  <b>METHODS</b> This cross-sectional study of 46 family medicine practices from New Jersey and Pennsylvania measured adherence to American Diabetes Association diabetes guidelines via chart audits of 846 patients with diabetes. Practice characteristics were identified by staff surveys. Hierarchical models determined differences between practices with and without NPs or PAs.  <b>RESULTS</b> Compared with practices employing PAs, practices employing NPs were more likely to measure hemoglobin A1c levels (66% vs 33%), lipid levels (80% vs 58%), and urinary microalbumin levels (32% vs 6%); to have treated for high lipid levels (77% vs 56%); and to have patients attain lipid targets (54% vs 37%) (<math>P \leq .005</math> for each). Practices with NPs were more likely than physician-only practices to assess hemoglobin A1c levels (66% vs 49%) and lipid levels (80% vs 68%) (<math>P \leq .007</math> for each). These effects could not be attributed to use of diabetes registries, health risk assessments, nurses for counseling, or patient reminder systems. Practices with either PAs or NPs were perceived as busier (<math>P = .03</math>) and had larger total staff (<math>P &lt; .001</math>) than physician-only practices.  <b>CONCLUSIONS</b> Family practices employing NPs performed better than those with physicians only and those employing PAs, especially with regard to diabetes process measures. The reasons for these differences are not clear.</p>	<p>Ohman-Strickland, P. A., Orzano, A. J., Hudson, S. V., Solberg, L. I., DiCiccio-Bloom, B., O’Malley, D., et al. (2008). Quality of diabetes care in family medicine practices: Influence of nurse-practitioners and physician’s assistants. <i>Annals of Family Medicine</i>, 6, 14-22.</p>

No.	Description	Reference
26	<p>Purpose: The Mount Sinai Surgical Residency program uses physician assistants and nurse practitioners, jointly termed non-physician practitioners (NPPs), to adhere to the 80-hour work-week restrictions implemented by Accreditation Council of Graduate Medical Education (ACGME) resident duty hour requirements initiated in 2003. A survey was performed to determine how the integration of NPPs into the surgical subspecialty teams has affected surgical residents' perceptions of their education and overall residency experience. The authors review the roles of NPPs within surgical specialty teams as well as their survey findings about NPP and resident impressions about the NPP role. The Mount Sinai Surgical Residency program in New York City recognizes the important role that NPPs play in resident education, both directly in clinical instruction and indirectly in decreasing their overall workload. The specific responsibilities of the surgical NPPs include managing preoperative and postoperative patients, assisting in procedures and the operating room (depending on the service), performing surgical consultations, participating in discharge planning, promoting wellness and patient education, and communicating with the entire surgical team. A daytime PA is assigned to each general surgery team. The PA works together with the residents to provide all inpatient floor work, see consults, and complete discharges. When residents on the team are scrubbed into the operating room, the PA will answer all forwarded pages. If a case in the operating room cannot be covered by the residents, the PA is available to assist. The general surgery teams are covered at night by a junior resident or an NP. An in-house senior resident always is on call for support. The subspecialty services all use their NPPs slightly differently, with some working jointly with only one physician and some practicing in the outpatient setting. Patient care decisions are made collaboratively by residents and NPPs. NPPs contribute more to the junior residents' education in direct clinical teaching (eg, nasogastric tube insertion or arterial catheter placement) and to all residents' patient coordination education (eg, how to expedite a physical therapy consult or home nursing services request). Methods: A survey was distributed to every surgical resident and inpatient NPP using a Likert scale for responses. The survey addressed general experiences about the NPP-resident relationship in regard to education, continuity of care, workload, communication, collaboration, role, and hierarchy. NPP responses were compared with resident responses through a Pearson chi-square test. Results: Sixty-six residents and 28 NPP responses were obtained. Overall, NPPs and residents have similar perceptions about the NPP function. Most NPPs and residents believe that having an NPP on the service decreases their workload (96.4% and 84.8%, respectively), and they believe that adequate communication and collaboration occurs between the NPPs and the residents (85.7% and 73.8% and 67.9% and 80.3%, respectively). Significantly more NPPs than residents feel that NPPs contribute to the residents' clinical education (75.0% vs. 38.5%, <math>p = 0.005</math>) and that NPPs provide better continuity of care (96.4% vs. 60.6%, <math>p = 0.002</math>). Although NPPs and residents believe that the NPP role is clearly defined, NPPs and residents have very different perceptions about where NPPs fall within the surgical hierarchy. Seventy-five percent of NPPs believe that they function at a senior resident level or above, whereas 90.5% of residents believe that NPPs function at the intern level or below (<math>p &lt; 0.001</math>). Conclusions: The main role of the surgical NPP at the Mount Sinai Medical Center is to enhance the resident's educational experience by decreasing their workload, thereby adhering to ACGME and Bell Commission regulations, and increasing their time in the operating room. Not surprisingly, the authors' survey reveals that residents and NPPs both agree that NPPs do decrease the resident workload. Additionally, no differences were found between resident and NPP views about the NPP role (although they found a difference in where the groups believe that NPPs fall within that hierarchy). This important finding demonstrates that there does not seem to be a conflict of perceived roles and that both groups believe that good collaboration occurs on the surgical services. The authors found that at their institution, residents and NPPs agree that they work well together and that NPPs positively contribute to resident education. They recommend a service-specific orientation for the residents with each rotation to clarify NPP responsibilities and functions, thereby maximizing collaboration. With a firm understanding of the various roles of the NPPs, a cohesive, multidisciplinary group can be attained while enhancing surgical education.</p>	<p>Buch, K. E., Genovese, M. Y., Conigliaro, J. L., Nguyen, S. Q., Byrn, J. C., Novembre, C. L. &amp; Divino, C. M. (2008). Non-physician practitioners' overall enhancement to a surgical resident's experience. <i>Journal of Surgical Education</i>, 65, 50-53.</p>

No.	Description	Reference
27	<p>Background The role of advanced registered nurse practitioners and physician assistants in emergency departments, trauma centers, and critical care is becoming more widely accepted. These personnel, collectively known as advanced practice providers, expand physicians' capabilities and are being increasingly recruited to provide care and perform invasive procedures that were previously performed exclusively by physicians. Objectives To determine whether the quality of tube thoracostomies performed by advanced practice providers is comparable to that performed by trauma surgeons and to ascertain whether the complication rates attributable to tube thoracostomies differ on the basis of who performed the procedure. Methods Retrospective blinded reviews of patients' charts and radiographs were conducted to determine differences in quality indicators, complications, and outcomes of tube thoracostomies by practitioner type: trauma surgeons vs advanced practice providers. Results A total of 55 records were identified that documented tube thoracostomy performed during the six-month study period. Of these, four records were excluded because of missing data; thus, 51 charts were included in the review. Differences between practitioner type in insertion complications, complications requiring additional interventions, hospital length of stay, and morbidity were not significant. The only significant difference was a complication related to placement of the tube: when the tube extended caudad, toward the feet, from the insertion site; this complication occurred in seven of 33 insertions (21%) made by surgeons and in one of 38 insertions (2.6%) made by APPs. Interrater reliability ranged from good to very good. Conclusions Use of advanced practice providers provides consistent and quality tube thoracostomies. Employment of these practitioners may be a safe and reasonable solution for staffing trauma centers.</p>	<p>Bevis, L. C., Berg-Copas, G. M., Thomas, B. W., Vasquez, D. G., Wetta-Hall, R., Brake, D., Lucas, E., Toumeh, K., &amp; Harrison, P. (2008). Outcomes of tube thoracostomies performed by advance practice providers vs. trauma surgeons. <i>American Journal of Critical Care, 17</i>, 357-363.</p>

No.	Description	Reference
28	<p>Study Objective: Several factors (eg, the shortage of board-certified emergency physicians, insufficient hospital funds to hire more physician providers, and difficulty with physician recruitment and retention in rural and other underserved areas), have led to the utilization of physician assistants (PAs) and nurse practitioners (NPs) as alternatives to traditional physician coverage of emergency departments (EDs). In this study, we sought to evaluate the frequency and utilization trends of these mid-level providers in US EDs.</p> <p>Methods: We performed a secondary analysis of the National Hospital Ambulatory Medical Care Survey, 1993-2005. Using the "Providers Seen" fields, we analyzed all visits seen by PAs and NPs, both with and without evidence of physician involvement in clinical care. We compared demographic, hospital, and visit characteristics of PA and NP visits to those seen by physicians only. Data regarding NP providers and time of visit were collected only during 1995 to 2005. We used assigned patient visit weights to calculate national estimates and compared characteristics using difference of estimates with 95% confidence intervals (CIs). We used weighted logistic regression to evaluate trends over the study period. Results: From 1993 to 2005, there were approximately 1.3 billion ED visits in the US. During this time period, 5.2% (95%CI, 4.6-5.8%) of all visits were seen by PAs and 1.7% (95%CI, 1.5-2.0%) of visits by NPs. PA visits rose from 2.9% in 1993 to 9.1% in 2005, while NP visits rose from 1.1% in 1995 to 3.8% in 2005 (both p for trend &lt;0.001). Limiting the analyses to visits without evidence of physician involvement, PAs saw 2.1% (95%CI, 1.7-2.5%) and NPs 0.8% (95%CI, 0.6-0.9%) of visits during the study period. Visits seen by mid-level providers without documented physician involvement increased 4-fold, from 1.2% in 1995 to 4.8% in 2005 (p for trend &lt;0.001). Compared to visits seen or directly supervised by physicians, those seen only by mid-level providers involved younger patients (mean age 31 [95%CI, 30-32] vs. 35 [95%CI, 35-36] years), had lower urgent acuity (37% [95%CI, 31-43%] vs. 59% [95%CI, 57-61%]), and were admitted less often (3.0% [95%CI, 1.7-4.3%] vs. 13% [95%CI, 13-14%]). Visits seen only by mid-level provider were also less frequent during the nightshift (11 pm-7am) (8.1% [95%CI, 6.9-9.4%] vs. 16% [95%CI, 16-17%]), but they were similar to physician visits by sex, race/ethnicity, insurance, region, and urban/rural status. Conclusions: PAs and NPs are utilized with increasing frequency in US EDs, both with and without physician involvement. In 2005, they participated in 13% of all ED visits. Although PAs and NPs were utilized more often for lower acuity visits, 37% of patients seen only by mid-level providers were of urgent acuity and 3% were admitted. This suggests that the role of mid-level providers, practicing without direct physician involvement, has extended beyond simple and minor presentations. These trends in alternative staffing of EDs are likely to continue, given that workforce needs in emergency medicine continue to outpace the supply (and national distribution) of board-certified emergency physicians.</p>	<p>Ginde, A. A., Espinola, J. J., Sullivan, A. F., Blum, F. C., &amp; Carmago, C. A. (2008). Use of Physician Assistants and Nurse Practitioners in United States Emergency Departments, 1993-2005: Implications for the emergency physician workforce. <i>Annals of Emergency Medicine</i>, 52(4), S87.</p>

No.	Description	Reference
29	<p>Background: Accreditation Council on Graduate Medical Education (ACGME) duty hour restrictions have led to the widespread implementation of non-house staff services in academic medical centers, yet little is known about the quality and efficiency of patient care on such services. Objective: To evaluate the quality and efficiency of patient care on a physician assistant/hospitalist service compared with that of traditional house staff services. Design: Retrospective cohort study. Setting: Inpatient general medicine service of a 747-bed academic medical center. Patients: A total of 5,194 consecutive patients admitted to the general medical service from July 2005 to June 2006, including 992 patients on the physician assistant/hospitalist service and 4,202 patients on a traditional house staff service. Intervention: A geographically localized service staffed with physician assistants and supervised by hospitalists. The Physician Assistant/Clinician Educator (PACE) consisted of 15 beds localized to two adjacent inpatient "pods," staffed by a single cadre of nurses and medically staffed by one hospitalist and two physician assistants from 7:00 AM to 7:00 PM on weekdays and by one hospitalist, one physician assistant, and one moonlighter from 7:00 AM to 7:00 PM on weekends. A moonlighter, typically a senior resident or medical subspecialty fellow, admitted patients and covered nights on the service from 7:00 PM to 7:00 AM seven days a week. The service accepted admissions 24 hours per day, seven days per week, whenever beds were available. Daily morning rounds included the hospitalist, physician assistants, nurses, a care coordinator, and a pharmacist. The PACE service did not have triage guidelines related to diagnosis, complexity, or acuity, but only accepted patients via the emergency department or via a primary care physician's office, and did not accept patients transferred from outside hospitals or from the intensive care units. All of the physician assistants on the PACE service had prior inpatient medicine experience, ranging from six months to five years. Their clinical responsibilities were similar to those of interns at the study hospital, and included taking histories and performing physical examinations, writing notes and orders, reviewing and assimilating data, creating and updating patient signouts, completing discharge summaries, consulting other services as needed, and communicating with nurses and family members. Measurements: Length of stay (LOS), cost of care, inpatient mortality, intensive care unit (ICU) transfers, readmissions, and patient satisfaction. Results: Patients admitted to the study service were younger, had lower comorbidity scores, and were more likely to be admitted at night. After adjustment for these and other factors, and for clustering by attending physician, total cost of care was marginally lower on the study service (adjusted costs 3.9% lower; 95% confidence interval [CI] -7.5% to -0.3%), but LOS was not significantly different (adjusted LOS 5.0% higher; 95% CI, -0.4% to +10%) as compared with house staff services. No difference was seen in inpatient mortality, ICU transfers, readmissions (within 72 hours, 14 days or 30 days), or patient satisfaction. Conclusions: For general medicine inpatients admitted to an academic medical center, a service staffed by hospitalists and physician assistants can provide a safe alternative to house staff services, with comparable efficiency.</p>	<p>Roy, C. L., Liang, C. L., Lund, M., Boyd, C., Katz, J. T., McKean, S. &amp; Schnipper, J. L. (2008). Implementation of a physician assistant/hospitalist service in an academic medical center: Impact on efficiency and patient outcomes. <i>Hospital Medicine</i>, 3, 361-368.</p>

