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According to Yogi Berra “You’ve got to be very careful if you don’t know where you’re going, because you might not get there.” Now is a good time for acute care PTs and PT assistants to consider where we are going, because our practice environment is facing another round of changes. We need to prepare for change and work to shape those changes to benefit our patients.

Before I propose my thoughts on where we should be going I want to share a story that has motivated my service in the Acute Care Section. My father has paraplegia from polio, along with progressing weakness from post-polio syndrome that presents challenges to his ability to get into and use a wheelchair. Several years ago, while receiving treatment for an infection, the complication of a clostridium difficile infection (CDI) developed and he was hospitalized. After two days in the hospital I was concerned about him developing impairments and losing function. I discussed this with a physician’s assistant who agreed and sent a referral to a PT. After two more days, and calls to the physical therapy department, he was not seen so I went to the department and inquired. A PT told me that he had reviewed his chart, and since he was not ambulatory prior to admission there was nothing a physical therapist could offer him. I explained his need to preserve his function with transfers and wheelchair use; the PT emphasized that there was nothing that could be done to benefit him.

I was reminded of that experience while reading A Vision for Society: Physical Therapy as Partners in the National Health Agenda in the November, 2011 issue of Physical Therapy.¹ The health policy perspective presented by former Neurology Section President Dr. Kathy Sullivan and colleagues proposed that it is no longer sufficient for PTs to provide episodic care in response to an alteration of health. Rather, they propose that we should adopt practices from the public health model, which is designed “to prevent disease or injury at the community level rather than to treat or cure disease. One of the priorities for HP2020 [Healthy People 2020] is to engage health care practitioners with the local community so that preventive services such as risk monitoring or early disease detection can occur, mitigating the need for more costly disease management or emergency care.”¹, p. 3

It was preventive services that my father needed while receiving treatment for CDI. Hospitalization, especially among the elderly, is often accompanied by profound inactivity¹ contributing to the evolution of impairments, with resultant deterioration of body function and

INSTRUCTIONS FOR AUTHORS

Journal of Acute Care Physical Therapy is the journal of the Acute Care Section-APTA. The goal of the publication is to provide timely information to Section members in matters that relate to acute care physical therapy practice. We accept articles that offer a professional opinion, clinical approaches and techniques, research, literature review, and continual quality improvement information. JACPT is published four times a year and is mailed to Section members and paid subscribers. JACPT is copyrighted and registered with the Library of Congress. It is indexed in EBSCO and Gale. Articles are submitted directly to the Editor-in-Chief. At least two reviewers and an Associate Editor will review submitted articles. The Editor-in-Chief is ultimately responsible for all decisions. Articles submitted to JACPT are expected to be original work that has not been previously published or under consideration by another publication. The Editor may consider republication of articles published elsewhere only with explicit permission of the other publication.

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Articles must be submitted electronically as documents that can be read by Microsoft Word 2007 for Windows or Word 2008 for OS X (.doc or .docx). Use an easily readable 12-point font such as Times New Roman or Arial. Type your article in double-spaced full-page format and we will convert it to the newsletter layout. Both pages and lines must be numbered. Microsoft Word has a line numbering function to generate line numbers for you. Please minimize the use of text formatting. We will set formatting for headings consistent with the style of the articles that appear in JACPT. Because manuscripts undergo a masked review process, you must submit a masked version with all author names, affiliations and other potentially identifying information removed from the article. An unmasked copy must also be submitted and will be kept with the Editor-in-Chief only. Submit articles to the Editor-in-Chief at girion@jaguar1.usouthal.edu. Each table and figure must be sent as a separate file. Although authors may be well-intentioned, we prefer refrain from creating an article with embedded tables and figures. During layout, we must have the flexibility to place figures and tables where needed. If embedded, figures and tables will need to be extracted, which is time-consuming and may lead to problems with size and clarity of the figure or table.

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The name of the Institutional Review Board or Institutional Animal Care and Use Committee that approved the research protocol must be included in the Methods section of the manuscript. Remove the name of the IRB or IACUC in the masked version.

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activity. In acute care much of the therapy we offer our patients is not directed at the primary pathology that caused the hospitalization; rather the rehabilitation is directed at preventing the impairments that accompany the tradition of bedrest while hospitalized. If we accept the call to action from Sullivan et al., and I recommend that we do, our future should include the promotion of a culture change in our hospitals to value prevention, and even wellness, concurrent with the medical treatment for pathology.

That message has recently gained popularity for the management of our sickest patients. There has been a groundswell of attention to the evidence that exercise and activity interventions in the intensive care unit will reduce impairments such as weakness and deconditioning, increase functional abilities and may reduce expenses due to shortening the duration of time in the ICU. Many of us recognize that most of our hospitalized patients may achieve similar benefits, but anecdotal reports suggest that the physical therapy services for those patients are not available because some institutions are responding to financial pressures by allocating resources elsewhere, leaving physical therapy departments with fewer PTs and PT assistants to provide services.

The Patient Protection and Affordable Care Act (Public Law 111-148)(PPACA) may provide us with opportunities to address this concern. For example, included in the PPACA are proposals for pilot projects of bundling reimbursement for Medicare beneficiaries for the services during hospitalization with the services provided during the 30 days after discharge. DeJong proposed that “bundling payment provides an unusual opportunity to shift from a culture of compliance to one that liberates providers to work together to do what is best, to be creative and innovative, and to look forward rather than backward. I believe that bundling can help unleash clinical creativity and help discover best practice- and save costs in a way that cannot be done in the current payment environment.” The incentives within bundling will reward patient management across an episode of care, rather than reimburse for singular services addressing episodic care in different settings. Management across the continuum of care (from acute to subacute to chronic) is consistent with the strategies employed by acute care PTs (refer to diagram). Some readers may have already decided that this vision will not fit their acute care practice environment. Before dismissing this proposal consider that there are acute care PTs and PTAs who are already doing this! In acute care our rigorous focus on discharge planning, by design, deliberately returns patients towards “preinjury or pre-illness function to resume participation in everyday activities such as employment or homemaking.”

We are able to achieve that through a unique appreciation of the episode of pathology as it fits within the continuum of care for each patient. Our perspective is distinctive because of the focus on functional activity and valuable to the management of hospitalized patients based on our determination of appropriate discharge recommendations. To capture this opportunity we need to find our voice, individually and collectively, to promote those contributions to our colleagues in health care.

If we are not able to distinguish our unique contributions to patient management, and if we are not willing to raise our voice in advocacy, we will be marginalized in our institutions. We are responsible for advocacy because health disparities are compounded when there are too few PTs and PTAs within an institution to meet the needs of patients. Last year Nalette provided an elegant analysis of the moral dilemma that is being encountered by PTs and PTAs in hospitals. The growing pressure on institutions to reduce expenses has resulted in fewer PTs and PTAs to provide services. Physical therapy should be provided when pathology limits mobility and function, and we have a responsibility to ensure that the resources are in place to serve those patients. If we get bogged down in analysis of physical therapy based only on measures of productivity among PTs and PT assistants we miss the opportunity to promote what we really offer patients- the improved functional abilities that contribute to the ability to return home, in a timely manner and with less reliance on medical and support services.

This message started with a story about my father and the rest of that story is informative. During the discussion a nearby occupational therapist (OT) overheard my discussion with the PT and proposed that she would examine him and see what she could do. For the rest of his hospitalization he received treatment from the OT, and I worked with him to improve his ability with transfers and aerobic activities.

What if the PT had anticipated problems and determined that my father required physical therapy to reduce the risks for the problem(s)? And what if the PT communicated that hypothesis through documentation and communication to the patient, the referring physician’s assistant and physicians, nurses and other members of the team? And finally, what if along the way that PT was able to describe the relationship between the problems, the intervention strategy, the risk reduction and goals for physical therapy?

It is vital to acute care practice that we communicate the depth of our examination, our diagnosis and our rationale. If our communication is that we restore the ability to
PRESIDENT’S MESSAGE

walk—that will be our identity; if we aspire to recognition as a profession we need to contribute to society’s health by meeting the comprehensive needs of individuals and by using each interaction and communication to enlighten others on how we meet those needs.

Following discharge my father required inpatient rehabilitation for two months to regain the independence he needed to return home. From a traditional accounting perspective the disposition of his case concluded upon his discharge from the hospital. The implementation of bundling, or a similar initiative designed to improve patient care while reducing costs, will change that accounting to include the stint of inpatient rehabilitation. When PTs and PT assistants provide preventive services so that the duration of that inpatient rehabilitation stay is decreased the benefits extend beyond those experienced by the patient and benefit society through reducing healthcare expenses. To ensure that we are able to continue to provide those services I beseech each member of the Acute Care Section to consistently communicate our unique contribution to patient rehabilitation and prevention of anticipated risks so that colleagues in the clinic, and administrators, recognize and value physical therapy. That includes explaining why we do what we do in our documentation, when participating in patient care rounds and when communicating with other members of the healthcare team— we cannot be bashful about the value of service we provide.

While society has valued physical therapy, changes in society’s need for comprehensive health care and wellness is altering what society expects from our profession.1 Individually, and collectively, we need to be able to answer how acute care physical therapists meet the needs of society. Our institutions impose an “epidemic of low mobility during hospitalization of older adults”2, p. 1660 that elevates the hazards accompanying admission to a hospital. When we provide surveillance to identify those at risk, and interventions to help those patients regain pre-illness function, we are effectively serving the needs of our patients and society. We also need to ensure that our community knows we do that.

The Acute Care Section is working within our resources, to promote acute care physical therapy. We have the Journal of Acute Care Physical Therapy and Research Committee that are advancing evidence-based practice, a Legislative Committee advocating about national issues, an Education Committee that provides resources for professional development and a Communications Committee that gets the message out to members. There are also several other committees and task forces dedicated to enriching acute care practice. We would appreciate your contribution on these committees, and if this is the right time in your career to participate please contact me to get involved. If there is not time right now please make sure that you are contributing to our profession’s reputation by promoting physical therapy every day so that physicians, nurses, administrators and the rest of your community recognize the evidence and rigorous decision-making that you bring to the care of your patients.

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President, Acute Care Section- APTA
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(References, see page 131)

Components contributing to specialization. CVP=cardiovascular and pulmonary, MS=musculoskeletal, NM=neuromuscular. Reprinted from Gorman SL, Wruble Hakim E, Johnson W, et al. Nationwide acute care physical therapy practice analysis identifies knowledge, skills, and behaviors that reflect acute care practice. Physical Therapy. 2010;90:1453-1467, with permission of the American Physical Therapy Association. This material is copyrighted, and any further reproduction or distribution requires written permission from APTA.
Physical Therapists’ Perceptions of Physical Therapy in the Emergency Department

Marla J. Weisend, Tiffany A. Marulli, and Jaime C. Paz

ABSTRACT

Purpose: The purpose of this study was to report the perceptions of physical therapists (PTs) associated with acute care toward practice in the emergency department (ED). A secondary purpose was to generate hypotheses about the relationships between these perceptions and factors such as education and level of training.

Methods: PTs involved in acute care were provided an electronic survey regarding demographic information, knowledge of practice in the ED, and opinions on advanced skills such as imaging, lab tests and pharmacology. Univariate logistic regression analyses were performed using a dichotomized version of three questions pertaining to value, confidence and feasibility of PT in the ED.

Results: 120 subjects completed the survey. A majority believed that PTs were a valuable asset to the ED (92%) and integrating PTs into the ED is feasible (67.5%). Eighty-four percent were confident in managing patients in the ED. Significant correlations (p<0.01) existed between these perceptions and the therapists' level of education, clinical experience, continuing review of literature and training in the areas of differential diagnosis, diagnostic imaging, lab values and non-steroidal anti-inflammatory drugs (NSAIDs).

Conclusion: Positive perceptions exist among PTs regarding practice in the ED. Factors related to these perceptions are stated in the results.

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BACKGROUND

In many cases, pursuing the emergency department (ED) for treatment of an acute ailment is not desirable due to the anticipation of extended wait times associated with receiving emergency care. Those with less severe impairments are often found waiting for hours to be seen by an emergency physician or other health care professional. According to the Centers for Disease Control (CDC), approximately 222 visits per minute were made to EDs in 2007.1 Physicians evaluated 90% of these patients with the remaining managed by physician’s assistants and nurse practitioners.1 The time spent waiting to be seen by a physician ranged from 15 minutes to 6 hours, with 36% waiting between 15 to 59 minutes and 33% of patients spending a total of 2-4 hours in the ED.1 The CDC reports that back and leg symptoms, pain, weakness and vertigo comprised 16% of the primary reasons for ED visits in individuals age 15 or older.1 These findings support the suggestions from Fleming-McDonald and colleagues2 that selected ED patients could be appropriately managed by musculoskeletal experts such as physical therapists (PTs). The ED is becoming a more common practice setting for PTs throughout the United States.3 Additionally, an ED Special Interest Group (SIG) within the Acute Care Section of the American Physical Therapy Association (APTA) has recently formed.4 In facilities where PT is implemented into the ED, both medical staff and patients view PTs as an asset in the ED.2 Primarily, PTs in this setting assess musculoskeletal-related-disease processes.3 Physical therapists also function to identify proper diagnoses that would have otherwise gone unnoticed,2,3,5 such as identifying a sacroiliac tumor that was otherwise overlooked as sacroiliac joint pain.5 At present, the majority of studies that investigated the use of physical therapy in an ED setting are located in accident and emergency departments in Europe.6,7,8,10 In these settings, PTs screen patients to assist in determining the need for imaging, leading to reduced exposure to radiation. Further, when incorporating a PT, fewer patients are prescribed NSAIDs, assistive devices and bandages.6,7 In the military model and in many European countries, PTs receive additional training to prescribe NSAIDs and analgesic medications.6,11 They are also trained to order and interpret x-rays—training that may be beyond that of many current PTs.6,11 Interaction with a PT may also allow opportunities to educate patients on risk of re-injury and preventative measures. By increasing patients’ knowledge and ability to engage in self-guided conservative treatment, PTs can potentially decrease overutilization of the ED and return visitation. The overall impact of PTs in the ED setting has decreased wait time and improved patient satisfaction, allowing physicians to dedicate more time to critical patients.4,11,12 Whether the advancement in degree requirements for entry into the PT profession would impact a PT’s perception of practicing in the ED setting is unknown. According to the most recent demographic profile of practicing PTs by the APTA,13 the professional (entry-level) degree held by the largest percentage of PTs (47%) continues to be the Baccalaureate degree. When the profession of physical therapy moved to graduate-level education for entry level practice, either at the Master’s or Doctorate level, curriculum content was increased. Courses such as pharmacology and diagnostic imaging are currently components of entry-level Doctorate of Physical Therapy (DPT) programs.14 These topics are also well represented continuing education course offerings for PTs.15 Knowledge within these content areas may further enhance the level of care provided by a PT in settings such as the ED. Since practice in the ED appears to involve further education,6,11 exploring whether any relationship between a clinician’s level of education and perceptions about practicing in the ED becomes important.

The integration of PTs into the current ED interdisciplinary team is supported by the current literature available on this topic.2,3,6,8,11,12 Whether PTs might become a common presence in the ED depends on the attitudes and perceptions of PTs most likely to practice in the ED. To date, the general perceptions and self-perceived capacity of PTs practicing in the acute care setting toward practicing in the ED are unknown. Therefore, the purpose of this study is to describe the attitudes of PTs who practice in acute care toward practice in the ED. Our secondary purpose is to describe associations among possible influences, such as education and level of preparation. Furthermore, since the literature indicates that additional training was a component of PTs practicing in the ED and also because the physical therapy profession has moved to a graduate level of education, we hypothesize that PTs with either a graduate degree or those who have furthered their education will agree that 1) PTs will be a valuable asset in the ED setting and 2) implementation of PT practice in the ED is feasible. We also hypothesize that respondents with graduate level degrees will report that they are confident in their skills to manage patients in the ED.

METHODS

Design

The study was an electronic survey design.

Sample

The subjects for this study were licensed PTs currently associated with the acute care–either practicing clinicians or faculty. This population was targeted as a cohort who would be most likely to practice in an ED setting. The targeted population included PT members of the Acute Care Section of the APTA. Permission was granted by the Acute Care Section of the APTA to post the electronic survey on the section’s online discussion board (Listserv) to recruit subjects. Because of varying levels of participation in the discussion board by section members, additional subjects were recruited.
to increase survey response and sample size by using a convenience sample of PTs associated with acute care, including faculty members and administrators. A total of 12 subjects comprised the convenience sample, which was generated from a list of colleagues known to the investigators. Subjects were excluded if they were not licensed PTs and had not practiced in the past five years.

**Preliminary Draft**

A preliminary draft of the survey was sent to six local PTs who practice in various settings to assist in the content and construct of the survey. Settings included outpatient rehabilitation, inpatient rehabilitation, acute care, administration, academics and private practice. The purpose of launching the survey to this panel was to ensure operation of the electronic survey. Feedback gained from this preliminary draft was used by the investigators to finalize the survey questions and data collection. Data from this draft were not included in the final analysis.

The final survey consisted of 24 questions aimed at collecting the opinions of acute care PTs regarding PTs in the ED (Appendix 1). Questions included knowledge on physical therapy practice in the ED (questions 1-5, 13 & 14), opinions on advanced skills reported in the literature (4 separate variables coded yes or no and tabulated separately for imaging, lab values, differential diagnosis, and NSAID knowledge), experience gained through continuing education (4 separate variables coded yes or no and tabulated separately for imaging, lab values, differential diagnosis, and NSAID knowledge), and experience gained through review of literature (4 separate variables coded yes or no and tabulated separately for imaging, lab values, differential diagnosis, and NSAID knowledge).

**Statistical Analyses**

Data from Microsoft Excel were transposed and coded into PASW Statistic 18, Somers, NY. General descriptive statistics were calculated and divided by degree level (Bachelor’s and Master’s/Doctorate). After Likert selections were collapsed, univariate logistic regression analyses were performed using a dichotomized version of the three questions: 1) **Would PTs be a valuable asset to the ED team?**; 2) **Integrating PTs as part of an ED team is feasible in the current healthcare model?**; and 3) **Based on the type of patients I typically work with, I would be confident in my ability to evaluate and treat patients in an ED setting as the dependent variables and the explanatory variables (e.g., degree level, experiences, etc) as the independent variables.** Model significance for each univariate analysis was reported along with the Nagelkerke value. By definition, a Nagelkerke value represents the proportion of variability in a data set that is accounted for by the relationship of the statistical model. Odds ratios (the likelihood of a behavior or pattern given the independent variable) and their 95% confidence intervals were determined for each level of the independent variables in those models that were significant. Confidence intervals including or crossing 1.0 were not considered statistically significant.

