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Original Contribution

Implementation of a novel point-of-care ultrasound billing and reimbursement program: fiscal impact☆,☆☆,★,★★

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ABSTRACT

Objectives: The aim of this study was to determine the fiscal impact of implementation of a novel emergency department (ED) point-of-care (POC) ultrasound billing and reimbursement program.

Methods: This was a single-center retrospective study at an academic medical center. A novel POC ultrasound billing protocol was implemented using the Q-path Web-based image archival system. Patient care ultrasound examination reports were completed and signed electronically online by faculty using Q-path. A notification was automatically sent to ED coders from Q-path to bill the scans. ED coders billed the professional fees for scans on a daily basis and also notified hospital coders to bill for facility fees. A fiscal analysis was performed at the end of the year after implementing the new billing protocol, and a before-and-after comparison was conducted.

Results: After implementation of the new billing program, there was a 45% increase in the ED faculty participation in billing for patient care examinations (30%-75%). The number of ultrasound examinations billed increased 5.1-fold (4449 vs 857) during the post implementation period. The total units billed increased from previous year for professional services to 4157 from 649 and facility services to 3266 from 516. During the post implementation period, the facility fees revenue increased 7-fold and professional fees revenue increased 6.34-fold. After deducting the capital costs and ongoing operational costs from approximate collections, the net profits gained by our ED ultrasound program was approximately $350 000.

Conclusions: Within 1 year of inception, our novel POC ultrasound billing and reimbursement program generated significant revenue through ultrasound billing.

1. Introduction

The use of point-of-care (POC) ultrasound in the evaluation of emergency department (ED) patients has grown rapidly in both academic and private settings [1]. POC ultrasound has emerged as an important tool for rapid diagnosis of serious and life-threatening conditions in the ED [2]. Prior studies have demonstrated that emergency physician-performed bedside ultrasound improves diagnostic accuracy and decreases length of stay [3,4]. The use of ultrasound for procedural guidance has been shown to be cost effective and to decrease complication rates [5]. Bedside ultrasound education has become an essential component of emergency medicine (EM) residency training and residents are required to demonstrate competency in performing bedside ultrasound to meet the Accreditation Council for Graduate Medical Education milestones [6].

The American College of Emergency Physicians (ACEP) Emergency Ultrasound Guidelines outline the scope of practice of emergency ultrasound, training pathways, credentialing, documentation, ultrasound equipment, and quality assurance (QA) process [7]. Successful implementation of an emergency ultrasound program requires financial integration of ultrasound into existing departmental billing and coding. A comprehensive document that addresses emergency ultrasound coding and reimbursement was developed by ACEP and recently updated [8]. This document provides guidance for appropriate emergency ultrasound documentation, current procedural terminology (CPT), *International Classification of Diseases-9* coding, payer policy, and reimbursement. There are significant costs associated with an emergency ultrasound program including physician education, appropriate ultrasound equipment, an image archival system, QA, ultrasound machine, and probe maintenance. The development of ED

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ultrasound billing and reimbursement program is therefore crucial to cover these costs and to provide incentives for emergency physicians who perform ultrasound examinations. To date, very little has been published regarding the financial implications of an ED ultrasound program. The objective of this study was to determine the fiscal impact of implementation of a novel ED POC ultrasound billing and reimbursement program.

2. Methods

2.1. Study design

This is a single-center retrospective study at an academic medical center with an annual ED census of 70 000 visits. The study data were collected during fiscal year 2013. Institutional review board approval was obtained for this study protocol.

2.2. Study setting and population

The study was conducted in an ED with a 3-year EM residency program and a 5-year EM/pediatrics combined residency program with 49 faculty members. The department offers fellowships in ultrasound, Emergency Medical Service, Toxicology, Sports Medicine, and Research. The ED is a level 1 trauma center and provides care to adult and pediatric patients. Radiology department ultrasound services are available 24 hours a day. The ED has had an emergency ultrasound education program since 2003. Performance of focused assessment with sonography for trauma (FAST) was included within the EM core privileges and all EM faculty are granted FAST ultrasound privileges during the initial credentialing process. Hospital credentialing in additional ED point-of-care ultrasound applications is available for emergency physicians and was derived from ACEP ultrasound guidelines (Table 1) [7]. Ultrasound billing was initiated in 2008 using paper documentation but was limited by inconsistent documentation by faculty. An ED coding and billing team has been in place for over 20 years, and a mechanism to keep track of ultrasound billing revenue (both professional and facility fees) exists.