No.	Description	Reference
30	<p>Non-housestaff medicine services are growing rapidly in academic medical centers (AMCs), partly driven by efforts to comply with resident duty hour restrictions. Hospitalists have emerged as a solution to providing these services given their commitment to delivering efficient and high-quality care and the field's rapid growth. However, limited evidence is available on designing these services, including the similarities and differences of existing ones. The authors describe non-housestaff medicine services at five AMCs in order to share their experiences and outline important considerations in service development. The authors discuss common challenges in building and sustaining these models along with local institutional factors that affect decision making. Keys to success include ensuring an equitable system for scheduling and staffing, fostering opportunities for scholarly activities and academic promotion (defining the "academic hospitalist"), and providing compensation that supports recruitment and retention of hospitalists. With further work hour restrictions expected in the future and increased requests for surgical co-management, the relationship between AMCs and hospitalists will continue to evolve. To succeed in developing hospitalist faculty who follow long careers in hospital medicine, academic leadership must carefully plan for and evaluate the methods of providing these clinical services while expanding on our academic mission. The article contains a Table (Table 2) which describes the characteristics of non-house staff medicine services at five academic centers, two of which used PAs in their staffing models. The Brigham &amp; Women's Hospital employed six FTE PAs seven days a week, who worked with one hospitalist, serving an average of 12 patients per day. The University of Michigan employed eight FTE PAs who worked weekdays with seven hospitalists and one swing shift hospitalist, serving an average of 70 patients per day.</p>	<p>Sehgal, N. L., Shah, H. M., Parekh, V. I., Roy, C. L. &amp; Williams, M. V. (2008). Non-housestaff medicine services in academic centers: Models and challenges. <i>Journal of Hospital Medicine</i>, 3, 247-255.</p>
31	<p>OBJECTIVE: To investigate whether the use of physician assistants (PAs) as providers for a substantive portion of a patient's office-based visits affects office visit resource use. DATA SOURCE: Medical Expenditure Panel Survey (MEPS) Household Component data from 1996 to 2004. STUDY DESIGN: This retrospective cohort study compares the number of office-based visits per year between adults for whom PAs provided <math>\geq 30</math> percent of visits and adults cared for by physicians only. DATA COLLECTION / EXTRACTION METHODS: The Agency for Healthcare Research and Quality collects MEPS data using methods designed to produce data representative of the U.S. noninstitutionalized civilian population. Negative binomial regression was used to compare the number of visits per year between persons with and without PA care, adjusted for demographic, geographic, and socioeconomic factors; insurance status; health status; and medical conditions. PRINCIPAL FINDINGS: After case-mix adjustment, patients for whom PAs provided a substantive portion of care used about 16 percent fewer office-based visits per year than patients cared for by physicians only. This difference in the use of office-based visits was not offset by increased office visit resource use in other settings. The authors note that physicians and PAs/NPs develop diverse practice arrangements based on personal preferences and practice needs. Some physicians may choose to hire PAs or NPs to provide preventive and counselling services that the physicians are unable to find the time to provide, leading to services that are intentionally complementary. Others may work out substitution practice arrangements in which PAs or NPs see the patients with the least complicated routine problems, while the physicians see the more complex patients. In other practices, the assignment of patients to PAs, NPs, or physicians may be random or may depend on scheduling constraints or idiosyncratic interests of the providers involved. In many practices, there will be a mix of substitute and complementary services. Practice patterns may also evolve over time, as individual physicians, PAs, or NPs develop special interests or skills. CONCLUSIONS: Results indicate that the inclusion of PAs in the U.S. provider mix does not affect overall office visit resource use.</p>	<p>Morgan, P. A., Shah, N. D., Kaufman, J. S., &amp; Albanese, M. A. (2008). Impact of physician assistant care on office visit resource use in the United States. <i>Health Services Research</i>, 43(5, Pt. 2), 1906-1922.</p>

No.	Description	Reference
32	<p>Physician assistants (PAs) practice medicine with physician supervision, which allows physicians to see more patients and concentrate their efforts on the needs of those with complex medical conditions. Physician assistants have been practicing in Minnesota since 1970. They work in a variety of settings and specialties, although most are in primary care practices. This article profiles the PA profession and describes the type of work PAs do, the training and credentialing required to become a PA, and the relationship between physicians and PAs. The authors note that the role of the PA is highly individualized, depending on the physician's needs and preferences, the type of practice, the setting, and the PA's training and experience. In some practices, the PA's role will closely resemble that of the physician's. For example, PAs will often serve as the primary care provider for some of the patients in a panel. In a primary care setting, these will be patients who need routine health maintenance or well-child care, as well as those with acute complaints. The PA also may help patients manage chronic health conditions such as hypertension, diabetes, dyslipidemia, asthma, obesity, and depression. Having PAs care for patients with these conditions allows the physician to devote more time and attention to patients who have more complex conditions. In other settings, the PA may function at the periphery of the physician's work, implementing medical decisions, performing procedures, and instructing and educating patients and caregivers; on the other hand, those with extensive training or experience may provide high-level consultations. In an inpatient, emergency room, or procedural practice, the PA and physician may practice side-by-side and confer on an ongoing basis throughout the day. Supervising physicians assume all responsibility for the care given by the PA. Although the physician does not have to be present when the PA provides care, he or she (or an alternate physician) must be available by phone or electronically. In most cases, the PA and physicians work closely and have regular opportunities to discuss cases and practice standards. Clinical postgraduate specialty training for PAs is available in a variety of fields including dermatology, rheumatology, psychiatry, sleep medicine, emergency medicine, occupational medicine, hospital medicine, critical care, general surgery, neurosurgery, orthopedic surgery, and urology. Advanced training or extended experience does not change the fact that a PA works under a supervising physician and that the clinical tasks delegated to the PA still must fall within the physician's scope of practice.</p>	<p>Kimball, B. A., Rothwell, W. S. (2008). Physician assistant practice in Minnesota: Providing care as part of a physician-directed team. <i>Minnesota Medicine</i>, 91(5), 45-48.</p>
33	<p>Objective. To assess applicability of national health survey data for generalizable research on outpatient care by physician assistants (PAs) and nurse practitioners (NPs). Data Sources. Methodology descriptions and 2003 data files from the National Ambulatory Medical Care Survey, the National Hospital Ambulatory Medical Care Survey, the Medical Expenditure Panel Survey, and the Community Tracking Study. Study Design. Surveys were assessed for utility for research on PA and NP patient care, with respect to survey coverage, structure, content, generalizability to the U.S. population, and validity. National estimates of patient encounters, statistically adjusted for survey design and nonresponse, were compared across surveys. Data Collection/Extraction Methods. Surveys were identified through literature review, selected according to inclusion criteria, and analyzed based on methodology descriptions. Quantitative analyses used publicly available data downloaded from survey websites. Principal Findings. Surveys varied with respect to applicability to PA and NP care. Features limiting applicability included (1) sampling schemes that inconsistently capture nonphysician practice, (2) inaccurate identification of provider type, and (3) data structure that does not support analysis of team practice. Because the majority of PAs work in group practices and because independent NP practices are not sampled, the National Ambulatory Medical Care Survey [NAMCS] probably underestimates visits to NPs and PAs. Conclusions. Researchers using national health care surveys to analyze PA and NP patient interactions should account for design features that may differentially affect nonphysician data. Workforce research that includes NPs and PAs is needed for national planning efforts, and this research will require improved survey methodologies.</p>	<p>Morgan, P. A., Strand, J., Østbye, T., &amp; Albanese, M. A. (2007). Missing in action: Care by physician assistants and nurse practitioners in national health surveys. <i>Health Services Research</i>, 42(5), 2022-2037.</p>

No.	Description	Reference
34	<p>Objective: To determine the effect of a rapid response system composed primarily of a rapid response team led by physician assistants on the rates of in-hospital cardiac arrests, total and unplanned intensive care unit admissions, and hospital mortality. Secondary outcomes examined included the rate of successful airway management by PAs, the need for any immediate physician intervention before transfer from the original site of the RRT call, overall nursing satisfaction with the particular RRT call, and the utility of 24-hr follow-up visits for all RRT calls. Design: Prospective, controlled, before and after trial. Setting: A 350-bed nonteaching community hospital. Patients: All adult patients admitted to the hospital from May 1, 2005, to October 1, 2006. Interventions: The authors introduced a hospital-wide rapid response system that included a rapid response team (RRT) led by physician assistants with specialized critical care training. The RRT was composed of a critical care nurse with ≥5 yrs of experience, a respiratory therapist, and a PA who functioned as team leader. An intensivist was available in house from 8 am until 8 pm and on call from home thereafter. A hospitalist was continuously available in house for emergency consultation, as was an anesthesiologist. The PAs had all undergone an intensive 3-day commercial airway management course run by emergency medicine physicians that placed emphasis on rapid sequence intubation techniques. Two additional weeks were spent with an anesthesiologist practicing intubations in operating rooms. Finally, each PA spent 1 month working in the intensive care unit under the supervision of an intensivist to further refine airway management skills as well as obtaining competency in central venous access. The PAs varied in experience from 2 to 20 yrs. There were no specific protocols or algorithms for dealing with specific clinical situations aside from the standard advanced cardiac life support, rapid sequence intubation, and difficult airway algorithms. The attending physician was contacted after the initial stabilization in order to determine the direction of care and disposition of the patient. Measurements and Main Results: They measured the incidence of cardiac arrests that occurred outside of the intensive care unit, total intensive care unit admissions, unplanned intensive care unit admissions, intensive care unit length of stay, and the total hospital mortality rate occurring over the study period. There were 344 RRT calls during the study period. In the five months before the rapid response system began, there were an average of 7.6 cardiac arrests per 1,000 discharges per month. In the subsequent 13 months, that figure decreased to 3.0 cardiac arrests per 1,000 discharges per month. Overall hospital mortality the year before the rapid response system was 2.82% and decreased to 2.35% by the end of the RRT year. The percentage of intensive care unit admissions that were unplanned decreased from 45% to 29%. Linear regression analysis of key outcome variables showed strong associations with the implementation of the rapid response system, as did analysis of variables over time. The PA successfully intubated the patient in 84% of cases, with physician assistance being required in the balance. Conclusions: The deployment of an RRT led by physician assistants with specialized skills was associated with significant decreases in rates of in-hospital cardiac arrest and unplanned intensive care unit admissions.</p>	<p>Dacey, M. J., Mirza, E. R., Wilcox, V., Doherty, M., Mello, J., Boyer, A., Gates, J., Brothers, T. &amp; Baute, R. (2007). The effect of a rapid response team on major clinical outcome measures in a community hospital. <i>Critical Care Medicine</i>, 35(9), 2076-2082.</p>

No.	Description	Reference
35	<p>Background: In the United States, the physician assistant (PA) model has proven to be a cost-effective way to train quality primary care providers with a high degree of acceptance of the PA role by patients and other healthcare providers. The PA is a health professional licensed to practice medicine in the United States. Within the physician–PA relationship, physician assistants exercise autonomy in medical decision-making and provide a broad range of diagnostic and therapeutic services. These include physical examination, diagnosing and treating illnesses, ordering and interpreting tests, counselling on preventive healthcare, assisting in surgery, and writing prescriptions. Physician assistants are also involved in education, research and administrative services. PA education is based on the medical model which aims to create a physician–PA team that enhances the delivery of high-quality healthcare. The legal basis of physician assistant practice is the concept of delegation of medical tasks by licensed physicians to qualified professionals. PAs work with the supervision of physicians and practice in a variety of clinical settings including rural clinics, multi-specialty group practices, community health centers and hospitals. Aim: Discuss PA model as it pertains to other countries. Methods: Review of relevant literature related to physician assistant education, practice and global interest. Results: Several countries including the United Kingdom, Scotland, Canada, the Netherlands, Taiwan, South Africa and Ghana are exploring or re-exploring the concept of the physician assistant as a way to quickly and efficiently train and employ autonomous and flexible health workers to address their nation’s healthcare needs. The general medical education of PAs gives them the ability to move between various clinical settings and specialties including clinics, medical centers and hospitals. In all settings they share in diagnosing and treating common medical problems and providing preventive care and health education. PAs are also utilized in all of the surgical specialties and the majority of the medical specialties. PAs have been shown to have proficiency in the performance of medical diagnostic and therapeutic procedures that require a high degree of technical proficiency. Conclusions: Physician assistant education is efficient and flexible and the PA model can be easily adapted to the specific health system needs of other nations. In addition, many PA programs have affiliation agreements with institutions outside of the United States to host PA students for clinical rotations and there is an ever-growing interest by students in international rotations. The Physician Assistant Education Association along with the American Academy of Physician Assistants is actively involved with sharing information about the PA profession with other countries.</p>	<p>Legler, C. F., Cawley, J. F., &amp; Fenn, W. H. (2007). Physician assistants: Education, practice and global interest. <i>Medical Teachers, 29</i>, e22-e25.</p>
36	<p>Physician assistants (PAs) and nurse practitioners (NPs) were introduced in the United States in 1967. As of 2006, there are 110 000 clinically active PAs and NPs (comprising approximately one sixth of the US medical workforce). Approximately 11 200 new PAs and NPs graduate each year. PAs and NPs are well distributed throughout primary care and specialty care and are more likely than physicians to practise in rural areas and where vulnerable populations exist. A growing number of NPs and PAs are employed in hospitals. Most are employed by the institution or a doctor, and are usually viewed as part of a two-person medical or surgical team. In general, PAs and NPs in hospitals can prescribe narcotics, undertake procedures, and direct patient care with fewer restrictions than in outpatient settings. About 30% of PAs report having some type of hospital relationship. In some instances, NPs and PAs serve as inpatient specialists or “hospitalists”, providing “back-fill” for junior hospital doctors who are no longer working extended hours, or providing care previously covered by junior doctors. The productivity of NPs and PAs, based on traditional doctor services, is comparable, and the range of services approaches 90% of what primary care physicians provide. The education time is approximately half that of a medical doctor and entry into the workforce is less restrictive. The interprofessional skill mix provided by PAs and NPs may enhance medical care in comparison with that provided by a doctor alone.</p>	<p>Hooker, R. A. (2006). Physician assistants and nurse practitioners: The United States experience. <i>Medical Journal of Australia, 185</i>, 4-7.</p>