**RESULTS**

A total of 120 subjects from the APTA’s Acute Care Section Listserv, asking participants to complete a short electronic survey. The survey was administered on zoomerang.com, a proprietary electronic survey administration source using Dillman’s methods. All participants had one month to complete the survey. A reminder notice was posted for participants approximately two weeks after the initial posting. Convenience sample participants were emailed the survey link asking them to participate in our research study. A reminder email was sent to participants approximately two weeks after the initial email. Reminders provided instruction to disregard the notice if the subject had already completed the survey, either through the Listserv or via email. All correspondence with participants was received through a Walsh University email account generated specifically for this study.

Data from the survey were collected and pooled into an Excel® file. The survey results followed the Checklist for Reporting Results of Internet E-Surveys (CHERRIES) guidelines and were not linked to individual participants.

**Items**

The researchers chose three survey questions, based upon the hypotheses of the study, to help determine associations in perceptions among the survey participants. After recoding, these questions functioned as the dependent variables in the study. These included the questions of 1) **Would PTs be a valuable asset to the ED team?**; 2) **Integrating PTs as part of an ED team is feasible in the current healthcare model?**; and 3) **Based on the type of patients I typically work with, I would be confident in my ability to evaluate and treat patients in an ED setting as the dependent variables and the explanatory variables (e.g., degree level, experiences, etc) as the independent variables.** Model significance for each univariate analysis was reported along with the Nagelkerke value. By definition, a Nagelkerke value represents the proportion of variability in a data set that is accounted for by the relationship of the statistical model. Odds ratios (the likelihood of a behavior or pattern given the independent variable) and their 95% confidence intervals were determined for each level of the independent variables in those models that were significant. Confidence intervals including or crossing 1.0 were not considered statistically significant.
and subjects reported practicing in 34 different states and in the U.S. Virgin Islands, mostly urban or suburban regions. A majority of the subjects responding to the survey were female (n=96), practiced in an inpatient setting (n=77) and were not board certified clinical specialists. Table 1 outlines the baseline demographics of all the subjects included in this study. Additionally, 75% of subjects reported having evaluated or treated a patient in the ED and over 90% of the sample agreed that PTs are appropriate for screening patients for fall risk, examining musculoskeletal complaints, and assessing patients who demonstrate an altered gait pattern.

Overall, the results of the survey demonstrate positive perceptions with regard to integrating PTs as part of the ED team. Ninety-two percent of respondents agreed that PTs were a valuable asset to the ED; 67.5% agreed that integrating PTs into the ED is feasible in the current healthcare model; and 84% of respondents were confident in their ability to evaluate and treat a patient in the ED (Figure 1). A difference in competency levels between entry-level and experienced clinicians, when treating patients in the ED, was observed (Figure 2). Only 37% of subjects reported that entry-level clinicians have the necessary competencies to work in the ED, while 87% of the subjects believed that clinicians with greater than five years of practice experience have the necessary competencies to work in the ED. A majority of subjects (71%) reported gaining experience with differential diagnosis through clinical practice. Approximately equal proportions of the subjects either had differential diagnosis as part of their PT curricula (54%), gained knowledge through continuing education (49%) or through critical review of evidence (48%).

Responses regarding advanced skills were slightly more positive about the importance of radiologic imaging while opinions on the importance of lab tests and NSAIDS were more diverse (Figure 3). Clinical practice appears to be the primary method of acquiring formal education regarding radiology (58%) and lab tests (82%), while PT curriculum (65%) and clinical experience accounts for NSAIDs education (66%).

Factors associated with PT being a valuable asset in the ED

Table 2 outlines the univariate relationships between the independent variables and association to PTs being a valuable asset to the ED. Physical therapists with a Masters or Doctorate degree were more likely than those with a Bachelors degree to believe PTs were a valuable asset to the ED (OR = 11.4, 95% confidence interval 2.2 – 58.5). Subjects who had gained knowledge of differential diagnosis through clinical practice were more likely to believe PTs were a valuable asset to the ED than those who did not gain knowledge through clinical practice.

Table 1. Sample Demographics

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<td>&gt;21 years: 13</td>
<td>&gt;21 years: 40</td>
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<td>Practice Pattern Most Commonly Treated Cardiopulmonary:</td>
<td>9</td>
<td>Cardiopulmonary: 9</td>
<td>Cardiopulmonary: 13</td>
<td>Cardiopulmonary: 31</td>
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<tr>
<td>Musculoskeletal:</td>
<td>16</td>
<td>Musculoskeletal: 13</td>
<td>Musculoskeletal: 13</td>
<td>Musculoskeletal: 42</td>
</tr>
<tr>
<td>Neuromuscular:</td>
<td>8</td>
<td>Neuromuscular: 9</td>
<td>Neuromuscular: 14</td>
<td>Neuromuscular: 31</td>
</tr>
<tr>
<td>Integumentary:</td>
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<td>Integumentary: 1</td>
<td>Integumentary: 1</td>
<td>Integumentary: 2</td>
</tr>
</tbody>
</table>
Factors associated with feasibility
Similarly, PTs who had earned a Master’s or Doctorate degree were more likely than Bachelor’s-level-trained PTs to believe that integrating PTs into the ED is feasible in the current healthcare model (OR = 2.6, 95% confidence interval 1.1 – 6.0) (p<0.01) (Table 3). Those who indicated that they gained knowledge of differential diagnosis through a continuing education course (OR = 2.6, 95% confidence interval 1.2 – 5.8) or clinical practice (OR = 3.2, 95% confidence interval 1.4 – 7.4), or gained knowledge of lab values through continuing education (OR = 2.8, 95% confidence interval 1.2 – 6.6) were more likely to believe that integrating PTs into the ED is feasible in the current healthcare model than those who did not (p<0.01).

Factors associated with confidence
Subjects who reported gaining knowledge of differential diagnosis through clinical practice (OR = 5.8, 95% confidence interval 2.1 – 16.5) and through critical review of the literature (OR = 10.6, 95% confidence interval 2.3 – 48.2) were more likely to feel confident in their ability to evaluate and treat patients in the ED setting, compared with those who did not report gaining this knowledge (p<0.01) (Table 4). Those who gained imaging-related knowledge (OR = 3.6, 95% confidence interval 1.3 – 10.2) and NSAIDS knowledge through clinical practice (OR = 3.2, 95% confidence interval 1.2 – 8.9) were more likely to feel confident in their abilities to evaluate and treat patients in the ED setting, compared with those who did not report gaining this knowledge (p<0.01). Subjects who gained knowledge of lab values through continuing education (OR = 3.9, 95% confidence interval 1.1 – 14.4) and review of literature (OR = 3.9, 95% confidence interval 1.2 – 12.8) were more likely to feel confident in their abilities to evaluate and treat patients...
in the ED setting, compared with those who did not report gaining this knowledge (p<0.01). (Table 4)

**DISCUSSION**

The purpose of this survey was to describe the perceptions of PTs on clinical practice in the ED. Our results suggest that PTs who are primarily involved in acute care practice have positive perceptions toward clinical practice in the ED setting. These findings are also consistent with the positive perceptions of PTs in the EDs by other professionals.2 Our results also suggest that those with additional training or those who have obtained a Masters or a Doctorate level of education appear to be more inclined to feel physical therapy is useful in an ED setting.

The target population for our study included a cohort of PTs that we, as investigators, believed to be the most likely clinicians who would practice in the ED setting given the potential acuity of patients seeking care in the ED. In the recently published practice analysis on acute care practice, Gorman and her colleagues19 reported on areas of knowledge expected of an acute care clinician. Areas included emergency medicine, trauma, imaging, and laboratory tests.19 Additionally, this practice analysis discussed how PTs in acute care practice must possess the depth and breadth of knowledge for specific patients with acute illnesses throughout the life span and across multiple body systems.19 These characteristics appear to be consistent with the needs of the ED setting. Since the majority of our sample either practiced solely in the inpatient setting (n=77) or both the inpatient and outpatient setting (n=30), the reported perceptions from this sample may be a reflection of those clinicians best suited to inform practice in the ED setting.

Based on the results of our study, possessing a graduate degree appears to be associated with positive perceptions toward practicing in the ED. Respondents with Master’s or Doctorate degrees were more likely to believe PTs were a valuable asset to the ED setting as well as being more likely to believe that integrating PTs in the ED setting is feasible. Previous literature6,7 suggests that knowledge of differential

<table>
<thead>
<tr>
<th>Factor</th>
<th>Level*</th>
<th>Odds Ratio (95% CI)</th>
<th>Model P</th>
<th>Model R²</th>
<th>N</th>
</tr>
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<td>Degree</td>
<td>Doctorate or Masters/ Bachelors</td>
<td>11.4** (2.2 - 58.5)</td>
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<td>0.21</td>
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<tr>
<td>Differential Diagnosis gained through continuing education</td>
<td>Yes/No</td>
<td>2.0 (0.5 - 8.6)</td>
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<td>0.02</td>
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<tr>
<td>Differential Diagnosis gained through clinical practice</td>
<td>Yes/No</td>
<td>5.7** (1.3 - 24.1)</td>
<td>0.001</td>
<td>0.12</td>
<td>120</td>
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<tr>
<td>Differential Diagnosis gained through review of literature</td>
<td>Yes/No</td>
<td>1.9 (0.5 - 8.2)</td>
<td>0.001</td>
<td>0.02</td>
<td>120</td>
</tr>
<tr>
<td>Imaging knowledge gained through continuing education</td>
<td>Yes/No</td>
<td>0.8 (0.18 - 3.3)</td>
<td>0.001</td>
<td>&lt;0.01</td>
<td>120</td>
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<tr>
<td>Imaging knowledge gained through clinical practice</td>
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<td>1.1 (0.3 - 4.3)</td>
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<td>&lt;0.01</td>
<td>120</td>
</tr>
<tr>
<td>Imaging knowledge gained through review of literature</td>
<td>Yes/No</td>
<td>1.4 (0.2 - 12.3)</td>
<td>0.001</td>
<td>&lt;0.01</td>
<td>120</td>
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<tr>
<td>Lab value knowledge gained through continuing education</td>
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<td>&lt;0.01</td>
<td>120</td>
</tr>
<tr>
<td>Lab value knowledge gained through clinical practice</td>
<td>Yes/No</td>
<td>0.5 (0.06 - 4.5)</td>
<td>0.001</td>
<td>&lt;0.01</td>
<td>120</td>
</tr>
<tr>
<td>Lab value knowledge gained through review of literature</td>
<td>Yes/No</td>
<td>3.3 (0.7 - 16.6)</td>
<td>0.001</td>
<td>0.05</td>
<td>120</td>
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<tr>
<td>NSAIDS knowledge gained through continuing education</td>
<td>Yes/No</td>
<td>1.8 (0.4 - 9.5)</td>
<td>0.001</td>
<td>0.01</td>
<td>120</td>
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<tr>
<td>NSAIDS knowledge gained through clinical practice</td>
<td>Yes/No</td>
<td>0.9 (0.2 - 4.1)</td>
<td>0.001</td>
<td>&lt;0.01</td>
<td>120</td>
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<tr>
<td>NSAIDS knowledge gained through review of literature</td>
<td>Yes/No</td>
<td>1.3 (0.3 - 6.5)</td>
<td>0.001</td>
<td>&lt;0.01</td>
<td>120</td>
</tr>
</tbody>
</table>

* Reference category is the second value (e.g. “Bachelors degree” and “no”) for which the odds ratio was calculated.
** Denotes statistical significance.
diagnosis, prescription medications and radiological imaging is a vital component of practicing in the ED. The current Doctorate of Physical Therapy (DPT) curriculum, compared with that of the Bachelors program, supports training in pharmacology, differential diagnoses, diagnostic imaging, vestibular rehabilitation, and women’s health that are now encompassed within the PT scope of practice. Training in pharmacology includes recognizing common medications, awareness of physiological effects of medications and common side effects. Furthermore, inclusion of differential diagnosis in DPT curriculum provides necessary skills to facilitate clinical decision-making skills in determining the need for appropriate referral to medical practitioners. Based on the results of this study, PTs with a graduate degree appear to have the educational background to practice in the ED setting. 

The topic of differential diagnosis was also a factor that was associated with positive perceptions toward PTs in the ED setting. The topic of differential diagnosis was also a factor that was associated with positive perceptions toward PTs in the ED setting. The topic of differential diagnosis was also a factor that was associated with positive perceptions toward PTs in the ED setting. The topic of differential diagnosis was also a factor that was associated with positive perceptions toward PTs in the ED setting. The topic of differential diagnosis was also a factor that was associated with positive perceptions toward PTs in the ED setting.

Table 3. Factors associated with agreeing that integrating PTs as part of an ED team is feasible in the current healthcare model.

<table>
<thead>
<tr>
<th>Factor</th>
<th>Level*</th>
<th>Odds Ratio (95% CI)</th>
<th>Model P</th>
<th>Model R²</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Degree</td>
<td>Doctorate or Masters/ Bachelors</td>
<td>2.6** (1.1 - 6.0)</td>
<td>0.001</td>
<td>0.06</td>
<td>120</td>
</tr>
<tr>
<td>Differential Diagnosis gained through continuing education</td>
<td>Yes/No</td>
<td>2.6** (1.2 - 5.8)</td>
<td>0.001</td>
<td>0.07</td>
<td>120</td>
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<tr>
<td>Differential Diagnosis gained through clinical practice</td>
<td>Yes/No</td>
<td>3.2** (1.4 - 7.4)</td>
<td>0.001</td>
<td>0.09</td>
<td>120</td>
</tr>
<tr>
<td>Differential Diagnosis gained through review of literature</td>
<td>Yes/No</td>
<td>1.5 (0.7 - 3.4)</td>
<td>0.001</td>
<td>0.01</td>
<td>120</td>
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<tr>
<td>Imaging knowledge gained through continuing education</td>
<td>Yes/No</td>
<td>1.2 (0.5 - 2.9)</td>
<td>0.001</td>
<td>&lt;0.01</td>
<td>120</td>
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<tr>
<td>Imaging knowledge gained through clinical practice</td>
<td>Yes/No</td>
<td>1.9 (0.9 - 4.3)</td>
<td>0.001</td>
<td>0.03</td>
<td>120</td>
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<tr>
<td>Imaging knowledge gained through review of literature</td>
<td>Yes/No</td>
<td>4.6 (0.9 - 20.9)</td>
<td>0.001</td>
<td>0.06</td>
<td>120</td>
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<tr>
<td>Lab value knowledge gained through continuing education</td>
<td>Yes/No</td>
<td>2.8** (1.2 - 6.6)</td>
<td>0.001</td>
<td>0.07</td>
<td>120</td>
</tr>
<tr>
<td>Lab value knowledge gained through clinical practice</td>
<td>Yes/No</td>
<td>1.5 (0.6 - 4.1)</td>
<td>0.001</td>
<td>0.01</td>
<td>120</td>
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<tr>
<td>Lab value knowledge gained through review of literature</td>
<td>Yes/No</td>
<td>3.3 (0.7 - 16.6)</td>
<td>0.001</td>
<td>0.05</td>
<td>120</td>
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<tr>
<td>NSAIDS knowledge gained through continuing education</td>
<td>Yes/No</td>
<td>1.2 (0.6 - 2.5)</td>
<td>0.001</td>
<td>&lt;0.01</td>
<td>120</td>
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<tr>
<td>NSAIDS knowledge gained through clinical practice</td>
<td>Yes/No</td>
<td>0.9 (0.4 - 1.9)</td>
<td>0.001</td>
<td>0.01</td>
<td>120</td>
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<tr>
<td>NSAIDS knowledge gained through review of literature</td>
<td>Yes/No</td>
<td>1.6 (0.7 - 3.4)</td>
<td>0.001</td>
<td>0.01</td>
<td>120</td>
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</tbody>
</table>

* Reference category is the second value (e.g. “Bachelors degree” and “no”) for which the odds ratio was calculated.

**Denotes statistical significance.

In addition to clinical practice, PTs who reported acquiring knowledge of differential diagnosis from continuing education courses were more likely to believe that integration of PT in the ED setting is feasible. Moreover, PTs who took these types of courses were more likely to report being confident in managing patients in the ED setting. Continuing education courses involving interpretation of lab values were also significantly associated with similar perceptions regarding feasibility and confidence. Even though the literature reports that PTs practicing in the ED are more likely to have received additional training, the amount of time on additional training was not specifically addressed. Our survey
also did not address how much time was spent on continuing education for these topics and, therefore, would need to be considered in the future should PTs seek to work in the ED setting.

Critical review of the literature was also significantly associated with PTs being confident in their abilities to practice in the ED setting. Subjects who gained knowledge of differential diagnosis and lab values through critical review of literature were more likely to be confident of their skills in the ED than those who did not gain knowledge through critical review of the literature. This result is very promising for the physical therapy profession as evidence-based practice (EBP) is a primary component of the APTA’s vision 2020 towards autonomous practice.21 In 2003, Jette and her colleagues22 reported that PTs who are members of the APTA had generally positive perceptions towards EBP and that literature was helpful in guiding their decision making. With the use of EBP by practicing clinicians coupled with the clinical decision making and differential diagnosis components of current DPT programs,14 some foundational components may already be in place for PTs to practice in the ED setting.

Advanced roles in the acute care setting have been described in other disciplines. For example, Schroeder23 describes an advanced practice role in nursing, termed the Acute Care Nurse Practitioner (ACNP). These clinicians provide care to patients with complex acute, critical, and chronic illnesses in practice settings such as the intensive care, burn, emergency and trauma units. All ACNPs are required to complete additional training to meet core competencies required of their roles. These competencies were established by the National Panel for the Acute Care Practitioner. The formation of the ED SIG in the Acute Care Section of the APTA seems to be an appropriate step toward determining whether practice in the ED setting should be an entry-level DPT competency or an advanced practice role as well as what competencies should be established to practice in the ED setting.