Table 1
Emergency department point-of-care ultrasound privileges

Level 1
1. *Aorta*: to detect abdominal aortic aneurysm
2. *Cardiac*: to assess pericardial effusion, tamponade, myocardial contractility, and intravascular volume status
3. *Renal and urinary bladder*: to detect obstructive uropathy, perinephric fluid, renal trauma, and urinary retention
4. *Superficial*: to detect soft-tissue infection, subcutaneous fluid collection, abscess and foreign body

Level 2
1. *DVT*: to detect lower extremity DVT
2. *First trimester pelvic*: to evaluate for the presence of intrauterine pregnancy or ectopic pregnancy
3. *Thoracic*: to detect pneumothorax and pleural effusion.
4. *Musculoskeletal*: to evaluate joint effusions in adult patients and tendon rupture
5. *Second or third trimester pelvic*: to evaluate the presence of fetal heart rate and fetal movement
6. *Ocular*: to detect foreign body, retinal detachment, lens dislocation, vitreous hemorrhage, and elevated intracranial pressure

Level 3
1. *Gallbladder*: to detect cholelithiasis, signs of inflammation, and common bile duct dilatation
2. *Abdominal*: to detect free fluid and hernia
3. *Scrotal*: to detect fluid and hernia
4. *Non-Pregnant Pelvic*: to detect free fluid, abscess, and foreign body
5. *Vascular*: to assess for pseudoaneurysm, stenosis and peripheral graft patency
6. *Advanced cardiac*: to determine left and right ventricular function and to detect proximal aortic dissection

2.3. Study protocol

Components of our new POC ultrasound billing program [9]:

1. *Web-based image archival system*: The paper documentation system was replaced with a Web-based image archival system (Q-path, Telexy Healthcare, BC, Canada). All ultrasound studies were wirelessly transferred to Q-path from ultrasound systems and were immediately available online for billing. The electronic worksheets used for documenting ultrasound examination findings in Q-path were designed to optimize documentation required for billing. The worksheets included specific components that correspond to the CPT codes. The worksheets also included a drop-down list of all EM faculty with a time stamp to facilitate electronic signature of ultrasound documentation. All staff including EM faculty, residents, and ED coders were trained to use Q-path and given refreshers periodically.
2. *Physician training*: EM faculty and residents were instructed regarding appropriate documentation in Q-path and obtaining required images through a series of emails, lectures, and posted information in the physician charting area. EM faculty were instructed to bill only the ultrasound examinations that are used for medical decision making in the ED. Additionally, emergency ultrasound section faculty and fellows provided ongoing education to physicians regarding billing procedures in Q-path. EM faculty had no direct financial incentive to bill ultrasound examinations during the study period.
3. *ED Billing and Coding specialist training*: ED coders were provided a master list of ED POC ultrasound privileges, a list of EM faculty with ultrasound privileges and CPT codes to be used with each examination type. The CPT codes used for billing are summarized in Table 2. Coders were trained to review Q-path worksheets, verify the documentation and identify appropriate billing codes. To avoid any inadvertent errors, coders were also instructed to check if the attending had ultrasound privileges correlating with each examination prior to billing. Emergency ultrasound section faculty and fellows were available for ED coders, and EM faculty, to resolve any billing issues. Emergency ultrasound section faculty also held monthly meetings with ED coders to discuss billing issues and workflow issues, and to assess revenue.
4. *Faculty credentialing*: The process for faculty credentialing in POC ultrasound was streamlined to decrease paperwork and administrative time required for an individual faculty member to apply for additional ultrasound privileges. The list of ultrasound credentialed faculty along with physician numbers was posted on all ultrasound systems to improve resident compliance with entering physician information on the

Table 2
Point-of-care ultrasound applications and associated CPT codes

Point-of-care ultrasound applications	CPT codes
FAST	76705-26, 93308-26
Aorta	76775-26
Renal	76775-26
Superficial	76536-26, 76881-26, 76604-26, 76645-26, 76705-26, 76604-26, 76705-26, 76857-26, 76881-26
Cardiac	93308-26
Pelvic	76815-26, 76817-26, 76857-26, 76830-26
Musculoskeletal	76882
Ocular	76512-26, 76529
Thoracic	76604-26
Vascular (DVT)	93971-26
Biliary	76705-26
Scrotal	76870-26
Vascular Access	76937-26
Procedural Guidance	76942-26, 76930-26, 49083-26, 49084-26

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ultrasound systems and assigning the ultrasound examination to the correct EM faculty member. The list was updated every month as additional faculty obtained ultrasound privileges and updates were communicated to the ED coders.

5. *Billing protocol implementation*: Our workflow was optimized so that patient care ultrasound examination reports were completed and signed electronically online by EM faculty using Q-path. EM faculty were required to confirm that the ultrasound examination was used for medical decision making, and required images were obtained prior to signing the report. Upon completion by faculty, a notification was automatically sent to ED coders from Q-path to bill the scans. The ED coders reviewed the documentation, billed the professional fees for scans on a daily basis, and also notified hospital coders to bill for facility fees. QA of all ultrasound examinations was performed within 7 days after the scans were performed. Regular feedback was provided to physicians regarding billing by ultrasound section faculty and fellows through several avenues. Specific e-mail reminders were sent to physicians if any examinations that were noted to be patient care examinations in Q-path were not billed. The decision to bill was ultimately left to the discretion of the faculty member. Feedback was provided to EM faculty regarding the billing revenue and noncompliance with billing at monthly faculty meetings.
6. *Fiscal Analysis*: A fiscal analysis was performed at the end of the fiscal year 2013 after implementing the new billing protocol. Ultrasound billing revenue data were extracted from hospital and ED database (professional and facility fees). Reimbursement rates and collections were included in the analyses. Since billing charges and reimbursement are considered proprietary information, specific details are not included in the manuscript. Both capital and operational costs were included in the analyses. Capital costs included ultrasound systems, replacement probes, service contract renewals, and intracavitary probe equipment. Operational costs consisted of faculty time for quality assurance review of images, Q-path costs, and ultrasound program maintenance costs.