No.	Description	Reference
37	<p>INTRODUCTION: The reduction of resident work hours due to the 80-hour workweek has created pressure on academic health-care systems to find “replacement residents.” At the authors’ institution, a group of nurse practitioners (NPs) and physician assistants (PAs), collectively referred to as non-physician practitioners (NPPs), were hired as these reinforcements, such that the number of NPPs (56) was almost twice the number of clinical categorical surgery residents (37). An experienced leader with national credibility was hired to run the NPP program. On each service, the call system was changed to a night float system, whereby residents were pulled from traditional resident teams to serve as nighttime residents during the week. A total of 1-3 NPPs were hired for each team, but whether NPPs worked for the team as a whole, or were assigned to individual attendings, was left to the discretion of the division chiefs. One year after the start of this program, the authors wanted to study the effects it has had on both surgery resident education and NPP job satisfaction. METHODS: An electronic, anonymous survey was conducted during a monthly surgery resident meeting, and out of 72 categorical and preliminary surgery residents, 50% submitted answers to 12 questions. A similar electronic survey was administered to all 56 NPPs, with 45% (20 NPs, and 5 PAs) responding. RESULTS: Overall, more than 60% of residents and more than 70% of NPPs felt that patient safety was not compromised by the new structure of the services; however, more than 20% of NPPs and 30% of residents believed patient safety was compromised by the new program. Overall, 63% of residents believed that lines of communication between surgery team members were clear, and 58% of residents and 71% of NPPs believed that attendings, residents, and NPPs worked together effectively. A total of 91% of residents believed that the addition of NPPs to the teams was positive overall, and 80% of NPPs were satisfied with their positions. Overall, 60% of residents and 50% of NPPs felt that educational goals were being met. DISCUSSION: Implementation of the 80-hour workweek and introduction of NPs and PAs onto the inpatient surgical services has altered resident education at the authors’ institution. Although overall most residents view the addition of NPPs to the clinical services as positive, there are concerns about the program. Although hired to fill the void left by decreasing labor hours of residents, NPPs do not necessarily have the same goals as surgery residents and there is confusion about how NPPs fit into the hierarchy of the traditional surgical team.</p>	<p>Resnick, A. S., Todd, B. A., Mullen, J. L., Morris, J. B. (2006). How do surgical residents and non-physician practitioners play together in the sandbox? <i>Current Surgery</i>, 63(2), 155-164.</p>

No.	Description	Reference
38	<p>The purposes of this study were: (1) to identify the frequency with which various clinical skills are used by PAs practicing in rural areas and (2) to ascertain the importance that PAs in rural practice place on various clinical skills. A survey tool was developed and administered to all PAs who practice in primary care in a rural community in Iowa. Primary care was defined as family medicine, general internal medicine, general pediatrics, and obstetrics and gynecology. Rural was defined as a community with a population of less than 10,000. The study was a nonexperimental, descriptive, research format using a questionnaire to query PAs about their characteristics, backgrounds, activities, and perceptions regarding frequency of performance and relative importance of 94 clinical skills as they relate to the practice of primary care medicine in a rural setting. Of the 185 surveys mailed to eligible participants, a total of 94 were returned, resulting in a response rate of 50.8%. The average age of the respondents was 42.6 years, and the majority were female (63%). Overall, the mean number of months in practice was 113.4, with an average of 96.7 months in a rural setting. Nearly two-thirds of the respondents (65%) indicated that they provided emergency room coverage as part of their practice. Call coverage was provided by 54% of the respondents, and those who provided this service averaged 28.4 hours on call per week. The mean population (determined by census) of the communities served by the PAs was 3,291. According to respondents, the ten most frequently performed skills, and the number of times they were performed annually were: dispensing medications (583 times/year), pap smears (160 times/year), teaching self-breast exams (155 times/year), venipuncture (112 times/year), giving injections (102 times/year), performing X-rays (85 times/year), microscopic exams of samples (73 times/year), nebulizer treatment (65 times/year), sexually transmitted disease testing (64 times/year), and teaching self-genital exams (64 times/year). Dispensing medications was performed with the greatest frequency, which was 3.6 times greater than the next most commonly performed skill (Pap smears). Clinical skills identified as most frequently performed and of the greatest perceived importance were cervical cytology smears, self-breast examination, microscopic examination of samples, and sexually transmitted disease testing. The authors noted that many of the skills appearing on both the list of most important skills and on the list of most frequently performed skills were specific for women's health. Sixteen percent of the survey respondents indicated that they did not believe that their PA program had prepared them with the skills necessary to enter practice in a rural setting.</p>	<p>Asprey, D. (2006). Clinical skills utilized by physician assistants in rural primary care settings. <i>The Journal of Physician Assistant Education</i>, 17(2), 45-47.</p>

No.	Description	Reference
39	<p>Due to the continuing pressure to see increasing numbers of patients efficiently and safely, Emergency Departments (EDs) have sought innovative ways to accomplish this goal. The creation of a “fast-track” program staffed by midlevel practitioners has been assumed to increase ED throughput for non-emergent patients. However, a reasonable concern arises as to whether this might occur at the cost of a decrease in overall ED performance or safety variables. This study was designed to assess the effects of a fast-track area opening, staffed by midlevel practitioners, on ED effectiveness and quality. To determine if a fast-track area (FTA) would improve Emergency Department (ED) performance, a historical cohort study was performed in the ED of a tertiary care adult hospital in the United States that, at the time of the study, treated approximately 75,000 patients per year in the ED. All patients are seen by a triage nurse and classified according to acuity of complaint as emergent, urgent, or non-urgent. Non-urgent patients are sub-grouped as FTA appropriate if triage nurse assessment suggests diagnoses that fall within the scope of practice of midlevel practitioners (Physician Assistants and Nurse Practitioners—PA/NPs) who are variously trained and adult-qualified to see FTA patients. Physician support is on an “as needed” basis and occurs about five times per 24-h day. During the two-year period, staffing increased slightly but not in direct relation to FTA opening. During the two years of construction, room count and availability varied but remained relatively constant. After the FTA opened, approximately 30% of patients were triaged as FTA appropriate. From 8:30 a.m. until 11:00 p.m., these patients are seen in a separate seven-bed unit staffed according to time of day and expected volume by one to four PA/NPs. After 11:00 p.m. they are placed in the main ED, and usually seen by PA/NPs. Two one-year consecutive periods, pre fast track area (FTA) opening—from February 1, 2001 to January 31, 2002 and after FTA opening—from February 1, 2002 to January 31, 2003 were studied. Daily values of the following variables were obtained from the ED patient tracking system: 1) To assess ED effectiveness: waiting time to be seen (WT), length of stay (LOS); 2) To assess ED care quality: rate of patients left without being seen (LWBS), mortality, and revisits; 3) To assess determinants of patient homogeneity between periods: daily census, age, acuity index, admission rate and emergent patient rate. For comparisons, the Wilcoxon test and the Student’s <i>t</i>-test were used to analyze the data. Results showed that despite an increase in the daily census (difference [diff] 8.71, 95% confidence interval [CI] six to 11.41), FTA was associated with a decrease in WT (diff -51 min, 95% CI [-56 to -46]), LOS (diff -28 min, 95% CI [-31 to -23]) and LWBS (diff -4.06, 95% CI [-4.48 to -3.46]), without change in the rates of mortality or revisits. In conclusion, the opening of a FTA improved ED effectiveness, measured by decreased WT and LOS, without deterioration in the quality of care provided, measured by rates of mortality and revisits.</p>	<p>Sanchez, M., Smally, A. J., Grant, R. J., &amp; Jacobs, L. M. (2006). Effects of a fast-track area on emergency department performance. <i>The Journal of Emergency Medicine, 31</i>(1), 117-120.</p>

No.	Description	Reference
40	<p>The use of mid-level providers, nurse practitioners, and physician assistants is growing in the practice of dermatology, fuelled by a perceived shortage of dermatologists and the promise of practice enhancement. From a practical standpoint, dermatologists use physician extenders in a number of ways, ranging from assisting in procedures such as biopsies, skin cancer destruction and assisting in surgery to performing a variety of cosmetic procedures. In some dermatology practices, physician extenders act as “dermatologists” seeing patients independently and consulting with the dermatologist when they feel it necessary to have the dermatologist view the patient. Legally, there are different regulations governing physician assistants and nurse practitioners and in each case different states allow for varying degrees of independence. In the state of Florida for instance, physician assistants are considered to be under either direct or indirect supervision, whereby the physician is available by telecommunication. All charts need to be reviewed and signed by the supervising physician. Physician assistants may prescribe a specified list of pharmaceuticals after approximately 3 months time of direct supervision and evaluation by the supervising physician. Exactly how the physician extender is used in the dermatology practice can either increase or decrease the risk of malpractice liability and ultimately may be a factor in whether the dermatologist prevails in a malpractice case. Reducing malpractice liability risk is dependent on adhering to or exceeding community standards of practice and patient care. Because very few physician extenders participate in officially sanctioned training programs, it is up to the physician to adequately train that provider and determine their level of competence. It should be obvious to most dermatologists that it would be impossible to train the mid level provider to perform at the level of knowledge and experience of the dermatologist. It is therefore up to the dermatologist to determine what aspects of dermatologic care should be delegated to the mid-level provider. Procedures can be taught by the dermatologist and mastered by the mid-level provider. These may include biopsies, destructions, and a variety of surgical procedures. Additionally, cosmetic procedures, especially nonablative rejuvenation, can be mastered by mid level providers. The difficulty is defining the degree of dermatologic expertise and training that is necessary for diagnosis and treatment of dermatologic disease. Although dermatologists can delegate care to physician extenders, they cannot delegate the liability risk. It is up to the dermatologist to embrace those principles and practices that enhance patient care, decrease medical errors, and improve physician/practice patient relationships to ultimately decrease the risk of malpractice liability.</p>	<p>Nestor, M. S. (2005). The use of mid-level providers in dermatology: A liability risk? <i>Seminars in Cutaneous Medicine and Surgery</i>, 24, 148-151.</p>

No.	Description	Reference
41	<p>Objective: To describe the scope of practice and complementary role of physician assistants as physician extenders in the pediatric intensive care unit. Design: Descriptive report of a five year experience using a physician assistant-resident staffing model in comparison to the traditional resident-only coverage. Setting: Six-bed pediatric intensive care unit at a tertiary care center subject to longstanding New York Hospital Code 405 restrictions on resident work hours. Interventions: Orientation, training, credentialing, and evaluation of physician assistants. Measurements and Main Results: New Accreditation Council for Graduate Medical Education regulations based on the longstanding New York Hospital Code 405 limit the number of resident hours worked per week. The hospital employs physician assistants as physician extenders in the pediatric intensive care unit to enable regulatory compliance. Physician assistants were oriented for a period of six months to one year to develop skill competencies, observe and learn pediatric intensive care unit practices and procedures, and complete credentialing to perform traditionally physician, nursing, and respiratory therapist functions. This period consisted of the following: 1. Department-wide learning opportunities: attendance at daily morning report, pediatric core resident lecture series, weekly case management seminars, morbidity and mortality conferences, and pathophysiology seminars 2. PICU-specific teaching: observation on PICU rounds, PICU core topics (<a href="http://www.picucourse.org">www.picucourse.org</a>), ventilator management lectures, transport team orientation, pretest, Basic Life Support, Pediatric Advanced Life Support 3. Skill competencies: in-service and credentialing by PICU clinical nurse specialist, respiratory therapists (RTs), resident, or attending MDs as appropriate; peripheral intravenous placement, phlebotomy, arterial blood sampling, placement of percutaneous arterial catheter, placement of peripherally inserted central catheters, naso-gastric tube placement, Foley placement, bag-valve-mask ventilation, point of care testing, lumbar puncture, peripherally inserted central catheter and central catheter care, changing tracheostomy tube, tracheostomy care, assisting with invasive procedures, bedside set-up for procedural sedation 4. Precepting: clinical bedside precepting with one of the existing and experienced PAs on day shifts only initially, expanded to nights toward the conclusion of the orientation period. Physician assistants were then assigned to an independent but supervised patient care role similar to that of a resident physician. One postgraduate year two or postgraduate year three resident is posted to the PICU for a one-month block and provides daytime coverage during weekdays. Night call is provided by a resident on a subspecialty rotation. At any given time there would be one PA and one resident covering the PICU, usually each responsible for the management of one to three patients. Both PAs and residents present their assigned patients on attending rounds and carry out the plans for the day on those patients. The orders that the PAs write on their patients are cosigned by a physician within 24 hrs. The impact of the physician assistant program was assessed by the attending physicians, and resident opinions were surveyed. Conclusions: Physician assistants play a complementary role as physician extenders in the pediatric intensive care unit, enabling compliance with New York state and Accreditation Council for Graduate Medical Education resident work hour regulations. Physician assistants perform similar tasks and activities as the pediatric intensive care unit residents and integrate well with them in enhancing bedside patient care. Over time, physician assistants provide additional direction to the residents by virtue of their familiarity with unit-specific policies and procedures and repetitive pediatric intensive care unit practice patterns. As multifunctional members of the health care team, they support nursing and respiratory therapy functions and improve the day-to-day functioning of the unit. The physician assistant serves as a key member of the pediatric intensive care unit transport team. The PAs collaborate directly with other subspecialty and consulting attendings and develop direct working relationships with them. In addition, by virtue of regular interaction with hospital staff in other departments—magnetic resonance imaging/ electroencephalogram/interventional radiology/radiography—in many cases they are able to facilitate timely performance of procedures on PICU patients. Limitations observed include high job turnover rates among the physician assistants and confusion between their role as shift workers or professional employees.</p>	<p>Mathur, M., Rampersad, A., Howard, K., &amp; Goldman, G. M. (2005). Physician assistants as physician extenders in the pediatric intensive care unit setting – A 5-year experience. <i>Pediatric Critical Care Medicine</i>, 6(1), 14-19.</p>