### Table 4. Factors associated with confidence in one’s ability to evaluate and treat patients in an ED setting.

<table>
<thead>
<tr>
<th>Factor</th>
<th>Level*</th>
<th>Odds Ratio (95% CI)</th>
<th>Model P</th>
<th>Model R²</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Degree</td>
<td>Doctorate or Masters/ Bachelors</td>
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<td>0.01</td>
<td>120</td>
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<td>Differential Diagnosis gained through continuing education</td>
<td>Yes/No</td>
<td>1.4 (0.5 - 3.8)</td>
<td>0.001</td>
<td>&lt;0.01</td>
<td>120</td>
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<td>Differential Diagnosis gained through clinical practice</td>
<td>Yes/No</td>
<td>5.8** (2.1 - 16.5)</td>
<td>0.001</td>
<td>0.16</td>
<td>120</td>
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<tr>
<td>Differential Diagnosis gained through review of literature</td>
<td>Yes/No</td>
<td>10.6** (2.3 - 48.2)</td>
<td>0.001</td>
<td>0.20</td>
<td>120</td>
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<tr>
<td>Imaging knowledge gained through continuing education</td>
<td>Yes/No</td>
<td>1.6 (0.5 - 5.2)</td>
<td>0.001</td>
<td>&lt;0.01</td>
<td>120</td>
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<tr>
<td>Imaging knowledge gained through clinical practice</td>
<td>Yes/No</td>
<td>3.6** (1.3 - 10.2)</td>
<td>0.001</td>
<td>0.09</td>
<td>120</td>
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<tr>
<td>Imaging knowledge gained through review of literature</td>
<td>Yes/No</td>
<td>3.7 (0.0 - Inf)</td>
<td>0.001</td>
<td>0.09</td>
<td>120</td>
</tr>
<tr>
<td>Lab value knowledge gained through continuing education</td>
<td>Yes/No</td>
<td>3.9** (1.1 - 14.4)</td>
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<td>Yes/No</td>
<td>2.5 (0.8 - 7.4)</td>
<td>0.001</td>
<td>0.03</td>
<td>120</td>
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<tr>
<td>Lab value knowledge gained through review of literature</td>
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<td>3.9** (1.2 - 12.8)</td>
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<td>0.09</td>
<td>120</td>
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<td>NSAIDS knowledge gained through continuing education</td>
<td>Yes/No</td>
<td>3.2 (0.9 - 11.8)</td>
<td>0.001</td>
<td>0.05</td>
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<tr>
<td>NSAIDS knowledge gained through clinical practice</td>
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<td>3.2** (1.2 - 8.9)</td>
<td>0.001</td>
<td>0.08</td>
<td>120</td>
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<tr>
<td>NSAIDS knowledge gained through review of literature</td>
<td>Yes/No</td>
<td>7.9 (1.0 - 62.3)</td>
<td>0.001</td>
<td>0.09</td>
<td>120</td>
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</table>

* Reference category is the second value (e.g. “Bachelors degree” and “no”) for which the odds ratio was calculated.
** Denotes statistical significance.
Limitations

Limitations to this study include a small sample size and potential bias, both in terms of self-report response inherent to survey design as well as the targeted cohort of the study. Participants who had practiced for greater than 21 years (n=40) outnumbered those who fell into other categories of 20 or less years of experience. Also, a majority of subjects who replied to our survey reported that they have practiced in the ED setting. Since a majority of subjects had reported practicing in the ED, some of the results of this study may be skewed. A sample of PTs in a variety of practice settings will need to be performed in order to produce more generalizable results regarding PTs perceptions toward practice in the ED.

The number and characteristics of PTs who were exposed to this survey on the Listserv and chose not to complete it is unknown. Also the number of subjects responding through a convenience sample is unknown. While a specific number of subjects included in the convenience sample received the survey from the primary investigator, an unknown number of subjects were recruited through forwarding of the email that invited additional subjects to complete the survey. Because of these factors, response rate cannot be reported.

Another consideration for this study is the statistical analysis performed on the variables. As a model of studying PT’s perceptions, the article by Jette22 regarding EBP was utilized which employed multiple univariate analysis. In the discussion above, certain relationships were described but not fully elucidated. Performing multivariate logistic regression allows for exploration of relationships among multiple variables and should be considered for future study. In employing univariate analysis in this study, the independent variables were analyzed separately and, therefore, any interaction among the independent variables in predicting the dependent variable is unclear. For example, performing multivariate analysis would determine how degree level, continuing education and clinical experience interact to predict whether a subject believed that integrating PTs in the ED is feasible. Furthermore, as stated in the Jette article,22 dichotomizing the variables during analyses may have influenced the results. For example, when response choices of “strongly agree” and “agree” were collapsed as “agree,” what the relationship would have been regarding subjects who “strongly agreed” that PTs are a valuable asset to the ED team as compared with those who “agreed” is unknown.

Lastly, the validity of the survey instrument was not established. While a preliminary draft of the survey was sent to a review panel for feedback, no specific pilot testing was performed on a small sample of the same targeted cohort utilized in this study. The survey did not discriminate between graduate education achieved through an entry-level DPT program and post-professional DPT program. Certain questions were also not operationally defined such as quantity of continuing education courses taken or what “critical review” of literature fully entailed. Repeated measures of the survey were not performed and therefore reliability cannot be established as well.

**CONCLUSION**

Physical therapists who are members of the Acute Care Section of the APTA have positive perceptions of the role of PTs in the ED. These subjects believed PTs were a valuable asset to the ED, believed that integrating PTs into the ED in the current healthcare model is feasible; and were confident in their abilities to evaluate and treat patients in the ED. Factors that appear to influence these perceptions include a graduate level of education, continuing education, clinical experience and critical review of literature. Relevant topics include training in differential diagnosis, lab values, diagnostic imaging and physiology of NSAIDS. Recommendations for further study on this topic include further analyses regarding the multiple interactions amongst these factors on a larger, more diverse sample with a reliable and valid survey tool.

**Acknowledgements**

The authors thank Dr. Chad Cook PT, PhD, MBA from Walsh University, for his expert assistance with the statistical analysis reported in this article as well as manuscript preparation and review.

Additionally, the authors thank the Acute Care Section for allowing the survey to be posted on the section’s Listserv. Lastly, with regards to conflict of interest for this paper, there was no funding for this study and the authors received no compensation for their work on this manuscript.

**REFERENCES**

6. Ball ST, Walton K, Hawes S. Do emergency department physiotherapy practitioners, emergency nurse practitioners

Appendix 1

1. Physical therapists would be a valuable asset to the emergency department team.
   a. Strongly agree
   b. Agree
   c. Disagree
   d. Strongly disagree

2. Integrating physical therapists as part of an emergency department team is feasible in the current healthcare model.
   a. Strongly agree
   b. Agree
   c. Disagree
   d. Strongly disagree

3. Based on the type of patients I typically work with, I would be confident in my ability to evaluate and treat patients in an emergency department setting.
   a. Strongly agree
   b. Agree
   c. Disagree
   d. Strongly disagree
4. Entry-level physical therapists have the necessary competencies to work in the emergency department.
   a. Strongly agree
   b. Agree
   c. Disagree
   d. Strongly disagree

5. Experienced physical therapists (> 5 years of practice) have the necessary competencies to work in the emergency department.
   a. Strongly agree
   b. Agree
   c. Disagree
   d. Strongly disagree

6. What is your formal educational experience regarding differential diagnosis? Check all that apply (a check-mark will appear on your selections).
   a. I have no exposure to differential diagnosis
   b. Differential diagnosis was included as part of my physical therapy curriculum
   c. I have attended a continuing education course regarding differential diagnosis
   d. I have gained experience with differential diagnosis through clinical practice
   e. I have increased my knowledge through critical review of the evidence

7. With appropriate training, physical therapists should be able to order and interpret radiological imaging.
   a. Strongly agree
   b. Agree
   c. Disagree
   d. Strongly disagree

8. What is your formal educational experience regarding radiologic imaging? Check all that apply (a check-mark will appear on your selections).
   a. I have no exposure to radiologic imaging
   b. Radiologic imaging was included as part of my physical therapy curriculum
   c. I have attended a continuing education course regarding radiologic imaging
   d. I have gained experience with radiologic imaging through clinical practice
   e. I have increased my knowledge through critical review of the evidence

9. With appropriate training, physical therapists should be able to order lab tests including complete blood count (CBC), PT/INR and basic metabolic panel (BMP).
   a. Strongly agree
   b. Agree
   c. Disagree
   d. Strongly disagree

10. What is your formal educational experience regarding lab values? Check all that apply (a check-mark will appear on your selections).
    a. I have no exposure to interpreting lab values
    b. Interpretation of lab values was included as part of my physical therapy curriculum
    c. I have attended a continuing education course regarding interpretation of lab values
    d. I have gained experience with interpreting lab values through clinical practice
    e. I have increased my knowledge through critical review of the evidence

11. With appropriate training, physical therapists should be able to prescribe NSAIDs to patients in the emergency department setting.
    a. Strongly agree
    b. Agree
    c. Disagree
    d. Strongly disagree

12. What is your formal educational experience regarding the physiological affects of NSAIDs? Check all that apply (a check-mark will appear on your selections).
    a. I have no exposure to the physiological affects of NSAIDs
    b. The physiological affects of NSAIDs was included as part of my physical therapy curriculum
    c. I have attended a continuing education course regarding the physiological affects of NSAIDs
    d. I have gained experience with the physiological affects of NSAIDs through clinical practice
    e. I have increased my knowledge through critical review of the evidence
13. Which of the following situations are most appropriate for a physical therapist to manage in the emergency department setting? Check all that apply (a check-mark will appear on your selections)
   a. Screening for fall risk
   b. Examination of musculoskeletal complaints
   c. Examination for shortness of breath
   d. Examination of altered gait.
   e. Other:

14. Have you ever evaluated or treated a patient in the emergency department?
   a. Yes
   b. No

15. What is the highest clinical degree you have earned?
   a. Bachelors Degree
   b. Masters Degree
   c. Doctorate Degree

16. Are you a board certified clinical specialist? If yes, please specify. If no, proceed to the next question.
   a. Yes
   b. No

17. How many years have you been practicing as a licensed physical therapist?
   a. Less than 1 year
   b. 1-5 years
   c. 6-10 years
   d. 11-15 years
   e. 16-20 years
   f. 21+ years

18. Do you currently hold a management position?
   a. Yes
   b. No

19. Please select your current practice setting. Check all that apply (a check-mark will appear on your selections)
   a. Inpatient Acute Care
   b. Inpatient Rehabilitation
   c. Outpatient Rehabilitation
   d. Outpatient Orthopedics
   e. Skilled Nursing Facility
   f. Hospice Facility
   g. Long Term Care Facility
   h. Home Health
   i. Women's Health
   j. Acute Care Pediatrics
   k. Outpatient Pediatrics
   l. School System
   m. Emergency Medicine
   n. Other:

20. Following the APTA's Guide to Physical Therapy Practice, select the practice pattern that best fits the majority of your patient population.
   a. Cardiopulmonary
   b. Musculoskeletal
   c. Neuromuscular
   d. Integumentary

21. In what state do you currently practice?

22. What geographical description best describes the area in which you practice?
   a. Urban
   b. Suburban
   c. Rural

23. What is your age?

24. What is your gender?
   a. Male
   b. Female
Acute Care Physical Therapy and Occupational Therapy Involvement throughout Implementation of a Hospital Electronic Health Record

Christopher M Wilson, Reyna Colombo, Janet Wiechec Seidell, and Violet Kosecki

ABSTRACT

Purpose: To describe processes, opportunities and challenges encountered by an acute care rehabilitation department during electronic medical record (EMR) implementation. The EMR can enhance quality, safety and efficiency but hospital adoption has been slow. Due to widespread support and financial incentives, implementation of certain areas of the EMR, such as medication administration and order entry, has become more prevalent.

Methods: During the design phase of EMR implementation, rehabilitation managers participated in several committees including system development and hospital infrastructure hardware assessment. For rehabilitation staff, EMR education was multimodal utilizing a train-the-trainer approach, including computer-based training, face-to-face, and classroom education. Due to resource constraints, the Information Technology department provided limited support to build and implement rehabilitation EMR documentation. The rehabilitation department took the initiative to internally develop and implement electronic documentation utilizing tools offered within EMR software.

Results: Average visits temporarily declined by 13.7% for PT and 8.4% for OT during EMR implementation; the volume of treatments returned to previous numbers after implementation. EMR implementation decreased the need for aide staff to spend time and resources to support the paper medical record.

Conclusion: EMR committees offered a direct line to provide input and troubleshoot EMR issues and increased awareness of options and processes. This empowered the rehabilitation department to seek creative ways to develop electronic documentation.
Adopting an electronic medical record (EMR) has the potential to enhance clinical efficiency, patient safety, and case management as well as improve clinical outcomes, communication and collaboration throughout a health system. The federal government has promoted and incentivized rapid implementation of the EMR through several pieces of legislation. In 2004, President Bush established a goal to have a universal EMR by 2014. In mid-February 2010, as part of the larger $787 billion economic stimulus package signed by President Obama, $19.2 billion was allocated to promote incorporation of the EMR through the HITECH (Health Information Technology for Economic and Clinical Health) Act. This bill included $17.2 billion to pay for the widespread adoption and “meaningful use” of “certified” interoperable EMR technology. Meaningful use is defined by the United States Department of Health and Human Services (HHS) as use of an EMR “by providers to achieve significant improvements in care. The legislation ties payments specifically to the achievement of advances in health care processes and outcomes.”

The objectives for meaningful use were released in July 2010 with an initial deadline of September 2010 to begin to qualify for incentives. In addition, HHS has developed a process that lays out the criteria that EMRs must meet in order to be officially certified, including standards for the “necessary technological capability, functionality, and security.” One of the key tenets of meaningful use is computerized physician/provider order entry (CPOE) where physicians and healthcare providers directly input orders for medications, tests, and procedures electronically instead of on a paper chart to improve accuracy and eliminate errors related to illegibility and transcription. The American Physical Therapy Association has supported the Electronic Health Record in Physical Therapy through a position statement passed by the House of Delegates in 2008. Although the EMR has been extensively supported by professional associations, hospital systems and governments, adoption and implementation rates remain low. Based on a 2008 survey of American Hospital Association member hospitals, Jha et al reported: “On the basis of responses from 63.1% (3,049 hospitals) of hospitals surveyed, only 1.5% of U.S. hospitals have a comprehensive electronic-records system (i.e., present in all [nursing or patient care] clinical units), and an additional 7.6% have a basic system (i.e., present in at least one [nursing or patient care] clinical unit).”

Barriers to adoption of the EMR include “inadequate capital for purchase, an unclear return on investment, maintenance cost, physician resistance, and inadequate Information Technology (IT) staff.” Once the decision to implement an EMR is made, these barriers may cause IT managers and hospital administrators to be selective as to which areas of implementation are most critical and present the most return-on-investment to the hospital, potentially at the cost of other areas of implementation. In addition to the barriers listed above, system failure, electricity interruption and downtime have been cited as possibly increasing staff and physician dissatisfaction as well as a patient safety risk if important information is not available while the system is offline.

A literature review was performed which included Medline, Cochrane and CINAHL utilizing combinations of the keywords “electronic medical record,” “electronic health record,” “rehabilitation,” “acute care,” “physical therapy,” and “implementation.” This search failed to find any articles detailing the development or effects of an acute care medical record implementation from a rehabilitation perspective, other than a description of a hospital-wide EMR implementation at a community hospital, in which phases of implementation including the operating room, results review, clinical nursing documentation, pharmacy and computerized physician/provider order entry (CPOE) were described.

In this paper, Wolf et al. discussed the importance of strong physician champions and the use of committees to develop the EMR among other common themes found to be relevant during our experiences in implementing an EMR.

The purpose of our report is to describe processes, opportunities and challenges of physical therapist and occupational therapist professionals during the multi-year implementation of an electronic medical record at a suburban-Detroit, Michigan, USA hospital system. We will also describe how the implementation of the EMR throughout the hospital affected the Physical Therapy (PT) and Occupational Therapy (OT) Department and the required adjustments in practice as well as the education methods utilized during this rollout.

**PROCESS**

Generally speaking, the medical record has three main functions related to acute care physical and occupational therapy: 1) the chart review to determine the patient’s current status and the history of the current admission; 2) to document clinical findings and treatment interventions; 3) to provide interdisciplinary communication. Prior to February 2008, nearly all of the charting was done using a handwritten paper medical record. Challenges commonly cited by therapists in this setting included illegibility of records, the medical record not accurately...
reflecting the patient’s current status including lab tests, vital signs and radiographic results, as well as lost efficiency in physically locating and interacting with the paper medical record. Additionally, quality control measures such as post-hospitalization chart review were delayed due to hospital records storage in a separate location in the hospital.

The health system did have a clinical computer system, Misys CPR Ultiview (Version 4.3.1 Copyrighted 2004) that was used in a limited fashion by therapists to access vital signs, laboratory results, imaging studies and transcribed physician reports for all nursing units. With some exceptions, the PT/OT clinical staff could obtain the required patient information using only the paper medical record as nursing and physicians would commonly write detailed notes including the above information, which reduced the need to consult the EMR. The acute care rehabilitation department was documenting on preprinted paper forms in a SOAP note format for initial evaluations, daily progress notes, interim and discharge notes. These notes were handwritten and placed in the PT/OT section of the paper chart.

**Acquisition of the EMR and Build Phase**

During 2004 and 2005, Beaumont Health System acquired software entitled EpicCare Inpatient Clinical System, from the Epic Corporation for its 3 hospitals. Selecting an EMR was an executive level task involving senior hospital system leadership. Criteria used for choosing an EMR included customizability, long-term viability, achieving HHS meaningful use benchmarks, and vendor support throughout implementation. At an introductory meeting, key contacts from each department were identified as “content experts” who would collaborate with department leaders and clinicians to make decisions to help shape the EMR to fit current workflows. To avoid reduced clinical productivity, the rehabilitation department chose management level staff as content experts; however, all material decisions affecting patient care, workflow and outcomes were vetted for feedback and input by staff before any implementation to assure appropriate functionality for the direct patient care providers.

The EMR installation was intended to provide an underlying infrastructure and connectivity to help share information and enhance communication between providers while driving unwarranted cost and variation out of system in order to simultaneously improve patient safety, clinical outcomes and enhance the patient experience. Goals were established to engineer a paperless system, standardize nomenclature, and to track clinical outcomes, i.e., discharge disposition, readmission rates, pain assessments, fall prevention interventions, and Process of Care (core) measures as well as provide for CPOE. Process of Care measures are defined by CMS as “data based on scientific evidence that converts medical information from patient records into a percentage that allows a facility or consumer to assess how well an entity provides care to its patients.”17

Epic team members would be working closely with the IT department and content experts from each department to customize or “build” the uncustomized “model” system to fit Beaumont Health System’s patient care practices and to help guide decisions based on the technical capacity and limitations of the program and to educate as to how other healthcare systems had addressed similar issues. The acute care implementation was to take place in 3 phases with the goal of core patient care functions implemented by 2009 (Table1). Due to the need to focus on achieving meaningful use milestones and the associated financial incentives as well as the limited staffing and resources in the IT department, PT and OT clinical documentation was postponed until after phase 3, which placed rehabilitation clinical documentation several years after the majority of

**Table 1. Initial Timeline for EMR Implementation**

<table>
<thead>
<tr>
<th>Phases</th>
<th>Primary Focus Related to Acute Care</th>
<th>Tentative Date</th>
<th>Actual Date Of Implementation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase 0</td>
<td>Billing and Charge Capture, Patient Census</td>
<td>Q1 2007</td>
<td>Aug ’08</td>
</tr>
<tr>
<td>Phase 1</td>
<td>Misys Migration, chart review functions</td>
<td>Jul ’07</td>
<td>Apr ’08 – GP</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Feb ’09 – RO, TR</td>
</tr>
<tr>
<td>Phase 1.5</td>
<td>Emergency Center documentation</td>
<td>NA</td>
<td>Oct ’09</td>
</tr>
<tr>
<td>Phase 2</td>
<td>Medication administration, nursing, speech, respiratory, dietary documentation</td>
<td>Jan ’08</td>
<td>Feb 2010 – RO, TR</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Oct ’10 - GP</td>
</tr>
<tr>
<td>Phase 3</td>
<td>Computerized Physician/Provider Order Entry (CPOE)</td>
<td>Q1 ’08</td>
<td>Jun ’10 - RO</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Sept ’10 – TR</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Dec ’10 - GP</td>
</tr>
<tr>
<td>Future Phases</td>
<td>Physician Documentation, Rehabilitation Documentation</td>
<td>TBD</td>
<td>Sept ’10 - Rehab documentation completed.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Physician documentation TBD</td>
</tr>
</tbody>
</table>

GP – Grosse Pointe, RO – Royal Oak, TR – Troy
other acute care clinical functionality was achieved.