No.	Description	Reference
42	<p>Background: Physician assistants (PAs) have been present in occupational and environmental medicine (OEM) in the USA since 1971, yet remarkably little is known about their activity. Methods: An administrative study of PA activities was undertaken and compared with the activities of physicians in the same occupational medicine setting. Patients were not triaged to either provider and all resources of care were recorded for the visit. An episode of care approach was used for the analysis. Results: The characteristics of patients seen by each provider were similar in age, gender ratio and severity of injury. Physicians saw a mean of 2.9 patients/h and PAs 2.5, but PAs worked more hours and saw more patients per year than physicians. The average charge per patient visit and total charge for an episode of care were similar. Differences between PAs and physicians were seen in the areas of 'limited duty' duration given to patients and on average PAs prescribed 15 days and physicians 17 days. PAs referred a patient 19.7% of the time, while physicians referred 17.4%. Most of the referrals were to physical therapy. The salary of a physician, based on an hourly rate, was approximately twice as much as a PA. Conclusion: The use of PAs in OEM may represent a cost-effective advantage from an administrative standpoint. Clearly, more research is necessary in determining the role and utilization of PAs in OEM and how they may improve the delivery of physician services.</p>	<p>Hooker, R. S. (2004). Physician assistants in occupational medicine: How do they compare to occupational physicians? <i>Occupational Medicine</i>, 54(3), 153-158.</p>
43	<p>A hopeful note in the contemporary abortion environment in the United States is the expanding role of advanced practice clinicians – nurse practitioners, physician assistants and nurse-midwives – in first trimester abortion provision. A large percentage of primary health care in the US is currently provided by these non-physicians but their involvement in abortion care is promising, especially in light of the shortage of physician providers. Two national symposia in 1990 and 1996 approved the expansion of early abortion care to non-physicians. As of January 2004, trained advanced practice clinicians were providing medical, and in some cases, early surgical abortion in 14 states. In most states, nurse-midwives, physician assistants and nurse practitioners practice under statutes that authorise them to administer medications and provide gynaecological services, including surgery that is comparable to surgical abortion, as long as they have been properly trained and are supervised. Under these professional standards, therefore, it would be logical for trained advanced practice clinicians to offer both medical and first trimester surgical abortion. This has required not only medical training but also political organising to achieve the necessary legal and regulatory changes, state by state, by groups such as Clinicians for Choice and the Abortion Access Project, described here in examples in two states and the reflections of three advanced practice clinicians. Recent surveys in three states show a substantial interest among advanced practice clinicians in abortion training, leading to cautious optimism about the possibility of increased abortion access for women. Most encouraging, advanced practice clinicians, like their physician counterparts, show a level of passionate commitment to the work that is rare elsewhere in health care in the US today. The authors note that Vermont is the state with the most extensive experience of advanced practice clinicians providing abortion care, being one of a handful of states that does not have a “physician-only” law. Physician assistants have been performing surgical abortion in Vermont since 1973 at the Planned Parenthood clinic in Burlington (formerly the Vermont Women’s Center). Indeed, the physician assistants at that clinic routinely train obstetrics and gynaecology residents from nearby medical schools in first trimester abortion techniques. A comprehensive analysis of complication rates in 2,456 first trimester abortions done between 1981 and 1982 at the Center found that the complication rates were no different than with abortions provided by physicians. A more recent, as yet unpublished, study by researchers at Planned Parenthood Northern New England compared complication rates for 2,027 procedures by physicians and physician assistants and nurse practitioners at five sites from November 2000 through December 2002. Complication rates for all providers were very low (2.5 per 1,000), and patients reported slightly more satisfaction with nonphysician providers.</p>	<p>Joffe, C., &amp; Yarrow, S. (2004). Advanced practice clinicians as abortion providers: Current developments in the United States. <i>Reproductive Health Matters</i>, 12(24 Supplement), 198-206.</p>

No.	Description	Reference
44	<p>Interventional radiology (IR) is a clinical subspecialty; as such, there is a large amount of direct patient care. However, until recently, this topic has not been a major focus in radiology training programs. Additionally, as interventional radiologists develop busier and busier practices, there is less time to spend with individual patients. Physician extenders such as physician assistants (PAs) represent an excellent way to improve clinical patient care. This article describes what PAs are and how they work together with physicians. It illustrates differences between PAs and other physician extenders and describes the duties that may be delegated to PAs in the IR setting. The article describes one university hospital's experience with PAs, who participate in inpatient and outpatient care. They are involved in daily morning inpatient rounds with the fellows and residents rotating on the hospital's service. In this capacity, they evaluate abscess, urinary, and biliary drainage catheters and monitor patient progress. They also perform and monitor compliant chart documentation for all inpatients being followed by the IR service. In conjunction with the house staff, the PAs will communicate with referring services as needed and help triage queries and consultation requests that may be brought to their attention during these rounds. The PAs have made an invaluable contribution to the implementation of IR outpatient services and establishment of an outpatient office, which operates two half-days per week. Outpatient service duties include scheduling initial patient consultations, obtaining histories and performing physical examinations, discussing the case with the IR physician, developing a treatment plan for the patient in conjunction with the IR, implementing the plan, and providing appropriate documentation for billing. The PA also ensures that any appropriate preprocedural testing and evaluation has been obtained. This process has been extremely helpful in ensuring a smooth transition for the patient from initial consultation through postprocedural discharge and follow-up. The PAs had also recently become involved in the management of dialysis fistulas and grafts, and had become the primary providers for temporary central venous access, including sonographically guided peripherally inserted central catheters and internal jugular central venous lines. They are involved in all aspects of these procedures, from assessment of appropriateness of the initial request, to patient evaluation, obtaining informed consent, placing the device, and troubleshooting subsequent malfunctions. Privileging for these procedures is granted at the institutional level. Before requesting privileges for a particular procedure, we have established that the PA must perform a requisite number of supervised procedures. Because the PAs did not have experience with venous access, they began learning to place peripherally inserted central catheters because it poses less risk than internal jugular catheter placement. After performing 30 directly supervised cases, they apply for institutional privileges. When permission is granted, the PAs may perform the procedures unsupervised. With that experience it was determined that 10 directly supervised internal jugular central venous catheter placement procedures should be required before those privileges are requested.</p>	<p>Stecker, M. S., Armenoff, D., &amp; Johnson, M. S. (2004). Physician assistants in interventional radiology practice. <i>Journal of Vascular and Interventional Radiology</i>, 15, 221-227.</p>

No.	Description	Reference
45	<p>In view of the new residency guidelines, which restrict resident work hours, the use of physician assistants (PAs) for patient care continuity during off-hours of residents may become a common practice. The purpose of this study was to assess the quality of patient care during transition from resident- to PA-assisted trauma program (without residents) and comparative simultaneous support. A retrospective analysis of patient care during two six-month segments was carried out: during resident-assisted program at a level II trauma center in 1998 and a PA-dedicated trauma program in 1999. With reinvolvement of senior surgical residents, a focused analysis for the last quarter of 2002 was done. Regression analysis indicated the only statistically significant outcome was decreased length of stay (LOS) when patients were transferred directly from emergency center (EC) to floor in 1999. The mean LOS was <math>2.54 \pm 4.65</math> compared to <math>3.4 \pm 5.81</math>, and no statistical difference in other assessments was noted. Focused analysis in 2002 showed 100% participation of PAs during the trauma alert compared to 51% by residents. Substitution of residents with PAs had no impact on patient mortality; however, LOS (from EC to floor), was statistically reduced by one day. Trauma programs can benefit with collaboration of residents and PAs in patient care.</p>	<p>Oswanski, M., F., Sharma, O., P. &amp; Raj, S. S. (2004). Comparative review of use of physician assistants in a level I trauma centre. <i>The American Surgeon</i>, 70(3), 272-279.</p>
46	<p>Objectives: The authors compared complication rates after surgical abortions performed by physician assistants with rates after abortions performed by physicians. Methods: A two-year prospective cohort study of women undergoing surgically induced abortion was conducted. All women who underwent an outpatient surgical abortion performed by a physician at the Feminist Health Center of Portsmouth, New Hampshire, or by a physician assistant at the Vermont Women's Health Center in Burlington, Vermont, between July 1996 and October 1997 were eligible to participate (n=1505). Ninety-one percent of eligible women (1,363) were enrolled; 546 received an abortion from a physician assistant, 817 received an abortion from a physician. Complications were defined according to National Abortion Federation guidelines as follows: a) incomplete abortion; b) failed abortion (continued pregnancy); c) ectopic/extruterine pregnancy; d) perforation; e) cervical laceration; f) infection; g) hemorrhage; h) other complications, including shock, coma, amniotic fluid embolism, anesthesia-related difficulties, and death. Complications were further classified as either immediate or delayed. Immediate complications were defined as those that occurred during the procedure or before discharge from the clinic. Delayed complications were those that occurred up to two weeks after discharge. Complication categories are not mutually exclusive. Results: Total complication rates were 22.0 per 1,000 procedures (95% confidence interval [CI]=11.9, 39.2) performed by physician assistants and 23.3 per 1,000 procedures (95% CI=14.5, 36.8) performed by physicians, a difference that was not statistically significant (P=.88). A total of 37 complications were reported from 31 procedures (12 by Vermont physician assistants and 19 by New Hampshire physicians). Five Vermont women and one New Hampshire woman experienced more than one complication. The most common complication that occurred during physician assistant-performed procedures was incomplete abortion; during physician-performed procedures the most common complication was infection not requiring hospitalization. A history of pelvic inflammatory disease was associated with an increased risk of total complications (odds ratio=2.1; 95% CI=1.1, 4.1).Conclusions: Surgical abortion services provided by experienced physician assistants were comparable in safety and efficacy to those provided by physicians. The authors conclude that these results support the idea that a potential solution to the shortage of providers would be to expand the training of physician assistants to include surgical abortion, thereby enhancing the ability of the medical community to provide needed reproductive health services to women.</p>	<p>Goldman, M. B., Occhiuto, J. S., Peterson, L. E., Zapka, J. G. &amp; Palmer, R. H. (2004). Physician assistants as providers of surgically induced abortion services. <i>American Journal of Public Health</i>, 94, 1352-1357.</p>

No.	Description	Reference
47	<p>Non-physician clinicians have become prominent providers of patient services within the practice of medicine. They include nurse practitioners and clinical nurse specialists, physician assistants, the alternative and complementary disciplines (chiropractic, naturopathy and acupuncture), mental health providers (psychologists, clinical social workers, counsellors and therapists) and specialty disciplines (optometrists, podiatrists, nurse anaesthetists and nurse-midwives). Although these various disciplines have differing histories and philosophic frameworks, which create distinctive approaches to patient care, they have shared a struggle to obtain recognition and autonomy through state licensure, to expand their state-granted practice prerogatives and to achieve broader reimbursement from third-party payers and managed care. Most entered into a growth spurt beginning in the early 1990s. All now provide care that not only overlaps that of physicians but that complements and supplements that care. Although PAs must always work under the delegated authority of a physician, most states allow them to practise within a radius of 50 miles or a one-hour drive from the supervising physician, as long as the opportunity for telephone contact is maintained. Moreover, the required frequency of direct contact with a physician varies from daily in most states to weekly in 12 states and 30-day intervals in seven. In three states, physicians are required to review only 10–15% of the PA's charts. The central question is, how does their care contribute to quality? The evidence thus far shows that non-physician clinicians throughout the range of disciplines can produce high-quality outcomes under particular circumstances. However, the strongest body of evidence is derived from care that is at the least complex end of the clinical spectrum or that is provided under the umbrella of physicians. Unfortunately, few studies have critically examined the outcomes of non-physician clinicians at the leading edge of their practice prerogatives and under conditions that are free of physician oversight. Thus, while the principle that they can deliver high quality care within the practice of medicine is unequivocally true, more research is needed to test this principle under conditions of greater clinical complexity and autonomy, and, pending the results of such research, caution must be exercised in applying this principle too broadly.</p>	<p>Cooper, R., &amp; Stoflet, S. (2004). Diversity and consistency: The challenge of maintaining quality in a multidisciplinary workforce. <i>Journal of Health Services Research and Policy</i>, 9(Suppl. 1), 39-47.</p>

No.	Description	Reference
48	<p>Hypothesis: The authors hypothesized that physician assistants (PAs) will decrease surgery resident work hours and improve resident work outlook. The Accreditation Council for Graduate Medical Education released resident training guidelines that modified training programs; including an 80-hour workweek and, a maximum work shift of 24 hours. If residency programs are to adhere to the guidelines, then someone must make up the workload that would have been completed by the residents to ensure quality surgical care. Physician assistants (PAs) have been suggested as ideal candidates for the position. The authors' department had spent several years working to acquire funding for PA positions on each surgical service at their urban county hospital; the positions were approved. Design: Surgical resident survey. Setting: A county hospital in a university-based surgical residency program. Participants: Surgery residents who switched (or "rotated") to the county hospital were polled monthly for six months after using PAs as team members on the surgical services. A general surgery resident survey was conducted from January 1, 2002, through June 30, 2002, at the county hospital in a university-based surgical residency program. There are typically 10 to 12 general surgery residents assigned to the four surgical services each month. During the period of the survey, chief residents took night call from home on alternating nights, junior house staff took in-house call every third to fourth night, and trauma team members took in-house call every other day. In the first week of January, one PA was assigned to each surgical service. The PAs were fully incorporated into the surgical team and functioned at the level of a postgraduate year one or postgraduate year two resident. The PAs are under the direct supervision of the chief resident or attending staff. Each PA worked four ten-hour shifts per week, usually 7 AM to 5 PM on Mondays, Tuesdays, Wednesdays, and Fridays. Thursdays are set aside for teaching conferences. The PAs switch (or "rotate") between services every three months. Rotating the PAs provides a varied work experience and prevents the PAs from taking over a service. This rotation occurs on the 15th of each month to provide continuity of care because residents switch services on the first of the month. Main Outcome Measures: Resident work hours and work outlook. Results: Surgery resident hours were significantly decreased by the fourth, fifth, and sixth months after PAs joined the surgical services. Despite what these data on resident hours suggest, six (60%) of 10 residents believed that the PAs had no influence on the amount of time the residents spend in the hospital. Six (60%) of 10 residents thought the PAs decreased stress levels and six (60%) of 10 residents thought the PAs helped to improve morale. Conclusions: Physician assistants can have a positive influence on graduate surgical education programs. Physician assistants can help decrease surgery resident work hours and improve resident work outlook.</p>	<p>Victorino, G. P. &amp; Organ, Jr., C. H. (2003). Physician assistant influence on surgery residents. <i>Archives of Surgery, 138</i>, 971-976.</p>
49	<p>Using a prospectively collected database of patients undergoing cardiac catheterization, the authors sought to compare the outcomes of procedures performed by supervised physician assistants (PAs) with those performed by supervised cardiology fellows-in-training. Outcome measures included procedural length, fluoroscopy use, volume of contrast media, and complications including myocardial infarction, stroke, arrhythmia requiring defibrillation or pacemaker placement, pulmonary edema requiring intubation, and vascular complications. Class three and four congestive heart failure was more common in patients who underwent procedures by fellows compared with those undergoing procedures by PAs (<math>P = 0.001</math>). PA cases tended to be slightly faster (<math>P = 0.05</math>) with less fluoroscopic time (<math>P &lt; 0.001</math>). The incidence of major complications within 24 hr of the procedure was similar between the two groups (0.54% in PA cases and 0.58% in fellow cases). Under the supervision of experienced attending cardiologists, trained PAs can perform diagnostic cardiac catheterization, including coronary angiography, with complication rates similar to those of cardiology fellows-in-training.</p>	<p>Krasuski, R. A., Wang, A., Ross, C., Bolles, J. F., Moloney, E. L., Kelly, L. P., et al. (2003). Trained and supervised physician assistants can safely perform diagnostic cardiac catheterization with coronary angiography. <i>Catheterization and Cardiovascular Interventions, 59</i>, 157-160.</p>