Development Committee Involvement
Prior to implementation, PT/OT participated in interdisciplinary development committees to help shape the model system into the production software that would be used for patient care. One of the committee tasks was to customize the operating procedures, screen views and guidelines for the EMR and determine what would constitute a “best practice alert.” An example of a best practice alert would be whether a nurse would be prompted to place a patient on a fall prevention protocol or consider recommending physical and occupational therapy when that patient was determined to be at high risk for falls upon nursing admission assessment.18

In addition, a group reviewed and reconciled “order sets” between the individual hospitals that would reflect current evidence based practice. An order set is a customizable electronic version of a protocol or a clinical pathway--a series of orders and actions taken by the healthcare team intended to optimize quality and reduce unwarranted variability for patients with similar diagnoses. Examples of order sets that impacted PT/OT included orthopedic surgeries, cerebrovascular accidents, cardiac surgery and intractable back pain.

One workgroup was assigned the task of determining when “charting by exception” would be allowable and when it would not be permissible or indicated. Charting by exception is defined as “a shorthand method of documenting normal findings, based on clearly defined normals, standards of practice, and predetermined criteria for assessments and interventions.”19

The key assumptions for charting by exception include the need for extensive education to properly document in this manner, possible limitations in malpractice protection, and the need for auditing the appropriate use of this documentation policy.20

Infrastructure evaluation and upgrades
The rehabilitation department participated in a series of hospital tours with the IT department to lend input to identify where more computers may be necessary. Therapists were also allowed to offer their clinical knowledge in ergonomics and workstation design to improve the posture and body mechanics of those using the computers. As a result of these tours, the number of computers was increased by approximately 20% and 5-10 EnovateIT LITE tiered laptop carts (Figure 1) per nursing unit were added. The rehabilitation department was able to acquire two EnovateIT LITE tiered laptop carts as well as 12 laptop computers for clinicians to carry during patient care. Some concerns of staff upon introduction of the laptops included the small keyboard and screen and the concern about misplacing or damaging the laptops; however approximately 1/3 of the therapists fully adopted the laptops. To prevent loss of the laptop computers, the lap

Figure 1. EnovateIT LITE tiered laptop cart
to practice with mock patients in a simulated network without any HIPAA identifying information or inappropriately documenting in a patient’s medical record.

**EMR implementation**

Once the system was built and the staff was educated in the clinical documentation procedures, the functionality was released in 3 phases, each with its own cycle of building, testing, revision, education and “go-live” support. Some of the benefits of a phased rollout are that the participants can learn from each phase and proactively correct any patient safety errors and reduced disruption to the hospital as compared to a system-wide single-phase implementation, which may cause confusion and errors that can negatively affect patient safety.

Some of the negative implications of the phased rollout included staff fatigue and frustration with frequent fundamental changes to their workflow and the possibility of an extended timeframe of reduced efficiency and need for compensatory overstaffing. Affected departments were advised that clinical efficiency could be decreased by up to 20% initially during go-live, especially for departments that had more job duties in that phase’s go-live. An integrated network of superusers and IT personnel, a technical support phone line, and daily meetings at the affected hospitals supported go-live support for each phase. An unexpected perk to EMR implementation included access to electronic versions of X-rays, CT scans, MRIs and other imaging studies through a hyperlink in the radiology reports. This access allowed the therapists to enhance clinical knowledge of their patients to better design achievable plans of care in both the acute care and outpatient settings.

**Rehabilitation documentation implementation**

The notes function in the Epic software worked in a similar manner to a traditional word-processing program with an additional function entitled “smart phrases.” A smart phrase was designed to be a time saver for clinicians who were required to type the same sentences on repeated instances. This would allow a clinician to initiate a series of sentences with just a few keystrokes. In addition, once these smart phrases were placed into a clinical note, they could be comprehensively edited to properly reflect the clinical situation. Once developed, a smartphrase could be shared with other clinicians who could then use the phrase for their documentation. The author of the smart phrase could designate or limit who had the access to edit or delete a smartphrase, thereby initiating content controls to the templates.

Due to rehabilitation documentation not being scheduled to receive full IT support for implementation before 2012, the rehabilitation department internally developed smartphrases based on currently existing paper forms. By pressing a few buttons in the EMR, the therapist could then have an electronic copy of the appropriate clinical form, in which they could type their findings, clinical impressions, goals and interventions (Figure 2). This approach allowed therapists to more easily adapt to the online documentation, as the staff was already familiar with the choices, locations and options of the paper forms. Key members of the rehabilitation staff piloted this format for several weeks to optimize the forms while other clinicians were still using paper forms. The feasibility of using smartphrases was confirmed during a site visit with Covenant Hospital in Saginaw, MI where the PT/OT department received significant IT support for their Epic EMR implementation with similar use of smartphrases but with customized drop-down menus.

After the smartphrase forms were piloted and tested for one month, the rehabilitation department superusers began training staff in appropriately applying smartphrases and introducing the online documentation standards in April through June 2010. During this transition phase, after an electronic note was completed and saved and the composing therapist would print out the typed note and file it into the paper chart, thereby preserving the continuity and chronological nature of the paper chart. After three months, all therapists were able to compose a note in a timely, proficient, competent manner on a regular basis; therefore, the department no longer required the online notes to be printed. An integral portion of the cessation of printing was communication with physicians, nursing personnel and other departments to assure that they all were aware of the online location of the documents.

After the staff was proficient in the electronic documentation, an enhancement to this process included implementing drop-down menus to assist therapists in selecting smart phrases to reflect clinical care instead of free texting. Rehab management utilized staff feedback to help develop comprehensive, customized drop-down menus. The use of drop-down menus within the smart phrases helped improve timeliness and accuracy as a note could not be submitted unless all drop-down menus were completed.

**Measures**

Approval for a human subject review for our project was sought from the Beaumont Health System’s Human Investigation Committee (Royal Oak, MI). The Human Investigation Committee determined that this study was exempt from review, and a written Waiver of Review was provided. Measures of interest, including number of patient visits and new patients by PT and OT, and technical aide support hours, were selected as proxy measures of the impact of the implementation of EMR on overall department operations. Comparison periods were carefully selected to provide the best “snapshot” of pre- and post-EMR implementation activities. Historical data at Beaumont Hospital, Troy indicate seasonal fluctuations in total patient visits and new patients. Therefore, we needed to select comparisons groups that would take this into account. Furthermore, due to the 2-3 month learning curve as the
EMR was first implemented, we also needed to select a post-implementation period that would not include this transition period. To accommodate these two concerns, we determined that the most appropriate comparison of the effect of EMR implementation included the corresponding 3 month periods (quarters) before (January-March 2010, Q1), during (April-June 2010, Q2), and after (July-September 2010, Q3) EMR implementation and comparing them with each other, as well as to corresponding quarters in 2009, which would serve as a control for seasonal fluctuations in visits.

**Statistical Analysis**

All outcome variables of interest were continuous and normally distributed; therefore, parametric tests were performed. ANOVA was used to examine mean differences between the periods of interest for each outcome measure. Post-hoc testing was conducted on comparisons involving more than 2 groups. Scheffé test was used to identify which groups were significantly different. A probability value of less than 0.05 was considered statistically significant. SAS version 9.2 (SAS Institute, Cary, NC) was used for all analyses.

**RESULTS**

Table 2 summarizes the number of patient visits and new patients by quarters for PT. A statistically significant difference was found for number of patient visits by PT over the first 3 quarters in 2010 (p=0.03), with a decrease in patient visits by PT in each quarter (Figure 3). Post-hoc tests showed that, while no statistically significant differences existed in number of patient visits by PT from Q1 to Q2 or from Q2 to Q3, a statistically significant difference was found between Q1 and Q3. Historical trends have shown a decline in PT visits in autumn (Q3). In order to adjust for seasonal fluctuations in number of visits, each quarter analyzed was compared with the same period in 2009. No statistically significant differences were found in the average number of patient visits by PT when comparing Q1 2009 with Q1 2010 or when comparing Q3 2009 with Q3 2010 (p>0.05), indicating that the 3 month period immediately preceding and following EMR implementation were similar in patient visits by PT to the same time period in 2009. For Q2 2010 (during EMR implementation)
a statistically significant decrease in
patient visits for PT occurred when
compared with Q2 2009 (p=0.01).

A summary of number of patient visits
and new patients by quarters for OT
is shown in Table 3. In comparing
average number of patient visits
for OT, no statistically significant
differences were found over the 3
quarters in 2010 (p=0.14). Historical
trends for OT also show seasonal
fluctuations with a decrease in patient
visits and new patients in autumn
(Q3). Similar to that seen for PT, no
statistically significant differences in
patient visits were found between Q1
2009 and Q1 2010 or between Q3
2009 and Q3 2010 (p>0.05), however
a statistically significant decrease in
patient visits for OT occurred when
comparing Q2 2010 (implementation
of EMR) with Q2 2009 (p=0.04).

No statistically significant differences
(p>0.05) were found in average number
of new patients for PT and OT for any
of the time frames in 2010 compared
with 2009. However, a statistically
significant reduction in technical aide
support hours from Q1 2010 to Q3
2010 (p=0.03) and between each of the
quarters was found when comparing
2009 with 2010 (Table 4).

DISCUSSION
Data analysis demonstrated a
temporary decrease in the Physical
and Occupational Therapy Department’s
average number of visits during EMR
implementation by 13.7% for PT
and 8.4% for OT when compared
with a similar timeframe in 2009. In
the immediate 3 months after EMR
implementation, the number of visits
returned to seasonal levels. No
statistically significant changes were
found in volume of new patients in any
timeframe in 2009 or 2010 for PT or
OT, even after CPOE implementation.
During 2010, the increased use of EMR
allowed the department to reduce its
utilization of technical aide support
personnel and allowed remaining staff
to focus on patient care instead of tasks
related to supporting the paper medical
record. This allowed for an average
reduction in monthly aide hours
by 229 hours per month (average
utilization Q1 = 1096 hours, Q3 = 867
hours) after EMR implementation, an
annual cost savings of approximately
$38,400 in salary costs. In summary,
the department was able to maintain
patient visit volume with significantly
less support personnel. This cost
savings did not include material costs of
the paper forms, Medical Records staff
handling of the documentation, and
other intangible benefits. In addition,
visit data did not reflect the content
experts’ time away from clinical care
during the development and build
committee participation, which was
estimated to be approximately four
to five hours per week. Anecdotally,
rehabilitation management noted an
improvement in completeness and
timeliness of notes and fewer calls from
other disciplines requesting therapy
notes, as they were easily located in
the EMR.

One of the benefits of the therapy
department internally developing
electronic documentation was that
we had no mandated timeline or
external requirements that may have
further affected the department. In
fact, the rehabilitation team was
able to strategically choose when
implementation of the education,
training, and rollout of online
documentation would occur to best
fit the needs of the department and
its patients.

A possible disadvantage of limited IT
support for online documentation
was that all of the rehabilitation
Implementation of a Hospital Electronic Health Record

Table 3. OT: Average number of patient visits and new patients by grouping.

<table>
<thead>
<tr>
<th></th>
<th>OT Total Patient Visits Mean (sd)</th>
<th>F (p-value)</th>
<th>OT Total New Patients Mean (sd)</th>
<th>F (p-value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan-March 2010</td>
<td>1355.7 (91.9)</td>
<td>2.84 (0.14)</td>
<td>570.3 (41.9)</td>
<td>2.15 (0.20)</td>
</tr>
<tr>
<td>April-June 2010</td>
<td>1271.3 (58.1)</td>
<td></td>
<td>545.3 (15.5)</td>
<td></td>
</tr>
<tr>
<td>July-Sept 2010</td>
<td>1202.3 (83.0)</td>
<td></td>
<td>494.0 (65.8)</td>
<td></td>
</tr>
<tr>
<td>Jan-March 2009</td>
<td>1523.7 (196.2)</td>
<td>1.80 (0.25)</td>
<td>564.3 (54.0)</td>
<td>0.02 (0.89)</td>
</tr>
<tr>
<td>Jan-March 2010</td>
<td>1355.7 (91.9)</td>
<td></td>
<td>570.3 (41.9)</td>
<td></td>
</tr>
<tr>
<td>April-June 2009</td>
<td>1387.3 (37.6)</td>
<td>8.44 (0.04)*</td>
<td>544.3 (23.8)</td>
<td>0.00 (0.95)</td>
</tr>
<tr>
<td>April-June 2010</td>
<td>1271.3 (58.1)</td>
<td></td>
<td>545.3 (15.5)</td>
<td></td>
</tr>
<tr>
<td>July-Sept 2009</td>
<td>1330.3 (97.5)</td>
<td>3.00 (0.16)</td>
<td>518.0 (34.6)</td>
<td>0.31 (0.61)</td>
</tr>
<tr>
<td>July-Sept 2010</td>
<td>1202.3 (83.0)</td>
<td></td>
<td>494.0 (65.8)</td>
<td></td>
</tr>
</tbody>
</table>

*Significant at p<0.05
†Identifies groups that are significantly different from each other in multi-group comparisons.

Table 4. Average number of aide hours by grouping.

<table>
<thead>
<tr>
<th></th>
<th>Aide Hours Mean (sd)</th>
<th>F (p-value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan-March 2010</td>
<td>1096.5 (88.1)†</td>
<td>6.34 (0.03)*</td>
</tr>
<tr>
<td>April-June 2010</td>
<td>958.6 (101.4)</td>
<td></td>
</tr>
<tr>
<td>July-Sept 2010</td>
<td>867.0 (30.2)†</td>
<td></td>
</tr>
<tr>
<td>Jan-March 2009</td>
<td>1374.7 (38.4)</td>
<td>25.2 (0.01)*</td>
</tr>
<tr>
<td>Jan-March 2010</td>
<td>1096.5 (88.1)</td>
<td></td>
</tr>
<tr>
<td>April-June 2009</td>
<td>1293.0 (15.5)</td>
<td>31.91 (0.005)*</td>
</tr>
<tr>
<td>April-June 2010</td>
<td>958.6 (101.4)</td>
<td></td>
</tr>
<tr>
<td>July-Sept 2009</td>
<td>1227.8 (132.4)</td>
<td>21.18 (0.01)*</td>
</tr>
<tr>
<td>July-Sept 2010</td>
<td>867.0 (30.2)</td>
<td></td>
</tr>
</tbody>
</table>

*Significant at p<0.05.
†Identifies groups that are significantly different from each other in multi-group comparisons.

documentation was encapsulated in smartphrase notes and was not fully integrated into interdisciplinary flowsheets. The merits of documenting in flowsheets had been debated in interviews with other institutions that had an EMR for PT and OT and we discovered that therapists who had never treated a specific patient before would experience difficulty getting a clear picture of how the patient presented when the patient’s treatment was scattered through several different flowsheets and that a concise, complete note was better for intra-discipline communication. This topic warrants further investigation.

Some limitations to this project include the fact that the limited IT support resources provided to rehabilitation services at Beaumont Health System may not be generalizable to all other hospitals, however we anticipate that financial resources of hospitals will continue to become more limited due to the trend of decreasing reimbursement rates. Another limitation is that the data collected on therapy visits, new patients, and support hours have multiple influences and a direct effect relationship cannot be attributed to EMR implementation alone.

During the literature review of the incentives offered by various entities promoting the EMR, although well-intentioned and important for the adoption of the EMR, a gap remains that does not proportionally incentivize the implementation and perfection of the rehabilitation services documentation, thereby placing this area at risk for delayed implementation.

or limited resources. Rehabilitation services’ evaluations, interventions and associated documentation has proven to have a strong correlation with appropriate and timely discharge placement. A Cochrane review of the literature has shown that customized discharge placement has a relationship with lower hospital length of stay and readmission rates. While the promotion of a fully integrated, interdisciplinary EMR would be optimal, rehabilitation professionals may have to advocate for their own discipline’s electronic documentation to meet professional standards.

In addition, one of the anticipated benefits of the EMR that has not been fully realized yet is the potential for interconnectivity between hospital systems or quality reporting agencies. At this time, many hospital systems do not yet have the IT infrastructure for a “seamless exchange of information;” however, the HHS department cites plans to work with “private sector and consumer groups to develop the specifics of a nationwide health information network.”

CONCLUSION

EMR technology has great potential to significantly advance several areas of clinical care including patient safety, medical record legibility and access, improved billing and efficiency. The EMR implementation process was a multi-year procedure and the implementation scope and timeline was heavily influenced by financial incentives offered by the federal government,
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which caused reprioritization away from rehabilitation documentation, delaying this area’s formal implementation support indefinitely. Although fully integrated IT support is optimal for achieving online documentation, creativity, persistence and strong understanding of the options and limitations of the EMR system can assist rehabilitation managers to achieve or optimize electronic documentation.

Acknowledgements
The authors would like to thank Victoria Lucia, PhD for data analysis and outcomes guidance, and Margaret Beaumont, RN, MSN and Rose Marie Prasatek, RN, MIS for clinical informatics guidance and support.

Approval for a human subject review was sought from the Beaumont Health System’s Human Investigation Committee (Royal Oak, MI). The Human Investigation Committee determined that this article was exempt from full review, and a written Waiver of Review was provided.

REFERENCES
Programmable Patient Simulators as an Educational Technique in Physical Therapy

Brad Stockert and Debra Brady

ABSTRACT

In a session on cardiorespiratory education at the 2007 World Confederation of Physical Therapy meeting in Vancouver, Canada the speakers noted a worldwide shortage of physical therapists willing to work in intensive care settings, especially in critical care units and cardiac rehabilitation programs. Simulation is a technique used in healthcare education to replicate the essential aspects of a clinical situation, so that the learner can more effectively examine, assess and manage a similar event when it occurs in clinical practice. While the use of patient simulators in the forms of role players and standardized patients has been a long-standing practice in physical therapy education, the use of programmable patient simulators is relatively new. The purpose of this article is to describe the programmable patient simulator technology available currently and to discuss the frequency and manner in which programmable patient simulation is used as an educational technique for training clinicians and student physical therapists.
World-wide, we are experiencing a shortage of physical therapists willing to work in intensive care settings (ICU)—especially in critical care units and cardiac rehabilitation programs. Thirty-one percent of student physical therapists surveyed reported “lower feelings of competency in cardiorespiratory care than in other specialties.” Physical therapists choose to not practice in these settings for a variety of reasons that may include 1) fear-avoidance secondary to the high mortality rate in this patient population; 2) dissatisfaction with their professional skills and training related to working in an ICU; and 3) dissatisfaction with their professional skills and training related to responding to specific emergency medical procedures. While student physical therapists may have internships to prepare for practice in acute and critical care settings, the reality is that some students never witness or intervene in a medical emergency during their professional training.

Simulation is a technique used in healthcare education to replicate the essential aspects of a clinical situation so the learner can more effectively examine, assess and manage a similar event when it occurs in clinical practice. While the use of patient simulators in the forms of role players and standardized patients has been a long-standing practice in physical therapy education, the use of programmable patient simulators is relatively new. The purpose of this article is to describe programmable patient simulator technology available currently and to discuss the frequency and manner in which programmable patient simulation is used as an educational technique for training clinicians and student physical therapists.

**PROGRAMMABLE PATIENT SIMULATOR TECHNOLOGY**

Programmable patient simulators are computer-operated, life-size mannequins with a variety of observable and clinical features that add to the degree of realism during simulation. The degree of realism present in the programmable patient simulator or in the simulation is referred to as fidelity. High-fidelity simulators have observable features that can include diaphoresis, chest wall movements, pupils that react to light, eyelids that blink, and the ability to converse and vocalize symptoms. Clinical features may include palpable pulses, breath sounds, heart tones, bowel sounds, and a library of normal and abnormal sounds for each. High-fidelity simulators are connected to patient monitors that display a variety of parameters in real time including ECG, blood pressure, and oxygen saturation during the simulation experience.

The features available in programmable patient simulators provide the operator with the ability to design scenarios that realistically replicate complex medical conditions and situations. For example, when a simulation participant enters the room, a “patient” can be stable but suddenly complain of chest pain while demonstrating blood pressure and ECG changes on the patient monitor that are associated with the onset of an acute myocardial infarction. When the programmable patient simulator is incorporated into a high-fidelity environment with lines, tubes, alarms, monitors, etc., the simulated critical care setting and experience become realistic, engaging, challenging, and uncertain for the participant learning to work with complex patients or to manage a clinical event. Simulation forces participants to examine, assess, and integrate information in real time while witnessing the consequences of their decisions and actions.

High-fidelity simulation has the potential to be a transformational learning experience that permanently changes the participant’s view of the clinical situation. Programmable patient simulation engages the participant in a student-centered, active-learning environment by creating hands-on learning experiences that promote critical thinking skills while facilitating clinical application and synthesis of knowledge in real time. High-fidelity simulation demands that participants apply their knowledge, clinical skills and professional behaviors in the context of a realistic and unpredictable patient care situation. Learners can observe the consequences of their actions, as well as their inactions, without compromising patient safety. As a result, high-fidelity simulation offers faculty an opportunity to train participants for work in critical care settings in a manner that directly addresses potential concerns that they may have regarding their professional skills and lack of experience.

**CASE FOR USING SIMULATION TECHNOLOGY**

A rise in the national focus on patient safety in recent years has resulted in increased attention on the use of programmable patient simulators for educational purposes. The 2003 report by the Institute of Medicine, *Health professions education: A bridge to quality*, challenged all professional healthcare education programs to integrate five competency areas into their curricular designs and clinical experiences. The five competency areas are patient-centered care, interdisciplinary teams, evidence-based practice, quality improvement, and informatics. Competencies are defined in the report as the “habitual and judicious use of communication, knowledge, technical skills, clinical reasoning, emotions, values and reflection in daily practice.” High-fidelity simulation provides a means to address, practice and assess all five of these competency areas in the context of a realistic patient care setting. The use of programmable patient simulators has been shown to have a positive impact on learning and improved performance of student nurses on subsequent simulation experiences. Critical assessment skills, performance and retention of information by medical students is significantly improved when training includes the use of programmable patient simulators.

Along with a growing concern for patient safety is the recognition...
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of the need for interprofessional education and training to develop effective multidisciplinary healthcare teams. Patient care has become more complicated requiring teamwork and a multidisciplinary approach; yet, education of healthcare professionals is still often provided in “silos” within each discipline. The Institute for Health Improvement (IHI) published a set of goals in 2006 that were designed to improve patient safety. Improved communication and teamwork among healthcare professionals during emergency situations was viewed as a priority in the IHI report. This report specifically focused on the use of programmable patient simulators as a means to improve communication and teamwork of healthcare professionals. Improved performance of emergency medical teams has been demonstrated when high-fidelity simulation is incorporated into the training of medical and nursing students.

Programmable patient simulators provide physical therapy faculty an opportunity to engage with other healthcare disciplines in creating scenarios that provide participants experience working as a member of an interprofessional team to manage patient care. Debriefing following an interprofessional simulation provides an opportunity for professionals from different healthcare disciplines to see and discuss the patient care situation from the perspective of another healthcare professional. Scenarios can be repeated, or new scenarios provided so that participants have opportunities to learn, practice and demonstrate their professional skills and behaviors as a member of interprofessional healthcare teams in a realistic clinical environment. In addition, faculty have an opportunity to verify that participants have demonstrated mastery of the information, skills and behaviors required for work in a critical care setting.

DEBRIEFING THE SIMULATION EXPERIENCE

Central to simulation-based learning is the experience-analysis and feedback following the simulation event known as “debriefing.” During the debriefing process, the rationale for treatment choices is discussed and related to the learning situation the participant experienced. The general consensus in the literature and among simulation experts is that optimal learning occurs when simulation is followed immediately by a verbal debriefing process rather than being delayed. Video recordings of the simulation, debriefing logs generated during the simulation by the computer software, and behavior checklists can be used to provide objective feedback and facilitate analysis.

While classroom learning often involves an instructor imparting knowledge, simulation debriefing is an active learner-centered experience. Skillfully-led debriefing enables participants to express emotional states, explain their internal frames of reference (rationales), analyze their clinical decisions, and synthesize information related to their clinical performances. Best practice patterns for the debriefing process favor having a facilitator that encourages and guides a learner-centered discussion of the simulation experience. The role of the facilitator is to answer clinical questions and clarify best practice patterns while promoting reflection. This process enables learners to reflect upon and discover the internal frames of reference they used to make their clinical decisions and to identify areas in which they met professional standards and any areas that need improvement. Following participant reflection, the facilitator may provide additional insights that may result in further modification or expansion of the participant's internal frames.

The debriefing process provides the simulation participant with an opportunity to reflect, learn, synthesize and integrate information that will improve their clinical performances in similar situations in the future. A growing body of literature on simulation research in healthcare professions indicates that debriefing and this reflective process are the most important aspects of the simulation-based learning experience.

STANDARDIZATION OF CLINICAL EXPERIENCES

While the use of patient simulators in the forms of role players and standardized patients has been a long-standing practice in physical therapy education, the use of programmable patient simulators is relatively new. When high-fidelity patient simulators are incorporated into a realistic setting such as a mock critical care unit with all of the lines, tubes, alarms, monitors, etc., the learning environment becomes realistic and immersive for the participant learning to work with complex patients. Simulations can be tailored to meet specific educational objectives and outcomes related to acute care and critical care settings, e.g. the role of a physical therapist in responding to an emergency or how to communicate effectively with interprofessional team members during a crisis. When a participant performs poorly during simulation, patient safety is not compromised. In addition, following the debriefing process, the participant can be given an opportunity to demonstrate incorporation and integration of the constructive feedback in the same, or a different, clinical scenario specific to the defined objectives. High-fidelity patient simulation provides clinicians and student physical therapists an opportunity to demonstrate clinical competence and confidence for managing a complex clinical situation, as well as provide an objective and realistic measure of participant performance with complex patient situations that can be designed according to objectives defined prior to setting up scenarios.

As an example of standardizing clinical experiences, we have incorporated nursing students into the simulation experiences of our student physical therapists. One specific outcome we have defined is for the physical therapist and nursing students to work together as a team to respond to the emergency
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and stabilize the patient. When our student physical therapists are working with a programmable patient simulator that becomes unstable or develops a medical emergency, they call for student nurses to assist in managing the event. Student program evaluation data indicate this activity has been extremely valuable in addressing fears in recognizing and managing an unstable patient, as well as for improving teamwork and communication between the interprofessional team members. Students report that this simulation experience has enhanced their understanding of and respect for other healthcare team members.

Simulation technology is used currently to practice and assess clinicians’ understanding of emergency procedures. For example, simulation has a pivotal role in advanced life support training programs to manage cardiac and respiratory arrest.12,20,28-32 In courses for anesthesiologists and advanced practice nurse anesthetists, simulation has been used extensively to perfect technical and communication skills in managing difficult intubations, surgical emergencies, and adverse patient responses to medications.13,22,33-35 Simulation increasingly forms the curricular base for orientation programs and post licensure continuing education courses in medicine and nursing. Course models that combine online learning modules with hands-on simulation experiences are used effectively in critical care orientation programs for nurses in clinical practice and form the basis for courses that address annual competencies or introduce new treatment protocols or equipment.35-38 Just as high-fidelity simulations can be used with nursing and medicine to meet such specialized objectives, a physical therapy continuing education course could utilize programmable patient simulation technology to provide a dynamic learning environment for therapists interested in developing, expanding, or practicing the skills, behaviors and best practice patterns requisite for acute care/critical care practice. This type of continuing education course could directly address potential concerns regarding inadequate professional preparation for working effectively in these high acuity practice areas. We believe that high-fidelity simulation can be used in both entry-level professional education and continuing education courses for practicing clinicians in a manner that would address the shortage of physical therapists willing to practice in these settings. In addition, high-fidelity simulation provides an opportunity and means for clinicians and students from a variety of healthcare disciplines to develop skills specific to interprofessional practice. This type of continuing education course could directly address potential concerns regarding inadequate professional preparation for working effectively in these high acuity practice areas. We believe that high-fidelity simulation can be used in both entry-level professional education and continuing education courses for practicing clinicians in a manner that would address the shortage of physical therapists willing to practice in these settings. In addition, high-fidelity simulation provides an opportunity and means for clinicians and students from a variety of healthcare disciplines to develop skills specific to interprofessional practice.

CURRENT USE OF PROGRAMMABLE PATIENT SIMULATION IN PHYSICAL THERAPIST EDUCATION

We contacted the 210 accredited physical therapist education programs listed on the CAPTE web site in 2009 and requested their participation in an on-line survey. We received replies from 142 programs (67.6% response rate). Sixty-two (44%) of the respondents reported using programmable patient simulators while 80 (56%) respondents denied use of the technology. In the physical therapy education programs that stated use of programmable patient simulators, 79% had medical or nursing programs that were currently utilizing programmable patient simulators to train students. The three most frequently reported uses of programmable patient simulators in physical therapy education programs were training student physical therapists to 1) perform a cardiopulmonary examination; 2) perform an acute/intensive care exam or 3) respond to a medical emergency. Of the 80 physical therapy programs that reported not using programmable patient simulators, 61% did have either a medical or nursing program or both that were utilizing the technology.

We contacted the 62 physical therapy programs that identified themselves as users of programmable patient simulators in our first survey and requested their participation in a follow-up on-line survey. We received usable responses to the second survey from 29 of the 62 schools (47% response rate). Users of programmable patient simulators in physical therapy education programs reported that 55% were using high-fidelity patient simulators and 52% reported using more than one form of programmable patient simulator in their program e.g., high-fidelity simulators, mid-fidelity simulators or virtual patient simulators.

Some form of debriefing at the conclusion of a simulation was reported by 69% of the physical therapy education programs that participated in our survey of users of simulation technology. These programs reported that debriefing consisted of feedback by role players, observers, and faculty. One program reported incorporating computerized logs and video generated during high-fidelity simulation into the debriefing process. While debriefing has been shown to be an essential element for improving the skills and behaviors of the simulation participants, our survey results indicated limited use of the best practice patterns for the debriefing process and the technology available with programmable patient simulators. This finding suggests potential opportunities for faculty to expand and enhance student physical therapist learning, skills and behaviors when simulation and debriefing are used in conjunction as an educational technique.

SIMULATION OUTCOME DATA

Outcome data gathered from simulation studies in nursing and medicine have demonstrated the effectiveness of programmable patient simulation experiences for the participants and justify the expense in terms of money and faculty time.5,6,10-12,28,39 The types of outcome data collected and reported by participants in our second survey included practical examination scores, confidence scales, post-test knowledge exam, reflection pieces and performance on clinical internship.
However, 55% of respondents did not report collecting any outcome data regarding the simulation experience. Establishing outcome measurements will be important as physical therapy education programs attempt to justify the expense of a programmable patient simulation program in terms of money, faculty time and student learning. In addition, outcome data can be utilized to determine the most effective strategies and applications of this teaching technique for clinicians and students.

PATIENT SAFETY AND INTERDISCIPLINARY HEALTHCARE TEAMS

A major issue in preparing student physical therapists for clinical practice is the growing concern for patient safety and recognition of the need for interprofessional education to develop effective healthcare teams. Approximately 40% of survey respondents that utilize simulation technology reported that their physical therapy education programs do not use any form of programmable patient simulator to train student physical therapists to respond to a medical emergency. In addition, 48% of respondents reported that their education program did not use any form of programmable patient simulator to train student physical therapists to work as an interprofessional team member during a medical emergency. These results suggest limited use of simulation technology for emergency and interprofessional team training which may be related to some student physical therapists not feeling adequately prepared to deal with emergency situations. High-fidelity simulation provides educators with a technique to address this gap in professional preparation.

Programmable patient simulators create an opportunity for students from multiple healthcare disciplines including nursing and medicine to practice team communication and role clarification in a safe learning environment where inexperience will not adversely affect patient outcomes. Our survey data indicate that programmable patient simulator use in physical therapy education programs was higher at schools where nursing programs or medical schools used the technology (79.0% vs. 61.3%) suggesting that collaboration among healthcare educators may help foster integration of the technology and the educational technique into physical therapy education curricula. Moreover, sixty-one percent of the physical therapy schools that reported not using programmable patient simulators stated that medicine or nursing program(s) at their schools used programmable patient simulators. Such programs may have the potential to form alliances to make simulation technology and interprofessional simulation experiences more widely available to their physical therapy education programs with minimal start-up costs and time as the simulation equipment, lab and expertise are already in place.

SUMMARY

Many physical therapists choose to not practice in acute and critical care settings for a variety of reasons. Although internships have the potential to provide some students with experiences that prepare them to practice in critical care settings, the reality is that some students never witness or intervene in an actual medical emergency during their professional training. We believe that programmable patient simulators in a realistic setting can be used as an educational technique to directly address the concerns of clinicians and students regarding work in critical care settings, while simultaneously standardizing and expanding the experiences of our students with complex patients in acute and critical care environments. We believe programmable patient simulators are highly valuable for working on interprofessional healthcare team issues related to patient care and communication during emergency situations. In addition, high-fidelity simulation provides a realistic means to prepare and assess clinicians and students for work in a complex healthcare environment.

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{\textbf{Number 3}}
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Physical Therapy Student Self-Efficacy and Knowledge after an Acute Care Human Simulation Laboratory Experience.

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Purpose/Hypothesis: Use of mannequins as human patient simulators is increasingly common in training medical professionals; however its utilization in training physical therapy students is not common practice. High-fidelity human simulator (HFHS) mannequins can be precisely controlled to portray changes in vital signs and have the capability to exhibit physical findings such as a visible respiration, audible heart and lung sounds and a palpable pulse. The HFHS can be customized to portray patients with different invasive lines and clinical monitoring devices to simulate various patient conditions. This study was designed to investigate a change in student report of self-efficacy and didactic knowledge after a human simulation laboratory experience focusing on acute care physical therapy skills.

Number of Subjects: 33 Doctor of Physical Therapy students at the end of their first year of professional curriculum.

Materials/Methods: Prior to the intervention, subjects completed a self-efficacy survey and knowledge test. The subjects participated in a 1.5 hour human simulation site visit which consisted of 2 stations. Station 1 involved a HFHS mannequin where the students performed range of motion on a vent-dependent patient in the intensive care unit with multiple invasive lines. A technician altered the vital signs on the monitor and the students discussed an appropriate course of action. Station 2 required students to plan and execute dependent functional mobility, including wheelchair transfers and bed mobility, with an articulated mannequin with multiple tubes and lines. Throughout both stations, course instructors provided feedback and discussed clinical relevance of the patient scenarios. After completion of the intervention, students underwent a 5-10 minute debriefing and completed the same self-efficacy survey and knowledge test as well as an evaluation of the experience.

Results: Prior to the intervention, 32.1% of students rated themselves as “confident” or “very confident” in acute care skills. After the intervention, 65.2% rated themselves as “confident” or “very confident”. For the knowledge test, the mean total pre-test score was 53.1%± 12.4% and mean total post-test score was 68.8% ±11.3%. Thirty out of 33 subjects achieved improvement in self-efficacy scores and 31 out of 33 subjects demonstrated improvement in the knowledge test. The evaluation demonstrated that 90.9% of subjects reported that they believed the experience was helpful in preparing them for the acute care setting.

Conclusions: Content test scores and self-efficacy survey scores both increased after the intervention indicating that incorporation of a human simulation experience may be a useful tool in the entry-level education of physical therapy students.

Clinical Relevance: Use of human simulation during entry level education may allow students to be more comfortable and effective and experience less anxiety on an acute care clinical affiliation. If proven effective, this education tool may also be useful for training physical therapists in advanced acute care skills.

Physical Therapist Consultation in the Emergency Department: A Descriptive Study of Programs in the American Southwest

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Purpose/Hypothesis: Physical Therapist (PT) consultation in the Emergency Department (ED) is a rare, but emerging area of practice. As a result, traditional ED staff and even many physical therapists remain unfamiliar with the role of the PT in the ED. This project describes the developmental framework, practice models, and barriers associated with 3 ED PT programs in Arizona.

Number of Subjects: Three geographically and organizationally distinct ED PT programs.

Materials/Methods: PTs involved in the delivery of services in the ED completed an online survey designed to collect information concerning the operations and demographics associated with their respective programs. Based on survey responses, researchers conducted interviews to gain a comprehensive and individualized understanding of PT function in these EDs. Subsequently, researchers analyzed interview transcripts for salient ideas and combined these with survey results to form aggregate data about each program. Latent content analysis of the data revealed common themes.