No.	Description	Reference
50	<p>Crowding in the emergency department (ED) has multiple causes, including space and staffing in both inpatient areas and the ED. Waiting for inpatient beds is the primary issue in our ED. Waiting inpatients require continuing care and attention from emergency-medicine (EM) physicians. As a managerial response, we developed a unique role for midlevel practitioners (MLPs) in which they could provide "back-end" work for patients awaiting inpatient beds. After initial EM physician evaluation, patients without ready inpatient beds were grouped in the ED and their care was transferred to the transition team (TT). The TT consisted of an MLP (nurse practitioner or physician assistant) and a registered nurse or licensed practical nurse, all reporting to ED supervisors. The TT was present 24 hours per day and accepted patients from the acute-care areas of the ED. A patient was eligible for management by the TT only if the attending physician in the ED had seen the patient and determined the patient's ED disposition. Two types of patients were transferred to the TT: (1) admitted patients awaiting an inpatient bed; and (2) patients scheduled for a test or consultation that would determine disposition. The TT MLP was expected to see each patient, confirm a care plan and disposition for the patient, monitor the patient's clinical care, document these items, and note the time of transfer of medical responsibility for the patient from the ED to the inpatient services (as applicable). Following evaluation by the inpatient service, a patient's care could be continued by the on-site TT MLP. The registered nurse (RN) or licensed practical nurse (LPN) on the TT was expected to initiate inpatient nursing procedures and protocols to the maximum possible extent. Exclusion criteria for assignment of patients to the TT were lack of readiness of an inpatient bed; hemodynamic instability or use of vasoactive medications for the patient; or intubation or candidacy of the patient for the intensive care unit (ICU). Medical responsibility for patients managed by the TT continued to be that of the attending ED physician until the hospital's inpatient services assumed care of the patient. MLPs were readily available from the local medical professional market. The TT provided all patient care until a patient was seen by the admitting inpatient service or until the patient left for an inpatient unit. The major TT objectives were a reduction of EM physician work in caring for inpatients, and improved patient care. We demonstrated that the TT assumed a significant patient load, an indirect measure of reduced EM physician work, but this did not improve patient satisfaction. The TT clinical role is less desirable to MLPs than are other traditional clinical roles. The TT is a potentially available, incremental staffing resource for a crowded ED.</p>	<p>Ganapathy, S., &amp; Zwemer, F. L. (2003). Coping with a crowded ED: An expanded unique role for midlevel providers. <i>American Journal of Emergency Medicine</i>, 21, 125-128.</p>

No.	Description	Reference
51	<p>Purpose To explore the licensing, certification, governance and education requirements of nurse practitioners (NPs) and physician assistants (PAs) in the state of Montana. Services provided and privileges retained in employment were also analyzed. Data Sources This was a descriptive study using a survey of rural hospital administrators (<math>N=34</math>). Conclusions Hospital administrators reported that 92.5% of PAs and their sponsoring physicians met the supervision requirements through site inspection and telephone communication, while 7.5% were required to have direct physician supervision. In contrast, 54.2% of NPs, who are autonomous by legal definition, have a telephone supervision requirement imposed on them by their employers. Implications for Practice These findings have implications for the current and prospective professionals and the businesses for which they work. Nurse practitioners and their professional organizations need to consider the implications these findings have on the professional image and marketability of all NPs. The authors note that both NPs and PAs are eligible to prescribe schedule II-V drugs. This excludes only schedule I drugs which have a high abuse potential and are not generally considered for medical use (e.g. heroin). The PA applies to the Board of Medical Examiners for prescriptive authority as part of the utilization plan. Physician assistants who are delegated prescribers of controlled medications are required to register with the federal Drug Enforcement Agency. The rules for the PAs emphasize the supervisory role of the physician. In the most autonomous scenario, the PA operating in a remote site will require the supervising physician to inspect the remote site and review patient records and office procedures at least once every 30 days or another interval at the discretion of the Board of Medical Examiners. The Board of Medical Examiners may grant the PA authority to maintain an office separate from the supervising physician.</p>	<p>Larsson, L. S., &amp; Zulkowski, K. (2002). Utilization and scope of practice of nurse practitioners and physician assistants in Montana. <i>Journal of the American Academy of Nurse Practitioners</i>, 14(4), 185-190.</p>
52	<p>Background. Nonphysician health care providers are in an optimal position to provide cancer prevention and screening services. Methods. We conducted a survey of primary care physicians to determine physician use and amenability to use of nonphysician health care providers to perform skin cancer screening in comparison with other cancer screening examinations. Results. A total of 1,363 eligible physicians completed the survey. Of these, 382 (28%) reported having a PA in their practice, and 671 (49.2%) reported having either a NP or a PA in their practice. 631 physicians (46%) reported a nurse practitioner or physician assistant performing at least one type of cancer screening examination on their patients. Twenty-nine and 22% of all physicians reported nurse practitioners or physician assistants performing skin cancer screening, respectively. Family physicians were more likely to use nurse practitioners and physician assistants to perform these cancer screening examinations than internists (<math>X^2</math> test, <math>P= 0.001</math> for each examination). Skin examinations were performed less frequently by nurse practitioners and physician assistants than all other cancer screening examinations. Overall, PAs performed digital rectal exams in 24.4% of practices, clinical breast exams in 23.8% of practices, and Papanicolaou testing in 23.2% of practices. Within the 382 practices that employed PAs, PAs performed complete body skin exams in 78.3% of practices, digital rectal exams in 86.9% of practices, clinical breast exams in 84.8% of practices, and Papanicolaou testing in 82.7% of practices. A total of 73–79% of family physicians and 60–70% of internists were amenable to having a nonphysician health care provider perform one or more of these examinations. Conclusions. Primary care physicians are currently utilizing nonphysician health care providers to perform cancer screening examinations and the majority of those surveyed are amenable to the use of these providers for such examinations. This suggests that one possible strategy for increasing skin cancer screening is through an expanded role of nonphysician health care providers.</p>	<p>Oliveria, S. A., Altman, J. F., Christos, P. J., &amp; Halpern, A. C. (2002). Use of nonphysician health care providers for skin cancer screening in the primary care setting. <i>Preventive Medicine</i>, 34, 374-379.</p>

No.	Description	Reference
53	<p>Objective: To compare resource use in physician assistant (PA) services versus teaching services for five medical diagnostic groups in a large community teaching hospital, while controlling for attending physician. Methods: The sample was drawn from an administrative database of patients admitted to an internal medicine service in which attending physicians' cases rotated between the PA and teaching services on a preassigned schedule. Diagnoses included in the study were stroke (diagnosis-related group [DRG] 014), pneumonia (DRG 089), acute myocardial infarction (DRG 122), congestive heart failure (DRG 127), and gastrointestinal hemorrhage (DRG 174). Cases discharged between January 1, 1994, and June 30, 1995, were evaluated. Inclusion of cases was based on the Integrated Inpatient Management Model (IIMM). Resource use was measured using direct costs expressed as relative value units (RVUs) for radiology, laboratory, and total resource use, as well as for length of stay (LOS). Results: After adjustment for admitting physician effects and other covariates, the mixed model analyses indicated that PAs used fewer total ancillary resources for patients with pneumonia and fewer laboratory resources for patients with stroke, pneumonia, and congestive heart failure than did residents, on average. No significant differences were noted in average LOS or use of radiology resources between PA and teaching services. In no cases did PAs use significantly more resources than residents. However, significantly higher mortality among pneumonia cases was detected for PAs. Conclusions: In the same practice setting, PAs used resources as effectively as, or more effectively than, residents.</p>	<p>Van Rhee, J., Ritchie, J. &amp; Eward, A. M. (2002). Resource use by physician assistant services versus teaching services. <i>Journal of the American Academy of Physician Assistants</i>, 15(1), 33-42.</p>

No.	Description	Reference
54	<p>Physician assistants are clinicians who are licensed throughout the United States to practise medicine in association with physicians. They perform many of the tasks previously done solely by their physician partners, including examination, diagnosis, and carrying out investigations, as well as treatment and prescribing. All physician assistants must be associated with a physician and must practise in an interdependent role, described as "negotiated performance autonomy." Physician assistants are not independent practitioners but practice-focused autonomous professionals delivering care in partnership with physicians, in a role described as "negotiated performance autonomy." This relationship allows them to staff satellite clinic offices, provide on-call services in the practice, and deliver care in rural areas, as in most states the physician partner need not be physically present for the physician assistant to practise. They may work as house staff in large academic teaching centres, replacing physicians whose posts are no longer funded, and they also serve as commissioned officers in all branches of the American armed forces. Numerous studies have shown that the quality of care given by physician assistants is at the level of that given by physicians in comparable situations, with high levels of patient satisfaction. Actuarial data do not show any increased liability as a result of using physician assistants. A growing body of research and extensive clinical experience shows that they are accepted by both patients and doctors and that their performance in terms of quality of care, expanded access, and cost effectiveness is satisfactory. The licensing boards in 50 states and the District of Columbia recognise physician assistants as healthcare practitioners authorised to perform diagnostic and therapeutic tasks delegated to them by physicians. From a legal perspective, enabling legislation empowers physician assistants to perform any clinical task within the scope of practice of, and sanctioned by, their supervising physicians. This wide latitude acknowledges the broad basis of physician assistants' abilities and recognizes their physician partner as the best judges of individual physician assistants' knowledge and skills. This conceptual framework has led to physician assistants providing virtually every clinical service, excluding primary responsibility for major surgery. This does not mean that every physician assistant is qualified to provide every service, even though they may be able to do so "legally." Physician assistants treat most primary care illnesses on their own without direct supervision by their physician partner. Physician assistants in community practice typically have a regular schedule of patients according to the needs of the particular practice - interviewing, examining, evaluating, diagnosing, and treating the vast majority of presenting patients - without the physician's presence in the room. In hospitals, physician assistants provide continuity of care for patients. This may take the form of attending private patients, or filling the role of house officer. PAs can be found in almost every medical and surgical specialty- both in broad specialties such as family medicine and general surgery and in subspecialties like cardiothoracic surgery, interventional neuroradiology, forensic medicine, occupational health, and dermatology. Specialised procedures performed by physician assistants tend to be specific to a particular clinical field or setting, not unlike those undertaken by physicians and commensurate with adequate formal or informal postgraduate training. Examples include insertion of central access lines and chest tubes, invasive diagnostic procedures, ambulatory surgery, harvesting of saphenous veins for bypass procedures, and many others.</p>	<p>Mittman, D. E., Cawley, J. F., Fenn, W. H. (2002). Physician assistants in the United States. <i>BMJ</i>, 325, 485-487.</p>

No.	Description	Reference
55	<p>Purpose: To describe the colorectal cancer-screening program at Harvard Vanguard Medical Associates, a large multispecialty medical group, in which nurse practitioners (NPs) and physician assistants (PAs) perform screening flexible sigmoidoscopies. Harvard Vanguard Medical Associates established endoscopy training guidelines based on information found in the literature and shared by other screening programs utilizing NP and PA endoscopists. The gastroenterology department did not offer a formally accredited course, but rather a hands-on learning experience under the direction of the group's gastroenterologists. Endoscopic skills are acquired gradually through the repeated performance of procedures under appropriate supervision. Trainees develop skills at variable rates due to differences in manual dexterity, interpretative skills, clinical judgment, and quality of instruction. Supervision requirements vary from clinician to clinician during the course of training. Training progresses through several stages along a continuum of graded responsibility and reduced supervision. A minimum of 100 supervised examinations performed over a two to four month training period are required before assuming competency in flexible sigmoidoscopy techniques. Once trainees have completed the required number of supervised cases and demonstrated the ability to perform the flexible sigmoidoscopy procedures within a reasonable period of time and with minimal discomfort to the patients, they are permitted to perform the procedures independently. Since the acquisition of endoscopy skills is a lifelong process, the NP or PA endoscopist continues to benefit from the immediate availability of staff gastroenterologists to assist with more difficult procedures and to consult on positive findings. On-site availability of a gastroenterologist at all times is a requirement of the program regardless of the skill level of the NP or PA. Within the screening program, the NPs and PAs are also responsible for discussing with patients the results of colonic biopsies and assisting the gastroenterologists with scheduling patients for further procedures. Data Sources: Scientific literature, consensus statements and guidelines, and the protocol utilized to train NPs and PAs to perform flexible sigmoidoscopy. Data from 9,500 screening procedures are presented. Conclusions: In comparison with gastroenterologists, trained NP and PA endoscopists perform screening flexible sigmoidoscopy with similar accuracy and safety but at lower cost. After an initial 100 examinations, three advanced practice clinicians (one NP and two PAs) achieved a mean depth of examination of <math>52 \pm 10</math> centimeters. The depth of insertion did not change with the performance of additional procedures. The length of the colon examined when a physician performed the sigmoidoscopy was <math>55 \pm 9</math> centimeters. This difference in the depth of insertion was not felt to be clinically significant. In fact, there were no differences in the rates of detection of polyps by physicians and those of the NPs and PAs. Polyps were detected in 321 (23%) of the examinations by physicians and in 619 (27%) of the examinations by NPs and PAs (<math>p=0.34</math>). Neoplastic polyps were detected in 80 (6%) of the examinations by physicians and in 180 (8%) of the examinations by NPs and PAs (<math>p=0.35</math>). No major complications were observed in examinations performed by the NPs and PAs. The overall costs for performing flexible sigmoidoscopy by NPs and PAs were 33% less than those of the staff gastroenterologists. The conclusions were that in comparison with gastroenterologists, trained NP and PA endoscopists perform screening flexible sigmoidoscopy with similar accuracy and safety, but at lower cost. Implications for Practice: Screening flexible sigmoidoscopy performed by NPs and PAs may increase the availability and lower the cost of flexible sigmoidoscopy for colorectal cancer screening.</p>	<p>Horton, K., Reffel, A., Rosen, K. &amp; Farraye, F. A. (2001). Training of nurse practitioners to perform screening flexible sigmoidoscopy. <i>Journal of the American Academy of Nurse Practitioners</i>, 13(10), 455-459.</p>