Results: Findings indicate PTs in these EDs provide services for 8-12 hours per day in community hospitals and are most often consulted to provide specialized care for patients with musculoskeletal conditions. The majority of these consultations were for patients with cervical and lumbar spine pathologies. Non-orthopedic referrals were most often initiated to assess patient safety and fall risk. While PTs reported providing a variety of services, the most commonly perceived interventions included patient education and exercise prescription (provided for ≥75% of patients) as well as non-pharmacological methods of pain management (provided for ≥50% patients).
PTs also indicated they were involved with discharge planning and follow-up recommendations for 75-100% of patient consultations. With respect to program development, educating ED providers about the potential benefits of the service was considered essential in creating and sustaining these programs. Physical therapy services in the ED were perceived to decrease inappropriate hospital admissions, increase patient satisfaction, enhance patient education, and improve continuity of care. Challenges described included tracking productivity, reimbursement concerns, and limitations associated with space and equipment.

**Conclusions**: These findings help illustrate the integral role the PT may provide as a part of the ED healthcare team. Though many services provided by PTs in the ED do not greatly differ from those seen in traditional practice settings, the nature of the ED setting poses unique challenges for developing and sustaining these programs.

**Clinical Relevance**: This research may provide PTs and other healthcare practitioners with a better understanding of the role filled by the PT in the ED. As the prevalence of ED physical therapy programs increases, this knowledge may aid in further expanding PT scope of practice in this environment.

**An Innovative Approach to Frequent Patient Mobilization**

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**Purpose**: The role of a physical therapist in the acute care setting has changed dramatically over the years. As hospital length of stay continues to decrease, the efforts of inpatient physical therapy have shifted towards a greater focus on response time to consult request, discharge planning, and safety clearance for discharge. This shift has caused many institutions to struggle with providing the necessary follow-up treatment frequency to patients. A combination of decreased PT treatment frequency and increased demands on nursing has contributed to patients not being mobilized as often as is necessary to achieve the appropriate functional goals. Consequently, patient, family, staff, and physician have diminished. The creation of an ambulation aide program allows for patients to receive more timely and frequent mobilization.

**Description**: Ambulation aides are non-clinical professionals who have a general interest in the field of healthcare. These aides independently ambulate patients who are assigned by the primary physical therapist. Additional criteria was developed outlining appropriate and inappropriate patient populations for the program. The department's ambulation aides are able to fill the gap in services through provision of daily ambulation of patients. It's a value-added service as it augments the physical therapist's follow-up visits and reinforces the mobility of patients. The program allows therapists to concentrate more of their efforts on responding to new referrals in a timely manner and working with the patients that need their advanced clinical skill set. The program entails three ambulation aides working seven days per week.

**Summary of Use**: The primary physical therapist will only refer appropriate patients to this program. These patients should be of minimal assist or less and be able to ambulate at least 25 feet. In a typical day each of the ambulation aides is able to walk 20–30 patients. Often times these ambulation visits are in addition to a skilled physical therapy session. The success factors for this program are multifaceted. A comparison of baseline data shows an 86% reduction in DVT/PE rates amongst hip and knee replacement patients and an overall LOS decline of 0.49 days for Orthopedics and Spinal cases. The ambulation aide program has helped the Press Ganey Physical Therapy scores increase from a mean score of 85.1 to 86.4. In 2010, 12,644 overall visits were completed by the ambulation aides.

**Importance to Members**: Early and frequent patient mobility will contribute to a reduction in length of stay, an improvement in quality metrics, and an improvement in the patient experience. The challenge for physical therapists in the acute care setting is deciding how to meet institutional demands and provide the necessary clinical care to patients. The adoption of an ambulation aide program has allowed for our department to achieve these goals. Without the adoption of this program these mobility sessions would never have been completed. All acute care institutions should seriously consider this model.

**Risk Factors Associated with Sternal Complications in Patients Following Open Heart Surgery and Implications for Activity Precautions**

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**Purpose/Hypothesis**: The processes that occur with normal sternal healing and potential complications related to median sternotomy are important in physical therapy management. The premise of patients following sternal precautions or specific activity restrictions is the belief that avoiding certain movements will reduce risk of sternal complications. The purpose of this study was to identify risk factors associated with sternal complications in patients status post median sternotomy.

**Number of Subjects**: A total of 18 studies were included in this systematic review of literature spanning a 15 year period from 1996 to present.

**Materials/Methods**: A review of literature was conducted using PubMed and CINHAL databases. Search terms included “median sternotomy complications,” and “sternal dehiscence.” Limits were set to constrain the search to clinical trials and randomized controlled trials published in English. References of resulting papers were also reviewed. Criteria for study inclusion were endpoints of sternal dehiscence, disruption, nonunion or mediastinitis. Studies examining only superficial incisional infections at the sternotomy site were excluded.

**Results**: In compiling data risk factors associated with median sternotomy complications were categorized as primary (identified by multiple research studies) or secondary (identified by 1-2 research studies). Primary risk factors included: high body mass index, chronic obstructive pulmonary disease, bilateral internal mammary artery grafting, diabetes mellitus, rethoracotomy, increased blood loss, higher disability classification, smoking, prolonged cardiopulmonary bypass and or surgical time, peripheral vascular disease, and female gender with large breast size. Secondary risk factors included: decreased sternal thickness, longer ICU length of stay, time of surgery, antibiotic administration > 2 hours presurgery, staple use for skin closure, impaired renal function,
immunocompromised status, closure by noncardiovascular surgeon, cardiac reinfarction, inadvertent paramedian sternotomy, emergency surgery, ACE inhibitor use, duration of temporary pacing wires, septic shock, and depressed left ventricular function.

Conclusions: Many variables highly associated with sternal wound complications were identified in this study. Peri-operative factors can put a patient at increased risk for complications and these should be considered when determining appropriate activity for patients following median sternotomy.

Clinical Relevance: We propose that the optimal degree and duration of postsurgical precautions should be based on an individual patient’s characteristics, including number and type of risk factors for sternal complications, which would enable physical activity to be targeted to particular limitations rather than restricting specific functional tasks and physical activity. Such patient-specific sternal precautions focusing on function may be more likely to facilitate recovery after median sternotomy and less likely to impede it.

Efficacy of Teaching Critical Care Physical Therapy Related Information Using Interactive, Self-paced, Computer Instruction Modules.

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Purpose/Hypothesis: Physical therapy students and physical therapists are often presented with independent learning materials to obtain information because it can be flexible and time efficient. Current information regarding critical care diagnostic tests and medical equipment is important not only for students but for physical therapists new to the acute care environment. The purpose of this study was to examine the efficacy of presenting critical care content via interactive, self-paced, computer instruction modules. A secondary purpose was to evaluate the influence of preferred learning style on the efficacy of this instruction method.

Number of Subjects: The study included students enrolled in the second year of a Doctor of Physical Therapy curriculum at a single university. A total of 34 students were eligible for participation in this study and we had 100% enrollment.

Materials/Methods: Since all data collection was anonymous and study participation involved minimal risk, this study was deemed exempt by the university’s institutional review board. Study participants were provided: 1) an instruction sheet, 2) a background information form, 3) a written pretest examination, 4) written posttest examination, 5) 2 self-report learning style inventories, and 6) disc with computer modules. The pretest and posttest included 44 multiple choice questions. Learning style inventories were used to determine study participants’ preferred mode of learning. The 5 computer modules included critical care diagnostic tests (Cardiac, Pulmonary, and Other) and medical equipment (Support and Monitoring). We calculated descriptive statistics and used a paired t-test to determine differences in pretest and posttest scores. Differences between score improvement (posttest – pretest) between visual learners and other learners were analyzed using an un paired t-test. (P < 0.05).

Results: Study participates were 26 + 3 (mean + SD) years old and 65% were female. The study participants were predominately visual learners (53%), but also included 26% kinesthetic, 15% auditory and 6% mixed learners. Posttest scores (83 + 8%) were significantly greater than pretest scores (63 + 8%). We found no difference in score improvement between visual and other learners (non-visual).

Conclusions: Baseline knowledge of physical therapy students is limited in the area of critical care diagnostic tests and medical equipment. The results of this study suggest that presenting physical therapy related critical care content via interactive, self-paced, computer, instruction modules is a viable option. Furthermore, non-visual learners are equally as good at garnering information in this format as visual learners.

Clinical Relevance: Use of independent learning materials to obtain information allows great flexibility and time efficiency in a variety of physical therapy settings. Providing content regarding critical care diagnostic tests and medical equipment using interactive, self-paced instruction modules is a viable option.

The Mind-Body Workout - Development of a Pocket Guide to Relaxation for use by Physical Therapists in the Acute Care Setting

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Purpose: The Acute Care Physical Therapist (PT) often treats patients who experience stress, pain, fear, or anxiety due to serious health problems. Frequently, this hampers the patient’s progress and may preclude meaningful participation in physical therapy. Adherents of the Mind-Body Connection recognize the positive and/or negative impact of feelings, thoughts and outlook on our bodies. Indeed, studies have shown that the performance of relaxation and guided imagery techniques can counteract or decrease these symptoms. By eliciting a relaxation response these techniques can also boost the immune system and hasten recovery. Complementing their traditional role, PTs can guide patients to a more relaxed state of mind thus increasing participation and improving mobility and function. To this end, the authors have partnered with NYULMC’s Department of Integrative Health and a multidisciplinary team of social workers, nurses, and PTs to create a pocket guide, The Mind-Body Workout. The guide presents specific techniques: deep-breathing, progressive muscle relaxation (PMR), and guided imagery for clinicians to use at the bedside with options for brief (1 minute) or extended (5 and 10 minutes) scripts.

Description: 1. A 66 year old female, post-op day 2 from a partial lung resection via thoracotomy, was experiencing incisional and chest tube site pain at 10/10 on theVAS when her epidural pain control was switched to oral analgesic. Anxious and unable to take deep breaths, her SpO2 was 90% on 2L/min nasal cannula at rest. The PT used a 1-minute script called 4x4x8 Breathing that allowed the patient to gain control of her breathing. Next, a 5-minute guided imagery technique was employed wherein the patient imagined herself relaxing in the park with her dog. Her pain reduced to 4/10, her SpO2 increased to 95% on 2L/min, and she was able to participate in chest physical therapy and ambulation. 2. A 79 year old male, post-op day 2 from a left hip ORIF was experiencing 8/10 hip pain prior to physical therapy. The
PT employed a 5-minute PMR technique focusing on relaxation of major muscle groups and simultaneous deep breathing. As pain decreased to 2/10, the patient participated in bed mobility, transfers and gait training with a rolling walker.

Summary of Use: By discharge from the Acute Care setting, Patient No. 1 was independently performing the 4x4x8 Breathing Technique whenever anxious or breathless. She was able to go home without oxygen and ambulated independently for household distances. Patient No. 2 was accepted to Acute Rehabilitation and planned to incorporate PMR into his daily program.

Importance to Members: PTs know firsthand the negative physical effects of stress, pain, fear, and anxiety and are thus well positioned to teach patients about the Mind-Body Connection. The Mind-Body Workout Pocket Guide is specifically designed for the time limitations of the Acute Care Setting, providing quick and easy relaxation scripts for use by PTs to ultimately increase patient participation and improve function.

Outcomes of Patients Receiving Physical Therapy at a Long Term Acute Care Hospital (LTACH)

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Purpose/Hypothesis: Long term acute care hospitals (LTACHs) have emerged to provide care for patients requiring extended medical care. LTACHs have qualities similar to medical intensive care units (ICU) of acute care hospitals. As with any ICU setting, physical therapists in an LTACH provide interventions to return patients to their prior functional status. While research is emerging to support the role of physical therapy in ICUs, little to no data has been reported on the outcomes of physical therapy in the LTACH setting. The purpose of this project is to describe the functional outcomes of a cohort of patients receiving physical therapy in an LTACH setting.

Number of Subjects: One hundred and twelve patients were consulted for therapy services during this time period. Of the 112 patients, thirty-three (29%) were transferred to the acute care setting and did not return to the facility. Of the remaining seventy nine, 22 patients (20%) transferred to a skilled nursing facility (SNF), 26 (23%) to an acute rehab, 12 (11%) to home, and 19 (17%) transferred to hospice, long term facilities, expired or were discharged from the therapy caseload. Only the sixty patients with a planned discharge contained complete data and were included in this analysis.

Materials/Methods: Physical therapy outcome measures were collected over an eight-month period beginning in September 2010. All physical therapy consults during this time period were included. Functional status was documented using a modified version of the Functional Status Score ICU (FSS-ICU), as adapted from previously published research. The pre-ambulation categories included rolling, supine to sit transfers and sitting, while the ambulation categories included sit to stand transfers and ambulation. Each category was rated on a zero to seven scale, with zero corresponding to “unable to perform” and seven referring to complete independence. The FSS-ICU was completed at baseline and every two weeks until discharge.

Results: FSS-ICU ratings for the sixty patients significantly improved from admission to discharge. The pre-ambulation categories increased from 3.3±2.0, 2.6±2.0, 3.5±2.0 to 4.5±1.8, 4.1±1.9, 5.0±1.6 (p < .001). The ambulation categories also improved significantly from 1.7±1.8 and 0.8±1.3, to 2.9±2.1 and 2.5±2.2 at discharge (p < .001). An ANCOVA was used to compare scores between the three discharge settings (acute rehab, home, SNF) with admission scores used as a covariate. Significant differences were found between the three discharge settings for supine to sit, sit to stand and the ambulation categories (p=0.01, 0.04, and 0.03).

Conclusions: Patients receiving physical therapy interventions at an LTACH demonstrate significant improvements from admission to discharge using the modified FSS-ICU. The transfer and ambulation categories were found to discriminate best between those patients discharged to home, a SNF or a rehab setting.

Clinical Relevance: This preliminary study using the modified FSS-ICU demonstrates success in documenting the functional gains of patients receiving physical therapy in an LTACH setting.

A Breath of Fresh Air: A Case Study of a Patient with Acute Respiratory Distress Syndrome in the Intensive Care Unit.

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Background & Purpose: Acute respiratory distress syndrome (ARDS) boasts a 25-40% mortality rate. Patients (Pts.) with ARDS typically undergo an extensive stay in the intensive care unit (ICU), involving life support medication, a ventilator, and, at times a prone ventilator bed(1-3,5,10,12). Studies of survivors 1-2yrs later reveal long term effects; multi-system impairments, decreased function, quality of life, and increased reports of disability(6,7,11). Once the respiratory crisis has been controlled, early ICU intervention, strength, endurance, ROM, and chest PT, has been shown to be safe and effective in improving pt. outcomes(4,8,9,13). Pts. typically progress slowly, requiring increased time to meet functional goals.

Case Description: A 63-yr old female presented with acute onset shortness of breath, cough, lack of stamina x1 month leading to diagnosis of ARDS. Past medical history was significant for recent respiratory infection, mild asthma. Pt. exhibited poor gas exchange on room air, non-re-breather, CPAP, was intubated and sedated. Diagnostic tests revealed an infection, signs of heart failure, acute renal failure (ARF), bilateral diffuse airspace consolidation with pulmonary edema. Hospital course complicated by SpO2 90% on the ventilator, RotoProne bed, (+) p-ANCA, vasculitis, pulmonary hemorrhage, plasmapheresis, continuous venovenous hemodialysis, multi-organ system failure, tracheostomy, pneumothorax with chest tube placement, and acinebacter pneumonia. PT evaluation was performed 14 days after admission, consisting of PROM x4/extremities, chest PT, pulmonary hygiene, and secretion clearance while ventilator dependent. PT resumed after tracheostomy, 23 days after admission, including pulmonary care and low-level therapeutic exercise(therex): AROM, AAROM, and PROM x4/extremities. Pt.’s treatments progressed to controlled...
breathing, manual facilitation, and more intense therex. Once pt. demonstrated stable vital signs during therex, rolling was trialed, then edge of bed, on days 33 and 34 after admission. Pt. required 1 person assist and increased rest periods due to tachypnea, poor breath control, demonstrating improved tolerance and increased time edge of bed at subsequent trials.

Outcomes: Pt. was discharged to a long-term acute care hospital (LTACH) 37 days after admission, and was able to perform bed mobility, tolerate 11 minutes sitting edge of bed with 1 person assist. After a few months at the LTACH, the pt. transitioned home as an unlimited household ambulator with continued home care.

Discussion: Pt. presented to the ER with labored breathing and fatigue, underwent a cascade of events including ARDS, ARF, and development of iatrogenic complications from the ventilator. The pt. woke from a sedated state barely able to actively move her toes and fingers. With a progressive exercise program and chest PT, she improved her strength, endurance, gas exchange, breath control, and balance to sit edge of bed. Further studies to investigate the role of PT in management of ARDS are warranted.

Progressing PT through the continuum of acute respiratory failure - mechanical ventilation, ECMO and lung transplantation: A case study

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Background & Purpose: Recent research demonstrates the benefits of early physical therapy (PT) in patients with critical illness. As a result, PTs are increasingly consulted for patients in the intensive care unit (ICU) who are receiving advanced life support, including extracorporeal membrane oxygenation (ECMO). Potential indications for ECMO include assisting with oxygenation and carbon dioxide removal when respiratory failure is refractory to mechanical ventilation alone. In these circumstances, ECMO may provide life support while allowing for recovery of lung function or while awaiting lung transplantation. In patients on ECMO, potential barriers to PT include complex medical equipment and illness acuity. There are little clinical data published on the feasibility and safety of PT in patients requiring ECMO.

Case Description: A 25 year old female with cystic fibrosis (CF) was transferred to our medical ICU from an outside hospital with a CF exacerbation and pneumonia. On ICU Day 1, PT was consulted and airway clearance was initiated. On Day 2, due to progressive respiratory failure, the patient was started on mechanical ventilation via an oral endotracheal tube. Over the next 27 days in the ICU, the patient received daily PT including airway clearance, therapeutic exercise, and mobilization. On ICU Day 14, she ambulated her greatest distance (240 feet) while receiving 100% oxygen and 8 cmH2O of positive end expiratory pressure (PEEP) via a portable ventilator. She was subsequently listed for lung transplantation. Given refractory hypoxemia and hypercarbia, she was transferred to the cardiac surgical ICU (CSICU) for initiation of veno-venous ECMO on Day 22. On Day 24, while on ECMO, the patient actively performed in-bed cycling for 30 minutes and a plan was developed for progressive PT. On Day 25, PT was deferred due to refractory hypoxemia on ECMO for which an atrial septostomy was performed with subsequent improvement in oxygenation. The patient underwent bilateral orthotopic lung transplantation on Day 26 and continued PT as she moved from CSICU to the step-down unit.

Outcomes: Despite the patient’s worsening respiratory failure, increasing ventilatory settings and ECMO, intensive PT, including ambulation and in-bed cycling, was feasible with no adverse safety events. The patient received 36 PT visits over 26 ICU days (mean of 1.4 per day) before lung transplantation, and continued PT starting the day after transplant surgery.

Discussion: PTs play an important role in the rehabilitation of critically ill patients and in the pre-operative management of lung transplantation by promoting optimal physical function. This case study demonstrates feasibility and safety in providing a customized PT program for a complex patient with severe respiratory failure, prolonged ICU stay, ECMO, and subsequent lung transplantation. Further research is needed to rigorously evaluate the safety, feasibility and benefits of rehabilitation for patients undergoing ECMO.

The Use of Decompressive Wrapping to Reduce Scrotal Edema in Acute Care

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Background & Purpose: Scrotal edema can be a painful, debilitating complication in hospitalized patients. Scrotal edema can cause pain, skin breakdown and functional deficits. Treatment typically includes diuretics for fluid management along with supportive measures, such as jock straps or rolled towels for elevation, which have limited success. Decompressive wrapping (DW) has been used successfully in patients with lymphedema, with limited research documenting use of this intervention for scrotal edema. Therefore, the purpose of this case series is to describe the use of DW in hospitalized patients with scrotal edema and describe their outcomes.

Case Description: Sixteen patients from a 728-bed hospital received physical therapy for DW over six months. Patients were considered for scrotal wrapping by the following criteria: scrotal edema causing pain/limiting mobility, presence of a foley catheter, and consent of the patient/medical team. If necessary, the decision for foley catheter placement was determined by collaboration between the therapist and the medical/surgical team. Patients were ineligible if they had an active, untreated infection or uncompensated heart failure. All therapists who provided the scrotal wrapping were trained by nationally certified lymphedema therapists. Each patient received a minimum of one session with a subsequent session within twenty four hours to remove the bandages, inspect the skin and assess if rewrapping was indicated. Outcome measures were assessed at each session including scrotal circumference, pain and functional mobility. Scrotal circumference was measured in centimeters using a tape measure around the largest diameter of the scrotum with the patient in a
comfortable, reproducible position.

**Outcomes**: Of the sixteen patients, one patient was excluded from the comparison as the DW was for penile edema and three were excluded for incomplete data. The remaining twelve patients received an average of 2.4 sessions (range 1 to 8). After one session of DW, there was a significant decrease in scrotal circumference from 39.5±9.8 to 30.4±8.6 cm after twenty-four hours of DW. After the bandages were removed on the second visit, therapists performed a reassessment of scrotal circumference, skin condition, pain/mobility issues and patient tolerance to the DW. Based upon this assessment, the therapist would determine if further rewrapping was warranted. Pain deficits were minimal in our sample, with nine of the twelve patients reporting no pain at initial assessment. Although it is unlikely to be related, one patient developed hematuria, with DW discontinued.

**Discussion**: This case series demonstrates the benefits of using one to two DW sessions to reduce scrotal edema in hospitalized patients. It is yet to be determined what effects, if any, the reduction has on subjective complaints of pain, measures of functional mobility, and wound prophylaxis. To further evaluate these relationships, a prospective study is proposed to further investigate the effects of this treatment for hospitalized patients with scrotal edema.

**A Medically Complex Patient after Quadruple Amputation: A Case Study Examining the Provision of Acute Rehabilitation in the Acute Hospital Setting**

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**Background & Purpose**: As medicine evolves, patients are able to survive extreme lifesaving measures that often result in significant impairments and functional compromise. Difficult economic times affect patients’ insurance and social situations. Thus, physical and occupational therapists are frequently faced with the challenges of providing extensive rehabilitation services in the acute care setting despite limited resources. Creativity, flexibility, and a coordinated interdisciplinary approach among caregivers focusing on the patient’s rehabilitation goals as well as medical issues are the keys to successful rehabilitation outcome with these complex patients.

**Case Description**: This case describes a previously independent, 53 year-old female who presented with a myocardial infarction, requiring an emergent coronary artery bypass graft and ventricular septal defect repair. Postoperatively, the patient presented with cardiogenic shock requiring an intraaortic balloon pump and vasopressors to sustain life. Ischemia developed in her feet bilaterally, resulting in bilateral below knee amputations. One month later, ischemia resulted in amputation at the left wrist and at the right metacarpals. To improve vascularization, her right residual upper extremity was grafted to her right groin for 2 weeks, rendering her dependent in all mobility and activities of daily living. During the 100 day hospitalization, the patient progressed through 5 phases of medical intervention and corresponding physical, cognitive and emotional impairments. During the first 2 phases, the therapists’ ability to mobilize the patient was affected by conflicting precautions resulting from her sacral wound and groin graft. Despite the resolution of medical issues in the third phase of care, she was not discharged to the next level of care due to insurance issues. The rehabilitation goals, interventions and functional progress will be presented by phase. Common themes emerged, such as interdisciplinary communication and consensus, customization of treatment schedule, emotional toll on the patient and caregivers and uncertainty regarding reimbursement and disposition.

**Outcomes**: At discharge, the patient was able to transfer with a transfer board, feed and groom and sit edge of the bed unsupported with supervision. The patient performed bed mobility at modified independence level and was able to sit in a highback wheelchair for 5 hours limited only by sacral wound precautions. After attaining Medicaid benefits, the patient was discharged to an acute rehabilitation center, achieving her goals of independent powered mobility and return to the community.

**Discussion**: Delivery of intensive rehabilitative services in the acute care setting requires the entire health care team to shift focus from the medical issues to the rehabilitation goals and PTs and OTs are poised to lead the interdisciplinary team to success.
Interdisciplinary Care Approach in the Neuroscience Intensive Care Unit and its Effect on Early Mobilization

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Purpose: Using interdisciplinary collaboration, create an algorithm to improve mobilization in the neuroscience intensive care unit (NSICU). Critically ill patients can have limited mobility due to multiple etiologies. Skeletal muscle strength decreases by 1/3 grade per day and up to 50% reduction of the total muscle mass in two weeks of bedrest. Patients on the NSICU are at an even greater risk of complications due to their acute neurologic insult.

Description: Physical Therapists collaborated with the nursing staff in the Neurosciences Intensive Care Unit to develop an algorithm to assist in the early implementation of the hospital's initiative of a mobility protocol. Key elements of the patient centered care are initiated upon patients' admission and include an algorithm, protocols and interventions of a dedicated group of physical therapists specially trained to care for the neuroscience patient. This algorithm will demonstrate the interdisciplinary approach the care of the stroke population within the NSICU to increase their mobility. Specific disciplines and their involvement are identified.

Summary of Use: The importance of an interdisciplinary approach for the care of the neuroscience critically ill patient is evident. The collaborative approach to creating an algorithm to improve mobilization in the NSICU demonstrates the patient centered initiative geared towards optimizing patient care. The quality of life of the patient as it pertains to increased mobility, decreased complications of prolonged bedrest, and optimal discharge setting may be improved by this process.

Importance to Members: As physical therapy develops as a profession and we strive to become a strong force in the primary care realm, it is of great importance to understand and define our role within the highly specialized Neuroscience critical care environment. This poster will allow therapists to embrace their involvement in the critical care unit as it pertains to the interdisciplinary team approach during the care of the critically ill stroke patient. The continued monitoring and treatment of patients who are diagnosed with ischemic and hemorrhagic stroke is essential in the functional outcomes of these individuals. This algorithm can be utilized as a guide for the therapist to provide services in the critical care unit as well as to educate other members of the interdisciplinany team in the role of the Physical Therapist within the critical care environment. Improved physical therapy intervention will optimize individualized patient center care.

Early Mobility and Activities in a Patient with Acute Respiratory Distress Syndrome in the Intensive Care Unit: A Case Study

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Background & Purpose: The ARDS Foundation defines Acute respiratory distress syndrome (ARDS) as an acute, inflammatory process that results in moderate/severe loss of lung function. Due to the lung damage associated with this condition 90% of patients are intubated within 72 hours and admitted to the intensive care unit (ICU). There is an overall mortality rate of 42% and only 34% of patients discharge directly home without further rehabilitation needs. There are multiple barriers to early mobility in the ICU. During prolonged immobilization patients develop neuromuscular abnormalities and hospital acquired diseases. Perme states that one week of bed rest may decrease muscle strength by 20% and Baily reports adverse events occur in less than 1% of patients that receive early physical therapy (PT) interventions in the ICU. This case study supports the practice of early PT intervention in the critically ill patient with ARDS on mechanical ventilation in the ICU.

Case Description: 35-year-old male was transferred to University of Michigan Hospital (UMH) secondary to increased respiratory distress after a prolonged hospitalization for pseudomonas pneumonia. Past medical history included hypertension and obesity (200 kg). He was independent in all mobility prior to first admission. Upon admission he was diagnosed with ARDS, placed on continuous renal replacement therapy, received a tracheotomy, and spent 25 days on a ventilator. PT was initiated on day 9 when ventilator settings/laboratory values were appropriate (PEEP 24, P/F 60%). Total length of stay was 37 days during which he received 18 physical therapy sessions. Upon examination he was A&Ox2, denied numbness/tingling in hands/feet, manual muscle testing of bilateral upper/lower extremities strength was graded as 2/5. He was evaluated for acute inpatient rehab and did not meet the clinical standards so he was discharged home with a wheeled walker and assist from family. Gait speed and TUG were the standardized outcome measures used to assess progress.

Outcomes: Functional milestones were graphed and demonstrated a
clear improvement in functional mobility. Activity tolerance was directly associated with hemoglobin/hematocrit values. Upon discharge bilateral upper/lower extremity strength was graded as 4/5. Weaning ventilator settings were directly correlated with overall muscle strength/endurance.

**Discussion**: When treating a mechanically ventilated patient with ARDS proper knowledge and teamwork among all members of the interdisciplinary team is an important factor to a positive patient outcome. This case report supports that a young, previously high functioning individual with ARDS benefited from a safe and feasible early mobility PT program in the ICU.

**Objective Gait and Upper Extremity Assessment in a Patient with Idiopathic Normal Pressure Hydrocephalus: A Prospective Case Study**

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**Background & Purpose**: Physical therapists in the acute care setting are often asked to assist in the process of determining whether patients with idiopathic Normal Pressure Hydrocephalus (NPH) are likely to respond to a ventriculoperitoneal shunt surgery. Patients with NPH present with a classic triad of symptoms easily remembered by three W:s: NPH patients are Wobbly (gait disturbance), Wet (urinary incontinence), and Weird (mental status changes). Gait disturbance is typically the first symptom to improve with treatment. Physical therapists are consulted to perform a gait assessment prior to and following the temporary removal of cerebrospinal fluid (CSF) from a patient diagnosed with NPH. While improvement in gait following CSF removal is accepted as a key indicator of responsiveness to cerebrospinal fluid removal, there is not consensus about which gait measures therapists should use. Additionally, there is evidence in the literature that the upper extremity is also affected in NPH. Therefore, objective upper extremity assessment before and after CSF removal may be useful as an adjunct to measures of gait in predicting shunt responsiveness in NPH patients. The purpose of this prospective case study is to demonstrate the value of using three objective measures of gait that are appropriate for use with the NPH population. Measures used were the Timed Up and Go test, Comfortable Gait Speed, and stride length. This study also demonstrates the application of a Line Tracing test, an upper extremity measure for use as an adjunct to gait testing in NPH patients.

**Case Description**: The patient chosen for this report was an 88 year old male admitted to the hospital with a diagnosis of idiopathic NPH. Physical therapy examinations were performed before and after temporary CSF removal, before and after ventriculoperitoneal shunt surgery, and at six weeks post-shunt surgery.

**Outcomes**: The patient had a positive response to the Tap Test in all three measures of gait, and the improvements were considered to be of clinical importance to both the therapist and the patient's caregiver. The patient also improved significantly on the upper extremity test. The patient underwent ventriculoperitoneal shunt surgery and experienced a transient decline in function in the early post-operative phase, but regained function quickly and was discharged to home on post-operative day seven. At six weeks post-shunt surgery, the patient was significantly improved in gait, urinary continence, dementia, and upper extremity coordination.

**Discussion**: The use of objective measures of gait in this case study provided valuable information to the healthcare team, and assisted in the decision to proceed with shunt surgery. This case study points to the value of applying objective measures of gait when evaluating the patient with NPH. It also highlights research opportunities in determining clinically important changes in gait performance as well as objective upper extremity assessment in NPH patients.

**Enhancing quality by adding Physical therapy to Intensive Care Unit order set: Early mobility culture change in SICU**

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**Background & Purpose**: Prolonged Intensive Care Unit (ICU) stay has many devastating sequelae for patients including paresis, muscular weakness and respiratory compromise that frequently results in long term functional impairments. Strongly contributing to these impairments is the typical medical management of deep sedation and bed rest for critically ill patients. There is a growing body of evidence focusing on initiating early mobility to improve patient outcomes but little is focused on the process of physical therapy (PT) and nursing partnership. Recent research has been focusing on initiating early mobility to improve the long term effects of patients in critical care units.

**Case Description**: To accelerate early mobility for these ICU patients a new team approach at University of Michigan Health System was initiated that included PT consults within the order set for every ICU patient and increased nursing involvement focused on mobility. Intervention was initiated as soon as the patient was able to tolerate progressive activity. PT along with nurses developed three phases of rehabilitation which began with range of motion in bed along with airway clearance and as patients progressed towards more hemodynamic stability included aggressive functional mobility.

**Outcomes**: With initiation of early mobility patients were found to have decreased hospital length of stay by approximately 3.59 days and increase in functional mobility prior to discharge.

**Discussion**: Literature supports a standardized mobility program with all members of the multidisciplinary team participating in order to improve functional outcomes and reduce
Improving the Care of Patients who have Difficulty Weaning from the Ventilator in the Acute Care Setting

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Purpose: Patients who have difficulty weaning from the ventilator have the potential for an increased length of stay, and this patient population lacked a consistent acute rehabilitation therapy standard of care at our facility. Acute therapies aspired to provide consistent, effective, evidence-based examination and interventions in order to maximize function with the expectation of expediting weaning from ventilation and ultimately discharge from the hospital. In addition, the therapists sought to improve the collaboration and education among their colleagues and other team members (i.e. nursing staff, respiratory therapists, and physicians) to improve care for this patient population.

Description: Acute therapies staff identified the needs of this patient population, the resources required, equipment needed, and barriers that are encountered. A survey of our physicians, nurses, and respiratory therapists was conducted to ascertain their perceptions of physical therapy’s role with these patients and therapy’s effectiveness and consistency when providing examination and intervention. Also, a survey of our own staff was performed to discover their comfort level with ventilators in general and progression of mobility with this patient population. Other large area hospitals were contacted to determine what protocols/standards of care these facilities utilized for this patient population. It also identified interventions that should be considered as well as guidelines with progression of mobility. General safety guidelines for when the team should be contacted were developed, and considerations were listed for when therapy should or should not take place during a ventilator wean. An informational handout on ventilator terminology was also completed.

Importance to Members: Consistency and effectiveness of physical therapy will be a key factor in maximizing function, expediting ventilator weaning and reducing length of stay in the acute care setting for this patient population. In addition, improvement in collaboration and education with acute care therapists and other health care team members could significantly improve patient care for this population.

Moving Towards a Living, Breathing Acute Care Curriculum

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Purpose: Direct access, autonomous practice, fragmentation of the healthcare delivery system, regulatory constraints, and reduction in hospital length of stay have each contributed to the need for physical therapists to make rapid, critical decisions in light of patient / client medical fragility and / or complexity. In such, increased responsibility is placed upon academic curricula to meet the educational and clinical practice needs of future physical therapists. This poster highlights the actions taken to revitalize the “acute care” instruction and student learning opportunities within an entry-level DPT program. Monitoring the success of such modifications is planned using both qualitative and quantitative variables.

Description: Analysis of teaching pedagogy and student outcomes
promoted identification of several areas wherein curricular enhancement would likely be of benefit. These domains include: alignment of teaching objectives with the knowledge, skills, and behaviors reflective of the acute care clinician (as outlined in the Acute Care Physical Therapist Practice Analysis); improved use of simulation for purposes of experiential learning; improved content integration amongst programmatic courses to ensure teaching efficiency and to overtly highlight patients and clients with acute health needs across varied practice settings; streamlining and redistributing instructional content to ensure time for development of higher-order critical analysis skills; implementation of timed and/or unexpected challenges to ascertain student ability to respond safely and appropriately to real-time fluctuations in patient medical status; reorganization of student internships to allow hospital-based experiences later within the curriculum; development of improved partnerships with community facilities; and obtainment of core faculty expertise in acute care to ensure continuity of instruction and visibility for the acute care clinician.

Summary of Use: The ability to introduce and implement a relevant acute care curriculum required human and fiscal resources, as well as a philosophical paradigm shift for both faculty and students. A change in mindset was required wherein acute care was no longer viewed solely as a practice setting, but rather as a phase of care along the medical continuum; wherein hospitals were no longer viewed as the prototypical setting requiring limited physical therapy knowledge or skill; and wherein time within the curriculum was reserved and valued for instruction on the medically complex.

Importance to Members: It is the hope that the curricular modifications undertaken will increase student comfort when interacting with the medically fragile, as well as student open mindedness to seeking careers in settings offering rehabilitative services to the medically complex. Student performance on internships, NPTE scores, and employer survey data on the extent of mentoring required of the new graduate will provide further evidence of the impact of such change.

The management of postoperative pain for a patient following total knee arthroplasty using mirror therapy: a novel case report
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Background & Purpose: The number of people seeking total knee arthroplasty (TKA) for osteoarthritis is expected to rise considerably in the coming decades. Recently, the neuromatrix pain theory has described multiple factors influencing pain perception. Mirror therapy (MT) has been shown to effectively reduce chronic and experimentally induced pain. Following TKA, a primary impairment is pain; the potential of MT to alter acute postoperative pain has not been discussed in peer-reviewed literature. As theorized, it is probable these patients have altered neurophysiological structure and function. The purpose of this case report is to describe the pain perception and functional outcomes in a patient post TKA utilizing MT in conjunction with standard medical and physical therapy interventions.

Case Description: A 63 year old female with a history of knee osteoarthritis underwent TKA. She had been experiencing chronic knee pain for the previous four years. Following surgery, the patient participated in physical therapy to manage postoperative pain, improve function and increase independence. In conjunction with traditional pain management strategies including pharmacological interventions and cryotherapy, MT was implemented during standard postoperative lower extremity exercises.

Outcomes: Outcomes were measured using a subjective pain rating, active range of motion (AROM) and pain medication usage. The patient’s pain perception using MT was compared to pain levels during AROM without MT. Numeric pain rating scores were provided by the patient throughout a 30 minute treatment session without, as well as, with MT in an A-B-A experimental design format. During supine AROM flexion and extension exercises, pain was rated 7/10 initially without mirror augmentation, 3/10 during MT, and 8/10 after removal of the mirror. Typical of patients following TKA, range of motion and functional progression showed improvements. Subjectively, the patient stated her left leg was “easier to move” during the use of MT.