No.	Description	Reference
56	<p>This article examines the question of whether the US physician assistant (PA) model is the right solution for the NHS staff shortage. It describes the US PA model, including training, conflicts and difficulties, the practicalities of introducing US-style PAs into the UK, and the potential impact of introducing US-style PAs. The authors provide four real examples of the roles of PAs; two in primary care, and two in secondary care. These are: Primary care <i>The Howard City Medic One Clinic</i> is a family medicine clinic in an underserved rural region of Michigan. An advanced practice nurse and a physician assistant routinely staff the clinic. A general practice doctor is on site for a day and a half each week and otherwise available for consultation via email and telephone. The practitioners on site provide medical care for the entire range of outpatient conditions from “well child” check ups to emergency treatment of myocardial infarctions and surgical conditions before transport to hospital. <i>The Kentwood Family Medicine Center</i> in suburban Grand Rapids, Michigan, is staffed by a team of five physicians in private practice, one physician assistant, one advanced nurse practitioner, and junior doctors at various levels of training. All patients are private patients who select the centre as the site for their medical care; reimbursement for services follows the traditional US model. The physician assistant and advanced nurse practitioner provide health maintenance and preventive care, diagnose and treat minor illness, provide prenatal care, and perform routine follow up care for illness and surgery. In addition, the centre provides instruction to medical students, physician assistant students, and advanced practice nursing students during the clinical experience part of their training. Secondary care <i>The urology service at Spectrum Health Medical Center</i> in Grand Rapids is staffed by 12 trained urologists (consultants and surgeons) and two physician assistants. In addition, the medical centre provides nursing services, and medical students, postgraduate physician assistants pursuing additional training in the surgical services, and junior doctors training in surgery provide medical care. The physician assistants on the unit provide preoperative care (including presurgical histories and physical examinations), assist in surgery, and provide postoperative care. <i>The emergency department at St Mary's Mercy Medical Center</i> is staffed at all times by three to five board specialty trained physicians in emergency medicine, an advanced practice nurse, and a physician assistant. As a training health facility, the department also has medical, nursing, and physician assistant students. In this setting the mid-level practitioners provide care such as first response at trauma cases, diagnosis and treatment of illnesses commonly seen in community clinics, repair of uncomplicated lacerations, and treatment of minor fractures and sprains.</p>	<p>Hutchinson, L., Marks, T., &amp; Pittilo, M. (2001). The physician assistant: Would the US model meet the needs of the NHS? <i>BMJ</i>, 323, 1244-1247.</p>

No.	Description	Reference
57	<p>Nonphysician providers are being increasingly used to care for trauma patients. As these complex patients recover, they require meticulous medical management and time-consuming psychosocial care. A retrospective evaluation of a unique patient care service staffed by nonphysician providers is presented. The Intermediate Care Service is designed to facilitate the management and long-term placement of trauma patients who no longer require intensive care while recovering from their injuries. In July 1998, the trauma physicians at a level one trauma center proposed using nonphysician providers to care for trauma patients who were likely to require long-term hospitalization. Under the supervision of a trauma surgeon/ surgical intensivist, two nonphysician providers—an ACNP (acute care nurse practitioner) and a PA—manage trauma patients whose injuries have been stabilized. The term Intermediate Care Service (ICS) is used to describe the ongoing trauma patient care services coordinated by these providers. The admitting trauma team transfers patients to the ICS. Patients who are transferred to the team are those admitted to the trauma service who no longer require treatment in the ICU, do not have active surgical problems (e.g., an open abdomen or fistula), and are likely to need extensive rehabilitation and long-term hospitalization for their injuries. Patients are transferred to the ICS directly from the ICU, or when acute surgical issues have been resolved after a brief stay on a medical/surgical unit. Once a patient is transferred to ICS, either the ACNP or PA assumes responsibility for patient care management, depending on who is on call and each person's patient caseload. On average, they each manage four to six patients. The trauma surgeon/surgical intensivist makes weekly rounds on the patients and is available on a daily basis as needed when questions arise. The model is an example of collaborative practice in which nonphysician providers and the trauma surgeon provide care for patients and share equal authority for care within their scopes of practice. When a new patient is accepted to the ICS, the nonphysician provider conducts an in-depth evaluation of the patient to assess existing and new problems, re-evaluate injuries, determine the level of care needed, and modify treatments as appropriate for the reduced acuity of the patient. The evaluation includes a detailed chart review to gain a thorough picture of the patient's hospital course. The provider reviews progress reports, diagnostic test results, and notes written by members of the multidisciplinary team (nursing, physical therapy, occupational therapy, speech therapy, social work, dietary) to learn as much about the patient as possible. Data are reviewed to identify physical, cognitive, social, financial, and other issues that may affect recovery and discharge to rehabilitation. After the record review, the nonphysician provider conducts an in-depth history and complete physical examination of the patient. Orders are written based on the initial evaluation of the patient, with a focus on rehabilitation and discharge planning. The new diagnoses, physician order changes, and disposition of 93 patients cared for during a six-month period are described. Most patients were admitted with neurologic injury. The most common new diagnosis was constipation; the most frequent new orders related to medications, including bowel management, and rehabilitation consultations. All patients were discharged from the hospital. One fourth of the patients were discharged home. The remaining patients were transferred to skilled nursing facilities, rehabilitation centers, or other hospitals. Because the ICS service is part of a regional level one trauma system, stable patients are sometimes transferred back to original outlying hospitals. All of the 93 patients managed by the ICS team survived, and no one required a higher level of care (e.g., transfer back to the ICU for treatment). The authors suggest that the ICS represents a unique and valuable model for the collaborative management of complex trauma patients. With regard to implications for practice and research, the authors state that the study was designed to describe the practice of an ACNP and PA who manage trauma patients. The study is not a comprehensive evaluation of outcomes of nonphysician providers, and it is limited to one institution. They note that many readers may want additional information on outcomes according to type of nonphysician provider (i.e., ACNP and PA). However, in the model of care provided by the ICS team, both providers assume equal responsibilities for patient care and work as a collaborative practice team. The authors conclude that this descriptive study shows that nonphysician providers can manage trauma patients once their injuries have been stabilized.</p>	<p>Sole, M. L., Hunkar-Huie, A. M., Schiller, J. S. &amp; Cheatham, M. J. (2001). Comprehensive trauma patient care by nonphysician providers. <i>AACN Clinical Issues</i>, 12(3), 438-446.</p>

No.	Description	Reference
58	<p>The practice autonomy of primary care physician assistants (PAs) is of interest to those organizing, financing, and delivering health services. This study examined the predictive abilities of practice attributes with respect to multidimensional aspects of practice autonomy (clinical decision making and prescriptive authority) in primary care PAs. A sample of 225 practicing PAs was used to construct the 16-item Physician Assistant Autonomy of Practice Instrument (PAAPI), which includes three subscales, routine prescriptive authority, advanced prescriptive authority, and clinical decision making. All were used as dependent variables in multiple regression analyses. The most significant correlates of practice autonomy included years in practice as a PA, years in practice with supervising physician, annual income from practice, recognition as the exclusive primary care provider for patients, primary practice in a rural county, and primary employment setting (single-specialty group practice). More primary care PAs continue to be used in underserved rural areas and in managed care. Organizational structure of the work setting may influence these PAs' practice autonomy.</p>	<p>Chumbler, N. R., Weier, A. W., &amp; Geller, J. M. (2001). Practice autonomy among primary care physician assistants: The predictive abilities of selected practice attributes. <i>Journal of Allied Health, 30</i>(1), 2-10.</p>

No.	Description	Reference
59	<p><b>Objective:</b> To compare patient care delivery by neonatal nurse practitioners (NNPs) and physician assistants with that of pediatric residents in the intensive care setting. <b>Design:</b> Retrospective chart review after developing specific performance criteria, namely, patient management, outcome, and charges. <b>Methods/Materials:</b> Charts for 244 consecutive admissions to a neonatal intensive care unit in Jacksonville, Florida, were reviewed. Patients were cared for by one of two teams, one staffed by residents and the other by neonatal nurse practitioners and physician assistants. Team 1 was composed of a neonatologist, a third-year pediatric resident, and three second-year pediatric residents. Pediatric residents were assigned to the NICU for two one-month rotations during the second year (PL-2) and again to two one-month rotations during the third year (PL-3). The PL-2 residents provided direct patient care and were responsible for writing daily notes, orders, and procedures. The PL-3 residents assisted in these functions when needed but performed a more supervisory role for the junior residents. Residents were on call every fourth night for their team and worked an average of 70 to 80 hours per week in the NICU. Team 2 was staffed by NNPs and PAs, with another neonatologist providing supervision. The UMC employed seven NNPs and two PAs during this period to work in the Division of Neonatology. All NNPs had been trained in the certificate nurse practitioner program at UFHSC-J (University of Florida Health Science Center, Jacksonville). Requirements for entry into this program include a registered nurse degree and previous experience as a staff nurse in an NICU, which varied from two to 12 years for the NNPs employed during the study period. The nurse practitioner training program included four months of classroom work and five months of supervised clinical training. The two PAs who had no previous NICU experience were also required to attend this course. Neonatal nurse practitioners and PAs held the same patient care responsibilities as did the residents, including writing daily progress notes and orders on all patients assigned to their team. Neonatal nurse practitioners and PAs also performed all procedures on their patients, including but not limited to endotracheal intubation and placement of umbilical catheters, peripheral arterial lines, and chest tubes. Similar patients were cared for by the two teams, as determined by patient background characteristics and diagnostic variables. Performance of the two teams was assessed by comparison of patient management, outcome, and charges. Management variables included data on length of critical care and hospital stay, ventilator and oxygen use, total parenteral nutritional use, number of transfusions, and the performance of various procedures. Outcome variables included the incidence of air leaks, bronchopulmonary dysplasia, intraventricular hemorrhage, patent ductus arteriosus, necrotizing enterocolitis, retinopathy of prematurity, and number of infants who died. Charge variables included hospital and physician charges. <b>Main Results:</b> Results demonstrated no significant differences in management, outcome, or charge variables between patients cared for by the two teams. <b>Conclusion:</b> Neonatal nurse practitioners and physician assistants are an effective alternative to residents for patient care in the neonatal intensive care unit.</p>	<p>Carzoli, R. P., Martinez-Cruz, M., Cuevas, L. L., Murphy, S. &amp; Chiu, T. (1994). Comparison of neonatal nurse practitioners, physician assistants, and residents in the neonatal intensive care unit. <i>Archives of Pediatrics and Adolescent Medicine</i>, 148, 1271-1276.</p>
<b>Grey Literature</b>		
60	<p><b>Background:</b> This is a summary of a two-year study of the Scottish Physician Assistants (PAs) pilot that ran from November 2006 to October 2008. Fifteen USA educated PAs worked in Scotland at some period during those 24 months in the following settings: primary care; out of hours clinic; emergency medicine; intermediate care; orthopaedics; acute receiving unit. The study aimed to evaluate the impact and contribution made by the appointed PAs to delivering effective healthcare in NHS Scotland. <b>Methods:</b> The evaluation used mixed data collection methods (e.g., individual and group interviews; monthly feedback forms; recording of scope of practice, etc.). Data were collected longitudinally to assess changes. A case study approach was taken in selected settings to attain richness. For qualitative data management, nVivo was used. SPSS and Excel were used for quantitative data analysis. <b>Findings: Response:</b> Six group interviews were held with PAs; 63 interviews with team members; 20 interviews with patients; four with NHS senior managers and three with Partnership Forum representatives. Work activity data were collected for settings; 48%</p>	<p>Farmer, J., Currie, M., West, C., Hyman, J. &amp; Amott, N. (2009). <i>Evaluation of Physician Assistants to NHS Scotland: Final Report</i>. UHI Millennium Institute.</p> <p>Available at:  <a href="http://www.nes.scot.nhs.uk/media/">http://www.nes.scot.nhs.uk/media/</a></p>

No.	Description	Reference
	<p>(92/190) of monthly PA/medical supervisor feedback forms were received. <i>Safety:</i> Over 24 months, two minor patient safety issues were noted by supervising doctors: a mix-up with patient notes and a PA advising a patient to change drug regimen without consulting their supervising GP. From this study, PAs appeared safe when working under medical supervision. All patients interviewed were satisfied with PAs, several noting that they appreciated PAs' communication skills. <i>Effectiveness:</i> PAs' scope of practice tended to expand over time, but most thought they had not been able to work to the scope and level they would do in the US. Inability to prescribe was a hindrance. PAs usually spent longer time with patients as patient education was reported to be a feature of PA training. PAs were reported to provide continuity in busy settings and to be an educational resource for other staff. Most interviewees reported PAs were working in a range from similar to a nurse practitioner to similar to a mid-level/generalist doctor. The valued distinctive features of PAs were: generalists with a background of medical training, confident and autonomous within their scope of practice, can do differential diagnosis, communication skills, confident in dealing with uncertainty. Medical supervision arrangements varied from close to formal/ distant relationships. PAs reported working most effectively, and were most satisfied, where there was a distinct gap in a team that they could fill. NHS senior managers were mostly satisfied that PAs might be one of several new roles developed for the future NHS. Partnership Forum representatives suggested that team members became less anxious about PAs once they were informed and had worked with them. <i>Cost-effectiveness:</i> Teams noted that PAs brought a level of skills and attitudes that overlapped with other roles. Thus PAs were described as complementing team skill-mix, rather than as a potential direct replacement for other staff members. When specifically asked to choose, interviewees suggested the types of existing job designations that PAs could be placed in. These included both nursing and medical roles and the costs of deploying a PA instead of these existing posts were calculated, based on gross salaries at the time of the study. Towards the end of the study, the newly qualified PA post was evaluated under Agenda for Change at Band 7 (£29,091 - £38,353). It was found that PAs would cost approximately £15,000 more if they worked in the role of a practice nurse (as one PA was actually deployed in primary care) to saving £43,000 upwards if they worked 'like' a generalist doctor (specialist trainee, staff grade or GP in training). Costs to the NHS would arise from setting up PA education courses, professional development and related structures. The time spent by supervising doctors, with PAs, was also noted as a cost. Conclusions: a) During the study PA's practice was found to be safe; b) Patients who were interviewed were found to be satisfied with PAs; c) PAs were reported to be most valued, and expressed most satisfaction themselves, where they were working in a new role or where they could find a distinct space to fulfill their potential scope of practice. Findings suggest they were less able to do this in primary care, compared with other settings. This may be related to the settings and work arrangements in the pilot project; d) Findings suggest a 'mid-level' practitioner space, that there are currently challenges filling, in some settings in NHS Scotland. There may be a range of types of practitioner that could fill this generalist space, with appropriate education, training and experience. The skills and attitudes required are: critical thinking, diagnostic skills (capacity for differential diagnosis), generalist/holistic medical approach, communication skills and confidence in dealing with uncertainty. Practitioners with these skills and attitudes can provide continuity and a training resource in settings; e) The opinions of team members interviewed in this study concur with evidence from the USA suggesting that PAs add complementary skills and attitudes to teams and should not be regarded as a potential direct 'substitute' for a nurse or a doctor. Findings suggest team members think PAs would be one of a range of roles that might be present in an ideal team. If PAs were to undertake some of the work that might 'replace' existing roles, then cost savings might result. There would be costs in developing education, accreditation and support structures; f) A strong and trusting relationship is required between PAs and their supervising doctor. Although the NHS tends to be hierarchical, instances of these types of relationships emerged in the pilot showing that this is possible in NHS Scotland. With such a relationship in place, PAs were described as working like 'physician extenders'; conducting a range of routine tasks in the manner that their supervising doctor required and freeing the doctor to concentrate on more complex work; g) PAs could not prescribe in the pilot. This was more of a hindrance in primary care and the out of hours clinic than in emergency medicine and other hospital settings. Piloting of PAs in other settings may be dependent on achieving prescribing rights; h) Findings of this study should be viewed in the light of caveats. PAs were piloted in a small number of settings. There were a small number of PAs, some departed and some arrived during the study, making evaluation complex. PAs could not prescribe and did not think they were given the scope to expand to their full potential. PAs in the Project were often highly experienced and were from the USA. The skills and attitudes of UK or Scottish trained PAs might be different. Sometimes personalities did not fit and this impacted on</p>	<p><a href="http://3933/uhi_final_report_january09.pdf">3933/uhi_final_report_january09.pdf</a> Last accessed: July, 2011</p>

No.	Description	Reference
	<p>team members' and NHS Boards' experiences with PAs; (i) The PA profession is spreading internationally in response to workforce gaps. This study suggests PAs may offer some promise in meeting Scottish policy goals. Scotland's choice is to become part of the world-wide development of the PA profession and/or to develop existing professional groups into the mid-level, generalist 'space' identified.</p>	
61	<p>In California, as in other states, consumers are having difficulty getting access to physicians in some specialties, including gastroenterology, orthopedics, and dermatology. The challenges may be particularly acute for patients of community clinics and public hospitals. Many specialty medical practices have incorporated physician assistants (PAs) and nurse practitioners (NPs) into their outpatient settings to improve access to care, reduce wait times, and improve quality of care. A study by the Center for the Health Professions at the University of California, San Francisco, examined these emerging models to evaluate their success and identify strategies that could be replicated. The study focused on outpatient care in three specialties with particularly high demand rates: orthopedics, gastroenterology (GI), and dermatology. The research found that utilization of physician assistants and nurse practitioners varied across these specialties. For example: Orthopedics. Orthopedic practices commonly rely on physician assistants to do many orthopedic assessments and procedures. The prevalence and long track record of this model throughout the United States suggests it will become even more widely adopted. Gastroenterology. A growing number of GI practices employ NPs and PAs to increase follow-up patient volume, freeing physicians to do high-level procedures. The business model is strong, suggesting that this approach will become more widespread. Dermatology. Some practices employ PAs as clinical providers for routine cases, allowing supervising physicians to focus on complex cases and surgeries. The study found that these models generally improved access, reduced wait times, and proved financially sustainable. Although quantitative evidence is scarce, qualitative information points to maintenance or improvement in quality of care. The successful models have implications for practitioners and delivery site managers, including those at community clinics and public hospitals where some patients experience significant delays in getting specialty care. Some sites might want to develop a system relying on teams of physicians, NPs, and PAs to provide specialty care. Others could benefit from fully understanding how such systems work to facilitate efficient and effective referrals. There are challenges to implementing these models. Most PAs and NPs must be trained on the job because of the small number of postgraduate medical specialty programs. In addition, all practitioners—physicians, PAs, and NPs—must be aware of everyone's strengths and limitations, must be able to work collaboratively, and must keep lines of communication open. Sustainable financing can be accomplished with attention to the details of the practice model, including incorporating time for supervision and mentoring into the daily routine. Although state laws and regulations regarding legal scopes of practice for NPs and PAs should be considered, the legal environment was not found to be a significant barrier to implementing these models. The document presents case studies of six practices that have integrated PAs and NPs into their clinical settings. 1) Kaiser Permanente Fontana Medical Center, Orthopedic department – Fontana, California. The Kaiser Fontana Medical Center Orthopedic Department relies on 13 physician assistants and one nurse practitioner to provide a broad range of out- and inpatient services, including “first call” for all orthopedic consult requests from urgent care, primary care, emergency, or inpatient services. PAs conduct all initial evaluations and fully handle an estimated 80 percent to 90 percent of patient cases, with the remainder—such as fractures that are not reducible and may require surgery—referred to physicians. PAs order and read imaging studies and other tests, apply casts, set bones such as wrists, prescribe medications (except schedule II drugs at discharge), and provide most other orthopedic treatment. Fourteen physicians supervise the PAs. A team of four rotating PAs works essentially as PA hospitalists to support inpatient care and work closely with three internist physicians. The nurse practitioner works in podiatric surgery. 2) <a href="#">St. John's Clinic-Orthopedic Specialists</a> – Springfield Missouri. This clinic provides a full range of orthopedic services within an integrated health care system owned and operated by the Sisters of Mercy. Approximately 13 physician assistants work with 16 orthopedic physicians providing both in- and outpatient clinical care. Outpatient services provided by the PAs include seeing and evaluating patients, applying and removing casts, prescribing medications (except narcotics), ordering and interpreting tests, and delivering joint injections. Physicians and PAs usually work together in teams of two, though some physicians in the group do not work with any PAs. With the one-on-one team approach, PAs always have access to a physician and receive both direct and general supervision. The practice experimented with allowing experienced PAs to see some new patients but modified its policy due to concerns from some community primary care physicians. Now, all new patients see a physician in addition to a PA. Patients are seen exclusively by PAs for many follow-up visits, although physicians emphasize to</p>	<p>Dower, C., &amp; Christian, S. (2009). Physician Assistants and Nurse Practitioners in Specialty Care: Six Practices Make It Work. Report prepared for the California HealthCare Foundation.</p>

No.	Description	Reference
	<p>PAs during their orientation and training that they must continuously sharpen their skills regarding patient satisfaction and assess whether a patient may want to see a physician instead of, or in addition to, the PA. 3) <a href="#">Division or gastroenterology, hepatology, and nutrition</a>, University of Florida - Gainesville The Gastroenterology, Hepatology &amp; Nutrition Division within the University of Florida's (UF) Department of Medicine is a top-ranked unit in the United States. A team of 14 medical doctors, four PAs, and three NPs work to meet extremely high-volume demands for GI services ranging from basic assessments to liver transplants. Physician assistants and nurse practitioners focus on outpatient needs and function similarly to medical fellows or junior attending physicians. Working collaboratively with the physicians, the PAs and NPs have broad scopes of responsibility and competence. The unit stresses communication among all clinicians and works to ensure that PAs and NPs have access to physicians whenever needed. Specific responsibilities vary. 4) <a href="#">Digestive Health Specialists</a> – Federal Way, Washington. Digestive Health Specialists (DHS) is a specialty group of medical doctors and non-physician clinical staff working at nine gastroenterology outpatient clinics and four endoscopy centers in and around Tacoma, Washington. Collectively, eight physician assistants and five nurse practitioners complement a team of about 20 gastroenterologist physicians to provide care in outpatient settings and at several affiliated local hospitals for inpatient services. Although specific duties and responsibilities may vary, the PAs and NPs work fairly independently and provide a full range of medical care except high-level diagnoses and procedures such as endoscopy and colonoscopy. 5) <a href="#">Dermatology Clinic, P. C.</a> – Salem, Oregon The Dermatology Clinic is a private group practice composed of four dermatology physicians and three physician assistants. Each PA has his or her own patient caseload, which is generally equal to the physician caseloads. Compared with physicians, PAs for the most part provide a similar scope of clinical services. Exceptions include some complicated surgeries and diagnostically complex patients, whom the physicians handle. PAs see patients, write treatment plans, prescribe medication, perform biopsies for skin cancer, make incisions, and provide some laser treatments. PAs work collaboratively with physicians on-site, requiring minimal supervision but under a rigorous monitoring policy. PAs do not see patients without a physician on-site. All new patients are seen by a physician and a PA at their first visit. PAs may see the patients on their own for follow-up visits when there is no change in treatment plans; if any questions arise, the PA consults with the physician to resolve the question, re-evaluate the patient, and/or re-establish a treatment plan. If any new problems arise, the patient sees the physician. All PAs work with all physicians and interact regularly throughout the day. 6) <a href="#">Central Carolina Dermatology Clinic Inc.</a> – High Point, North Carolina This six-physician dermatology group employs one physician assistant who sees 25 to 40 patients per day. He does evaluations, orders laboratory tests, orders ultraviolet light treatment, and performs biopsies and excisional surgeries (though not flaps, grafts, or Mohs surgeries). He has prescriptive authority but no Drug Enforcement Agency number, by choice, so he does not prescribe narcotics. He has worked with this practice for five years and previously was at another dermatology practice for seven years. With this experience, he works fairly independently and occasionally consults with the physicians for second opinions or complex cases</p>	

No.	Description	Reference
62	<p>As the physician assistant (PA) profession has matured, it has become a significant factor in the nation's health care delivery system. Quality of care stakeholders are increasingly concerned about the medical care being delivered by non-physician providers. Stakeholders include local and national government, health care delivery organizations, health care provider education programs, the health insurance industry, and the general public. Each is affected by the liability of physician assistant medical practice. While PAs are being trained and hired at a rate that assumes adequate competence, quality and safety, current research is absent of a comprehensive analysis of PA malpractice over time. This study examined 17 years of data related to unsafe medical practice (i.e., practice that harms patients or the public). The study analyzed and compared a variety of markers (e.g., civil lawsuits and Medicare program exclusions filed with the National Practitioner Data Bank) of safety between physicians, PAs, and advanced practice nurses (APNs). Results of the study suggested that: a) the overall incidence and ratio of malpractice claims per provider was no greater for PAs and APNs than for physicians over a 17 year period; b) the average and median malpractice payments of PAs were less than that of physicians while that of APNs were greater; c) the trend in median payment increases was less for PAs than physicians and APNs, and higher for APNs than physicians; d) PAs did not negate their cost effectiveness through the costs of malpractice; e) the rate of malpractice incidence increased for PAs and APNs over the study period but remained steady for physicians; and f) the reasons for disciplinary actions against PAs were similar to that of physicians and APNs. Other study findings included gender differences in both malpractice payment incidence and malpractice payment amount and disparities between states regarding the frequency of disciplinary actions as compared to malpractice incidence.</p>	<p>Nicholson, J. G. (2008). Physician Assistant Medical Practice in the Health Care Workforce: A Retrospective Study of Medical Malpractice and Safety Comparing Physician Assistants to Physicians and Advance Practice Nurses. Doctoral dissertation, University of Wisconsin – Madison.</p> <p>Available at:  <a href="http://www.paexperts.com/Dissertation.pdf">http://www.paexperts.com/Dissertation.pdf</a></p> <p>Last accessed: July, 2011</p>