Discussion: In the past decade, research into MT has grown substantially into clinical application. The changes in numerical pain ratings and subjective report in this case suggest that MT may reduce pain perception following recent TKA. These findings parallel previous research focused on chronic pain that demonstrates the significance of visual sensory input and its effect on pain perception. In conclusion, MT is an innovative adjunct treatment for pain management and seems to have potential value as a pain modifying physical therapy intervention, possibly by altering pain perception in a patient post TKA. Additional investigation seems warranted to investigate expanded MT applications to patients who undergo joint arthroplasty in an effort to improve pain tolerance, function and quality of life for this large and growing population of patients. Physical therapists are poised to become leaders in this endeavor and expand on this encouraging clinical research in the future.

Characteristics of Patients with Poor Functional Outcomes 1 Year Following Coronary Artery Bypass Surgery.
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Purpose/Hypothesis: Patients recovering from coronary artery bypass surgery (CABS) are vulnerable to impaired function due to many factors. Understanding what variables may be predictive of poor functional outcomes following CABS would help physical therapists identify patients at high risk. The purpose of this study was to describe the characteristics and
recovery events of patients with poor functional outcomes 1 year following CABS.

**Number of Subjects**: This multiple patient case report included 4 participants from a larger prospective study of patients recovering from CABS. These 4 patients were selected for secondary retrospective analysis because their scores on the Disability Index (DI) were greater than 1 SD less than the cohort mean. The original study included 28 patients aged 65 or older hospitalized for CABS at a regional medical center.

**Materials/Methods**: Baseline outcome measures obtained prior to hospital discharge included the Heart Surgery Symptom Inventory, Telephone Interview of Cognitive Status, Timed-Up-and-Go (TUG), 2 Minute Walk Test, hand grip strength (HG), and the Timed Sit-to-Stand (STS). Follow-up measurements of recovery course, disability, habitual physical activity level, exercise self-efficacy, and cognitive function were obtained via telephone interview at 3, 6, and 12 months following CABS. Recovery course considerations included use of services, complications, hospital readmissions, and episodes of bed rest. A DI was used to determine dependency, difficulty, and pain with daily activities.

**Results**: Preoperatively, 2 of the patients had DI scores higher than the cohort. For 1 patient, intra-operative variables were dissimilar from the cohort including increased aortic cross-clamp, cardiopulmonary bypass, and surgery time. Many of the baseline characteristics for the 4 patients with poor long term functional outcomes were similar to those of the cohort mean, for example body mass index, hospital length of stay, and number of coronary heart disease risk factors. Three of the patients showed impairment with HG, TUG, and STS as compared to the cohort. Clinical course documented at 3, 6, and 12 months following CABS for each of the 4 patients was remarkable for atrial fibrillation, stroke, pleural effusion, and lung resection.

**Conclusions**: This report of 4 patients with poor functional outcomes 1 year following CABS suggests that some intra-operative or baseline variables might be predictive of future risk for disability. The occurrence of major medical events during the recovery period most likely contributed to impaired function and periods of bed rest in these patients.

**Clinical Relevance**: This study suggests that medical complications following CABS contribute to poor long term functional outcomes. Identifying patients at high risk for loss of function can assist physical therapists in determining need for rehabilitation (or perhaps extended services) and advocating for appropriate and timely referrals.

**Current Research in Critical Illness Polyneuropathy/Myopathy for the Liver Transplant Patient**

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**Background & Purpose**: The objective of this presentation is to provide a review of current research in critical illness polyneuropathy/myopathy, collectively CIPNM, and to apply this information to the patient population of liver transplantation. Differentiating between polyneuropathy and myopathy is not only difficult, but treatment decisions and outcomes are likely to be unchanged with a specific diagnosis. However, polyneuropathy may include distal loss of sensation and/or symmetrical muscle weakness and loss of tendon reflexes. Also associated with symmetrical weakness, myopathy, is a dysfunction in the muscle membrane versus a loss of axonal fibers in polyneuropathy. Statistics vary on the prevalence of CIPNM, but it is agreed upon that the primary causal factors are mechanical ventilation, sepsis, steroid use and multiple organ failure (MOF). Post-operative liver transplant patients require at least a short ICU stay, mechanical ventilation, and immunosuppressant drugs that increase the chances for CIPNM.

**Case Description**: The patient is a 19 year old male who underwent a liver and kidney transplant. His past medical history is significant for Cerebral Palsy and Budd Chiari syndrome, which causes hepatic vein occlusion. Prior to his hospitalization, the patient was independently functioning with a Kaye Walker. His hospitalization leading up to and after transplantation included respiratory failure with multiple vent weans, severe sepsis, and a subdural hematoma with seizures. Further medical management included a tracheostomy, and continuous dialysis filter. Due to these complications, the patient had an interrupted physical therapy course that fluctuated daily based on the patient's condition. As the hospitalization progressed, the patient demonstrated signs of CIPNM, primarily of the lower extremities.

**Outcomes**: At the time of discharge from the ICU, the patient was ready for acute rehab instead of long term acute care. He was sitting on the side of the bed for 10 minutes with minimum assist. His progress will continue to be monitored in pediatric acute rehab.

**Discussion**: The cost of critical care in the United States accounts for approximately $90 billion. Furthermore, signs of CIPNM can be seen as early as 4 days into the ICU stay. A comprehensive knowledge of the current research could potentially decrease the extended rehabilitation course associated with this illness. Therefore, information gained from research and experience in treating the above patient has led us to consider a proposal for treatment of liver transplants within the IU Health system. We are proposing daily treatments, progressing to BID when the patient is clinically ready. Transfers will be initiated when the patient is providing purposeful responses to verbal stimulation, assuming there are no contraindications to mobility. In regards to the importance of CIPNM to PT, the authors S. Pati et al. stated it best by saying, "In a majority of cases physical therapy is the only effective rehabilitation treatment available".

**Increased Gait Velocity and Improvements in Functional Walking Category Following Reserve Velocity Gait Training: A Pilot Study**

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Purpose/Hypothesis: The benefit of increased gait speed in the geriatric population is evident. Research has shown that each 0.1 m/s of improved gait speed increases survival in older adults. Two types of gait speed include self-selected gait speed (SGS) and reserve gait velocity (RGV). SGS refers to gait velocity that a person attains when walking without urgency/fatigue, and RGV refers to any gait velocity that an individual can attain that is faster than SGS. The majority of literature concerning reserve velocity gait training (RGT) has been completed with adults who have sustained stroke. The primary purpose of this study was to investigate the effect of reserve velocity gait training on self-selected gait speed in a cohort of older adults admitted to an acute rehabilitation center. Secondly, an investigation of the effect of RGT on Perry’s Functional Walking Categories in this same population was performed. We hypothesized that training RGV would result in greater gains in functional walking speeds.

Number of Subjects: 14 patients referred for general post-acute rehabilitation.

Materials/Methods: The inclusion criteria were age greater than 55 years, a functional level of contact guard assist or better during a 50 ft of SGS, and a FIM score of 5 or above in cognition. Patients were excluded if the attending physician ordered activity restrictions due to acute or unstable cardiac morbidity. Consented patients were assigned to groups sequentially. The experimental group received 5 days of >50% of gait training at RGV, with the remainder of gait training administered at SGS. The control group received 5 days of >50% of their gait training at SGS. Therapeutic exercise, functional training, and education interventions were not controlled. Outcome measures used were the two-minute walk test (2MWT), 10 meter walk test (10mT), and gait velocity applied to Perry’s Functional Walking Categories.

Results: The gender and diagnostic composition of the groups did not differ. After the assigned interventions, the experimental group made significantly larger improvements in gait speed than controls (RM ANOVA, F(1,12)=20.055, p<0.001). There were no statistically significant treatment-time interactions for 10mT gait velocity, although all patients walked faster after the intervention. Concerning Perry’s Functional Walking Categories, patients in the experimental group achieved a greater functional outcomes in the 2MWT (binomial table analysis, 0.018<P).

Conclusions: The principal findings of this study were: (1) patients who underwent RGT experienced significant improvements in gait speed, measured by the 2MWT and (2) individuals who underwent RGT were significantly more likely to improve Functional Walking Category.

Clinical Relevance: Reserve velocity gait training is a low-cost, accessible intervention that can be utilized in the clinic to potentially increase gait speed. These findings are preliminary and may warrant continued investigation with a larger sample of participants.

A Program to Restore Functional Mobility in a Patient with Morbid Obesity, Critical Illness Polyneuropathy and Respiratory Failure

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Background & Purpose: Research suggests that early mobilization of patients with respiratory failure can reduce or minimize the detrimental effects of prolonged bed rest and mechanical ventilation. Patients with the combined problems of morbid obesity, respiratory failure and critical illness polyneuropathy present substantial challenges to the physical therapist. The purpose of this case report is to present a scenario in which a progressive mobility program was used to gradually restore functional mobility in a patient after a lengthy period of immobility.

Case Description: The patient was a 33 year old male with morbid obesity who was admitted to the hospital with a scrotal abscess. The patient subsequently developed respiratory failure and critical illness polyneuropathy resulting in a prolonged stay in the Intensive Care Unit (ICU). The patient was referred to physical therapy on the 27th day of hospitalization and a progressive mobility program was initiated. At the time of referral the patient had no volitional movement of the lower extremities and was completely dependent for bed mobility.

Outcomes: In the acute care hospital bed mobility improved from dependant to minimum assistance, range of motion at the hip and knee improved by approximately 50%, and strength improved from 1/5 to 2/5. After a lengthy stay in a skilled nursing facility (SNF) the patient gained complete independence, had lost over 300 pounds, and was returned to functionally independent community living.

Discussion: Despite a prolonged period of bedrest, a progressive mobility program was safely implemented for a medically complex patient. A shorter length of stay and considerable cost savings may have been possible if referral to physical therapy had occurred earlier in the ICU stay.

The importance of medical monitoring and modification of exercise prescription in physical therapy for patients with anorexia nervosa: a case report.

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Background & Purpose: Medical instability requiring hospitalization is common in patients with anorexia nervosa (AN). Physical functioning may be impaired due to musculoskeletal, cardiovascular, hepatic, integumentary, and gastrointestinal system involvement. The purpose of this case report is to emphasize the importance of close medical monitoring and exercise modification by the physical therapist (PT) when treating a patient with AN.

Case Description: A 20-year-old female was hospitalized with severe malnutrition, starvation hepatitis, electrolyte abnormalities,
and osteoporosis secondary to AN and diabetes mellitus type 1, with a history of depression and anxiety. At admission she was BMI of 9.5. Medical precautions included a limit to one 30-minute session of physical therapy per day, phosphorus levels above 2.5 for out of room activity, and heart rate to remain < 150 beats per minute (bpm). Minimal assistance was required for bed mobility and transfers. Due to severe weakness, she used compensatory mechanisms including upper extremity assistance to perform lower extremity movement for bed mobility. Resting heart rate (RHR) was 80 bpm and rose to 140 bpm in standing. Blood pressure was monitored during therapy due to risk of orthostatic hypotension. On the second day of her stay, the patient fell in the shower and within the first week developed edema in her feet due to refeeding syndrome, a common risk associated with replenishing nutrition in patients well below IBW. PT interventions de-emphasized traditional exercises to discourage exercise compulsion, and included extensive patient education focused on safety, techniques to decrease anxiety levels, functional training, and prevention of additional skin breakdown. As medical stability improved, proprioception/balance training, endurance and strengthening were added.

Outcomes: After 24 days, at a BMI of 11.6, she entered an inpatient eating recovery center, and was independent in bed mobility and basic bed/ chair transfers. The Performance Oriented Mobility Assessment score of 26/28 and the timed up and-go score of 8.2 seconds, placed her at low-risk for falls. RHR in sitting was 60 bpm and she was able to ambulate 500 feet at a gait velocity of 1.25 meters/ second, with HR averaging 115 bpm. Gait speed indicated she was safe for community ambulation and improved heart rate response reflected gains in medical stability.

Discussion: Activity limitations are common in patients with AN, thus physical therapy in the hospital may be beneficial. Medical stability is often compromised in this population requiring constant observation and vital sign monitoring throughout treatment. Increase in activity including physical therapy progression is contingent upon medical stability and caloric restoration. This case highlights the importance of continuous medical monitoring by the PT to allow for safe participation in physical therapy while prescribing interventions that de-emphasize what is traditionally perceived as exercise.

Many Faces of Simulation: Physical Therapist, Nursing, and Theater Student Collaboration

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Purpose: As physical therapists assume larger roles working with complex, medically unstable patients, adequate preparation by entry-level curricula is paramount. Academic programs may find utility in use of simulation to enhance student learning, especially when no affiliation with a medical center exists and opportunities for exposure to “real patients” are limited.

Description: Physical therapy (PT), nursing, and theater students interact during simulation exercises to determine mastery in meeting discipline-specific objectives. Collectively, faculty develop cases and grading rubrics. While any practice setting can be simulated, the hospital backdrop was selected given lack of exposure to this environment. After a case has been approved by faculty, theater students initiate a structured curriculum to learn how to portray the physical and emotional status of “patient,” “care provider,” and /or “significant other.” Upon calibration of the theater students to the case, PT and nursing students not only offer medical and rehabilitative care to the “student actor,” but also interact in an interdisciplinary fashion. As students in the disciplines lack casual familiarity with each other, the simulation experience becomes more “real.” In the fall, students perform an intervention and psychomotor competence is the primary outcome of record. In the spring, scenarios become more complex (chart review through discharge planning) with increased need for critical analysis (rapid response to acute changes in physiologic status). While psychomotor skills remain important, successful outcomes require greater proficiency in cognitive and affective domains per the learning taxonomy. Encounters are recorded for future viewing, discussion, and reflection. Feedback is triangulated to incorporate all perspectives from the learning exercise.

Summary of Use: Simulation provides a valuable practice opportunity for students, as well as a safe mechanism for evaluating student skill prior to “true” clinical practice. To best reflect the knowledge, skills, and behaviors required of the acute care physical therapist, escalating performance standards and a shift of mastery toward higher order cognitive and affective proficiency was overtly designed. Data is currently being analyzed to determine correlations of the grading rubric with other clinical variables, as well as to better understand student perceptions through reflective practice.

Importance to Members: While true clinical practice does not allow repeat attempts at patient care, the simulated environment provides a safe haven for learning and skill development. Further, it promotes appreciation of the benefits of interdisciplinary care when caring for medically complex patients. Proper practice and preparation produces proficiency. It is this philosophy that governs use of simulation in the acute care curriculum.

The Effects of a Multi-Disciplinary Mobility Initiative on Liver Transplant Patient Outcomes

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Purpose/Hypothesis: The standard of care for liver transplant patients in a large acute care hospital is to provide non-specific out of bed activity orders and to allow patients the majority of opportunities for mobility during physical and occupational therapy sessions. The purpose of this study was to determine if a multi-disciplinary
approach to patient mobility had an impact on 1) incidence of falls, 2) length of stay, and 3) disposition.

**Number of Subjects**: This study included 209 liver transplant patients. One-hundred sixteen patients were included prior to the mobility initiative (group A), and 93 patients were included after the initiative (group B).

**Materials/Methods**: The nursing staff on a transplant special care unit participated in a 30 minute interactive training session led by a physical therapist and an occupational therapist. The nursing staff was instructed in bed mobility, transfers, proper use of gait belts, proper use of walkers, and environmental set-up for safe mobility. Following the training sessions, walkers and gait belts were made available to the nursing staff on that unit. Specific activity orders were placed for each patient by the physician based on the recommendations provided by the physical and occupational therapists. Patients were also individually instructed on mobility expectations and provided with a log to track their activity. Data was collected via database extraction and the hospital’s safety event reporting system.

**Results**: Both groups had similar age and gender distributions, and comparative Model for End-Stage Liver Disease (MELD) scores. The percentage of patient who experienced falls in group A was 6.9% and in group B was 5.38%. The average length of stay for patients in group A was 13.29±8.38 days, and in group B was 10.85±6.41 days (p=0.004). The percentage of patients discharged home in group A was 68.1%, and in group B was 77.42%.

**Conclusions**: The results indicated that there was a decrease in percentage of patients experiencing falls, a decrease in the average length of stay, and an increase in the percentage of patients discharged home after the initiation of the multi-disciplinary mobility program.

**Clinical Relevance**: A multi-disciplinary approach to patient mobility following a liver transplant can help decrease the occurrence of falls post-operatively, reduce length of stay, and increase the rate of return home. Involvement of physical and occupational therapists in the education and training of nursing staff members can improve patient outcomes in this setting.

**Analysis of Practice in Physical Therapy: Acute Care Management**

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**Purpose/Hypothesis**: To examine treatment strategies and patient outcomes in the acute care setting.

**Number of Subjects**: 332 patients in acute care hospitals.

**Materials/Methods**: This analysis of practice included information collected by Regis University Doctor of Physical Therapy students during their acute care clinical affiliations using an acute care outcome tracker developed and modified as part of this study. Descriptive statistics, Wilcoxon sign analyses, Chi Square testing, and correlations were employed to determine differences and associations between diagnostic categories, interventions used, levels of assistance, distances ambulated, and to describe the subject population.

**Results**: The mean age of patients was 63.69 ± 18.54 years. 56% of patients were admitted from home without assistance, 23.5% from home with assistance, 12.4% from an acute care facility, 5.0% from a skilled nursing facility and 0.9% from a rehabilitation facility. Furthermore, 46.7% of patients were divided into two diagnostic categories: post-surgical and general medical. Other diagnoses included cardio-pulmonary, neurological, multiple diagnoses, orthopedic, and oncological. The average number of PT treatment sessions was 6.19±6.32 with 53.3% of all patients having received four PT treatment sessions. The most frequently used intervention on day 1 was PT evaluation (88.4%), gait training on day 2 (69.7%), and therapeutic exercise on day 3 (72.4%) and day 4 (76.3%). Interventions used in significantly different quantities by diagnosis were assistive device or wheelchair prescription (p<.05), and balance training (p<.01) on day 1. Changes in ambulation/mobility distance categories were not different between diagnosis categories and improved significantly between all treatment days (p<.001). Patients in a lower ambulation/mobility distance category were more likely to receive gait and bed mobility/transfer training on all four days (p<0.0001). Those patients not receiving gait training improved significantly between days 1 and 4 on their level of assistance required for bed mobility (p<.05) and transfer (p<0.001).

**Conclusions**: The only interventions where diagnosis impacted frequency of utilization were assistive device and wheelchair prescription wherein patients with neurological or post surgical diagnoses were more likely to receive these interventions, and balance training which patients with neurological or general medicine diagnoses were more likely to receive. Further research is needed to determine if these patients are more likely to require these interventions or if they are more likely to be assessed for the need for these interventions. Gait training appears to be an important intervention initially in acute care, but after 3 days in this setting, gains are diminished. However, it should be noted that patient in the acute care setting, even at time of discharge are only walking approximately 100 feet. Further research is needed to determine if greater gait distances in acute care would be beneficial.

**Clinical Relevance**: This study provides valuable insight into current practices in the acute care setting.
REFERENCES


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