No.	Description	Reference
63	<p>The Canadian population is severely under-served by orthopaedic services while experiencing the longest waiting times of any specialty for elective consultation and surgery. Resource restrictions further exacerbate this problem. The University of Manitoba Joint Replacement Group (UMJRG) at Concordia Hospital in Winnipeg, Manitoba has met these challenges by adopting the physician assistant model. Known as clinical assistants (CA) in Manitoba, CAs have been practicing since 2003. Working under a supervisory physician, orthopaedic physician assistants perform the following: take medical histories; examine and treat patients under supervision; order and interpret investigations to make diagnoses; chart operative and progress notes; write orders; assist in the operating room; and write prescriptions. Some empirical evidence from the literature indicates that physician assistants enhance physician productivity and economic efficiency. They also enhance access and patient satisfaction. The literature on PAs in orthopaedics, while limited, indicates strongly positive outcomes for PA-orthopaedic surgeon practice. There are four components to this study: The first examines surgeon time savings; the second is an opinion survey of stakeholders including surgeons, nurses, residents and patients on the role of physician assistants in care delivery; the third is a costing analysis; and the fourth examines reduced waiting times attributed to running two operating rooms employing clinical assistants. In this study, physician assistants were found to free up for their supervising orthopaedic surgeon the equivalent of four 50 hour work weeks per year. Surgeons can in turn use this time for other activities such as administrative work, research, and other clinical activities. The use of physician assistants as first assistants in the operating room instead of general practitioners freed up the equivalent of 1.5 general practitioners working 40 hours per week for 44 weeks per year based on a surgical volume of 1,400 joint replacements per year. Operating room and ward nurses feel that physician assistants are important team members that improve care delivery. Nursing staff do not feel that physician assistants fill an expanded healthcare provider role that should be in the domain of nursing. Orthopaedic surgeons feel strongly that physician assistants improve the quality of care of their patients both in the operating room and on the ward, and that physician assistants greatly reduce the amount of "scut work" that they have to perform. Patients report very positively that physician assistants improve the care that they receive on the ward, and that they are important members of the care team. Physician assistants can greatly improve surgical throughput and greatly improve surgeon capacity. In this study, the double room model facilitated an increase in primary joint volumes of 42%. The increased throughput associated with the double room model has reduced median wait times in this particular surgical group by 14 weeks down to 30 weeks, which is quite close to the national benchmark. This is a reduction in median waiting times of 32% over the previous year. Improved efficiencies would also be anticipated under other operating room arrangements where PAs are employed. Evidence supports that employing PAs reduces health system expenditures. While the forgone general practitioner surgical assist fees in 2006 (\$270,000CDN) correspond to the total salary costs for the three physician assistants (\$270,000 to \$327,000 CDN), these numbers underestimate the real cost savings of PAs. (The value added benefits of PAs noted above and the flexibility of PAs to work in both the OR and on the ward are not reflected in these salary only numbers.)</p>	<p>National Standards Committee, Canadian Orthopaedic Association (2007). <i>Report on Orthopaedic Clinical Assistants in Manitoba</i>. June.</p> <p>Available at: <a href="http://www.coa-aco.org/images/stories/articles/nsc_physician_assistant_report_2007_final.pdf">http://www.coa-aco.org/images/stories/articles/nsc_physician_assistant_report_2007_final.pdf</a></p> <p>Last accessed: July, 2011.</p>

No.	Description	Reference
64	<p>This document contains the Ontario PA scope of practice statement and the Ontario PA competency profile. The clinical expert competencies require that the PA demonstrate competency in the following clinical and procedural skills: The PA will be able to: i. Obtain health history as appropriate, including patient demographics, chief complaint, history of the present illness or injury, past medical, surgical, family and psychosocial history, medications, allergies and systems review. ii. Conduct comprehensive and focused physical assessments and interpret findings. This includes assessment of vital signs and examination of all major body systems. In addition, the PA will be able to perform psychological, ob-gyn, neonatal, pediatric and geriatric assessments. iii. Utilize primary and secondary assessment results to formulate a differential diagnosis and determine if further clinical investigation is required. iv. Order and complete preliminary interpretation of necessary diagnostic tests, which may include, but are not limited to, hematology, microbiology, chemistry, serology, urinalysis, blood gas, ECG, peak flow and plain film x-ray. v. Perform the following diagnostic procedures: ECG, Peak expiratory flow tests, Slit lamp examination (including fluorescein dye and intraocular pressure measurement), Visual acuity, Pap smear; and will demonstrate at least an academic understanding of the performance of the following diagnostic procedures: Routine and micro-urinalysis, Basic hematology, Clinical chemistry, Microbiology, Point of care kits, Audiometry. vi. Collect blood samples (arterial and venous), minor surgical samples, body secretions and body fluids (semen, sputum, wound drainage, and urine). vii. Formulate a treatment and management plan based on assessment and investigation results, availability of services and special needs of patient. viii. Implement the following interventions: Basic Life Support (BLS), Advanced Cardiac Life Support (ACLS), Basic and advanced airway management, IV cannulation, Immobilize fractures or suspected fractures with splints and/or casts, Basic and advanced wound management including suturing, Surgical first assist, if needed, and, will demonstrate at least an academic understanding, and may have demonstrated skills in a simulated setting, of the following interventions: Airway management including initiating treatment with portable transport ventilatory devices, Advanced trauma life support protocols, Minor surgery: biopsies, incision and drainage of abscesses, Other procedures: ear syringing, gastric lavage, enema administration, ix. Provide pharmacological therapy. The PA will be able to administer medication by the following routes: Topical, Oral, Sublingual, Inhalation, Subcutaneous, Intramuscular, Intravenous. And, the PA will demonstrate at least an academic understanding, and may have demonstrated skills in a simulated setting, in the administration of medications via the following routes: Intraosseous, Endotracheal, Rectal, Intranasal, Other. x. Monitor patient progress and response to treatment.</p>	<p>Mikhael, N., Ozon, P., &amp; Rhule, C. (2007). Defining the Physician Assistant Role in Ontario: Ontario Physician Assistant Scope of Practice Statement and Ontario Physician Assistant Competency Profile. HealthForceOntario.</p> <p>Available at:  <a href="http://www.healthforceontario.ca/upload/en/work/defining%20the%20role%20of%20physician%20assistant%20scope%20of%20practice%20and%20competencies%20document_%20may%209%202007.pdf">http://www.healthforceontario.ca/upload/en/work/defining%20the%20role%20of%20physician%20assistant%20scope%20of%20practice%20and%20competencies%20document_%20may%209%202007.pdf</a></p> <p>Last accessed: August, 2011.</p>

No.	Description	Reference
65	<p>Introduction: Looming demographic challenges are opening the door to the rise of a parallel private care system which will forever change the nature of a Canadian institution. Current shortages in surgical manpower cannot be addressed expediently due to 14-year university training requirements for new surgeons. A potential solution is to increase the efficiency of surgeons currently in practice. Physician assistants (PAs) may play a role in this regard by allowing surgeons to concentrate on their core competency, namely operating. The purposes of this investigation are to explore the inefficiencies in a current Canadian surgeon's practice, examine the feasibility of PA employment and evaluate the financial impacts. A PA is a health professional who practices certain aspects of medicine under the direct supervision of a licensed physician. Physician Assistants work in close association with physicians. They participate in a team approach to managing patients with an emphasis on performing tasks and duties that are routine in nature. Physician Assistants can work in primary care or subspecialty areas including orthopedic and plastic surgery, diagnostic imaging and internal medicine. They can be certified to perform duties such as history and physical taking, surgical assisting, writing prescriptions and managing routine medical problems. In the US, the scope of a PA's practice is limited by the guidelines set out by policy H-160.947 of the American Medical Association (AMA), which include: (1) The physician is responsible for managing the health care of patients in all settings. (2) Health care services delivered by physicians and physician assistants must be within the scope of each practitioner's authorized practice, as defined by state law. (3) The physician is ultimately responsible for coordinating and managing the care of patients and, with the appropriate input of the physician assistant, ensuring the quality of health care provided to patients. (4) The physician is responsible for the supervision of the physician assistant in all settings. (5) The role of the physician assistant in the delivery of care should be defined through mutually agreed upon guidelines that are developed by the physician and the physician assistant and based on the physician's delegatory style. (6) The physician must be available for consultation with the physician assistant at all times, either in person or through telecommunication systems or other means. (7) The extent of the involvement by the physician assistant in the assessment and implementation of treatment will depend on the complexity and acuity of the patient's condition and the training, experience, and preparation of the physician assistant, as adjudged by the physician. (8) Patients should be made clearly aware at all times whether they are being cared for by a physician or a physician assistant. (9) The physician and physician assistant together should review all delegated patient services on a regular basis, as well as the mutually agreed upon guidelines for practice. (10) The physician is responsible for clarifying and familiarizing the physician assistant with his/her supervising methods and style of delegating patient care. No such national guidelines are yet established in Canada.</p> <p>Methods: The study was performed in three parts. In the first part, operating room (OR) plastic surgery data for the ten years ending in 2005 was analyzed to determine the allotted daily operating time used in performing operative procedures. In the second part, four months of detailed time series data was captured prospectively for every patient care event. The data was analyzed to determine the percentage and composition of events that could be delegated to a PA. In the third part, these delegation percentages were used to model different PA hiring scenarios using formal business case analyses. Results: Over the course of 3,635 days the mean operating time used in a ten hour surgical day was 5.93 hours. Of the 806 patients seen in 13 clinics, 53.5% could have safely been cared for by a PA. In the minor procedure area, 48.8 % of surgical time was spent performing non-essential, PA compatible work. In the main OR, 25.9% of surgical time was PA compatible. Considering the weekly mix of activities, a PA could increase surgical productivity by 36.7%. The business case analyses indicate that hiring a PA was neutrally cost effective at the 37% productivity increase level. However, much greater discounted incremental cash flows, internal rates of return (IRR) and return on investments (ROI) were achieved when PA hiring allowed one surgeon to run two OR's simultaneously. Conclusions: Hiring and proper implementation of PA's, in conjunction with increases in operating room capacity, have the potential to markedly increase the capability of surgeons to deal with lengthy surgical wait lists in a cost effective manner.</p>	<p>Sigurdson, L. (2006). Meeting challenges in the delivery of surgical care: A financial analysis of the role of physician assistants. MBA thesis, Saint Mary's University, Halifax, Nova Scotia. April.</p> <p>Available at:  <a href="http://web.mac.com/lsigurdson/Leif_Sigurdson/Profile_files/Surgical%20Care%20Challenges.pdf">http://web.mac.com/lsigurdson/Leif_Sigurdson/Profile_files/Surgical%20Care%20Challenges.pdf</a></p> <p>Last accessed: July, 2011.</p>

No.	Description	Reference
66	<p>In response to local recruitment difficulties for General Practitioners (GPs), and in the Accident and Emergency (A&amp;E) Departments at Sandwell Hospital and City Hospital Birmingham in the UK, 15 PAs were recruited to work in the Sandwell and West Birmingham areas. This report presents the findings of an evaluation commissioned from the Health Services Management Centre (HSMC) by the Department of Health (NHS Modernisation Agency) Changing Workforce Programme (CWP). In primary care, the PAs were found to undertake a wide range of clinical work covering a similar spread of presenting problems to their supervising GPs. With one exception, the PAs were dealing with an undifferentiated, acutely presenting, caseload. The PAs have expanded medical capacity in primary care, complementing GP expertise and increasing the available clinical skill-mix. However, as with other professionals, the impact of the introduction of PAs has varied, depending on a range of factors, including: a) The duration of PA consultations and the number of clinical sessions undertaken; b) The existing clinical skill-mix; c) The practices' clinic arrangements; d) GPs' and PAs' preferences, experience and the supervisory relationship. In A&amp;E, the variation in the pattern of activity across the PAs is more marked. In one department with four PAs, the PA caseload ranged from dealing with mostly minor cases (like a clinical assistant or nurse practitioner) to concentrating on more complex or "major" cases (like a specialist registrar). However, the A&amp;E experience has shown that the supervisory relationship embodied in the PA profession can prove challenging to operate in this setting in the NHS. The PAs working in primary care have commonly generated a highly positive response by clinical and non-clinical colleagues. The PAs working in A&amp;E departments have in the main also been positively received, particularly by medical staff. Patients reported very positive views on their experience of PAs in primary care, and staff have reported positive feedback from patients in the A&amp;E departments. Patients reported that PAs were able to meet their perceived needs, dealing with needs other than the presenting issue there and then without the need for another appointment. Patients also appreciated the good communication skills and pro-active giving of information as practiced by the PAs. PAs have made a positive impact on service quality in primary care. They are reported to have helped practices to improve access, are regarded by patients as giving high quality care, and are beginning to facilitate service development. PAs need to be included in clinical governance arrangements. There is no evidence to date that the introduction of PAs has resulted in any redefinition of professional boundaries or re-profiling of work between professions. This study, informed by patients' views, suggests that the PAs' working practices successfully facilitate patient-centred care, which is a key goal of NHS policy. In particular, the supervisory relationship is such that a PA can seek advice about a patient, when desired, without necessarily referring the patient on to a GP. The GP might be asked to join a consultation or discuss a patient after he or she has left the practice, with the PA subsequently contacting the patient if necessary. In this way, the supervisory relationship explicitly facilitates clinical collaboration, without adding to the "procession of healthcare faces" patients must endure to obtain treatment or advice. The extent of the contact initiated by PAs with doctors relating to patient care varies. However, the data show that the extent of the contact is often small, and appears to diminish over time, at least for those relating to the two PAs who have been in working in the NHS for longest. This study suggests that once PAs and GPs have established mutual trust and understanding, the burden on supervising GPs relating to PAs will not be unduly onerous. The two caveats here are that the PAs' ability to prescribe must be resolved, and that the PAs included in the study have at least four years' experience, and some are very experienced: newly qualified PAs are unlikely to practice in the same way. The cost-effectiveness of PAs compared to GPs varies; in some cases the lower cost of the PA is offset by longer consultation times and a lower volume of activity; in other cases the cost-effectiveness of the PA is compelling. More important, is the fact that the PAs have increased medical capacity in the face of an inability to recruit GPs to these deprived localities. Fulfillment of an individual PA's potential requires that their skills are well matched to a specific local need and work setting. The effectiveness of an overall programme to introduce PAs will have similar requirements.</p>	<p>Woodin, J., McLeod, H., McManus, R. &amp; Jelphs, K. (2005). <i>The introduction of US-trained physician assistants to Primary care and Accident and Emergency departments in Sandwell and Birmingham: Final Report</i>. Health Services Management Centre, University of Birmingham.</p> <p>Available at:  <a href="http://www.hsmc.bham.ac.uk/publications/pdfs/Physician_Assistant_final_report.pdf">http://www.hsmc.bham.ac.uk/publications/pdfs/Physician_Assistant_final_report.pdf</a></p> <p>Last accessed: July, 2011.</p>

**Health Professions Regulatory Advisory Council**

55 St. Clair Avenue West  
Suite 806 Box 18  
Toronto, Ontario, Canada M4V 2Y7

Telephone: 416-326-1550  
Toll-Free: 1-888-377-7746  
Fax: 416-326-1549

Website: [www.hprac.org](http://www.hprac.org)

Email: [hpracwebmaster@ontario.ca](mailto:hpracwebmaster@ontario.ca)



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