2.4. Outcome measures

The primary outcomes included volume of ultrasound examinations billed and ultrasound billing revenue (professional and facility fees). The secondary outcomes included faculty credentialing, ultrasound equipment purchase, and profits gained from ultrasound billing.

2.5. Data analysis

Data for the year prior to implementation and for the year after implementation of the new billing program were analyzed [9]. All analyses were performed in SAS version 9.3 (Copyright, SAS Institute Inc, Cary, NC). Data were analyzed using descriptive statistics.

3. Results

After the implementation of the new billing program there was a 45% increase in ED faculty participation in billing for patient care examinations (30%-75%). ED coding staff ensured that all ultrasound examinations billed had appropriate documentation required for billing. Compared to the previous year, the number of ultrasound examinations billed increased 5.1 fold (4449 vs. 857) during the post implementation period. The total units billed increased from previous year for professional services to 4157 from 649 and facility services to 3266 from 516. A wide variety of scans were billed during the post implementation period. FAST examinations represented the greatest source of billing (47%). Billing volume is summarized in Table 3. During the post implementation period, there was a significant increase in billing revenue (both professional and facility fees) for emergency ultrasound examinations. Compared to the previous year, the facility fees revenue increased 7-fold and the professional fees revenue increased 6.34-fold. The use of POC ultrasound in trauma patients increased the overall evaluation and management (E & M) fee by 39% in patients being admitted and 59% in patients being discharged from the ED. There was a significant interest among faculty to bill patient care examinations and also apply for additional ultrasound privileges. Specifically, 10 faculty members obtained additional ultrasound privileges during the post implementation period. Two new ultrasound systems were purchased with hospital support. Based on the projected revenue, a proposal to purchase 1–2 additional ultrasound systems annually was approved during the post implementation period. After deducting the capital costs and ongoing operational costs from approximate collections, the net profits gained by our ED ultrasound program was approximately $350 000.

Table 3
Billing volume (different point-of-care ultrasound applications)

POC ultrasound applications	Billing volume
FAST	47%
Cardiac	13.6%
Superficial	11.3%
Renal	4.5%
Biliary	3.7%
Pelvic	3.6%
Vascular (DVT)	2.7%
Aorta	2.6%
Musculoskeletal	2.5%
Procedural guidance	2.4%
Thoracic	2.3%
Vascular access	1.8%
Other	1.2%

4. Discussion

The scope and indications for POC ultrasound in emergency medicine are rapidly growing across the nation. Use of ultrasound in the ED has been shown to improve patient care and is becoming standard practice. Development of a financially viable emergency ultrasound program is essential to cover the costs of implementation (capital, training, and maintenance). A fiscal analysis done by Soremekun et al described actual and potential return on investment for their ED ultrasound program based on their observed and potential billing volumes and estimated revenue [10]. They reported that an ED ultrasound program can become profitable within 5 years of inception if trauma and procedural ultrasound charges are captured. The time to break even or generate profits is highly dependent on billing volume. Additionally, reimbursement rates affect the income generated and are in turn dependent on payer mix, a variable that is generally not modifiable. Other factors that impact fiscal sustainability include the need for additional or replacement ultrasound systems and maintenance costs.

In this study, we report an increase in ultrasound revenue after implementing changes designed to capture billing for all patient care examinations. We took into consideration capital and ongoing operational costs while computing the profits generated. We successfully demonstrated that our ultrasound program is financially viable, and, after 1 year, was able to generate profits covering capital and operational costs. Multiple explanations exist for the increase in emergency ultrasound billing revenue at our institution. To address the common barriers to the ultrasound billing process, we included several components in our protocol: Web-based archival system for documentation and electronic signature, physician training, timely QA review with continuous billing reminders, ED coder training and communication, streamlining of faculty credentialing and optimization of the billing workflow.

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Faculty compliance with documentation is crucial for generating ultrasound billing revenue. Prior to implementing the new ultrasound billing protocol, we conducted an internal analysis which demonstrated that POC ultrasound utilization rates for patient care by our ED faculty were high. However documentation rates were extremely variable resulting in minimal ultrasound billing revenue. We believe regular audits, continuous reminders, and feedback from ultrasound section faculty and fellows as part of our new billing program played a crucial role in the increase in compliance with documentation. In addition, the paper documentation system used in the previous years could have contributed to low documentation rates. The ability to electronically sign the reports using the new Web-based system might have also improved faculty documentation at our institution. Permanent image retention as part of the medical record is required for reimbursement. Web-based workflow systems paired with wireless technology which allows image transfer directly from ultrasound systems is ideal for image archival. We believe the new workflow system had a significant impact on timeliness and completion of documentation at our institution. Other reasons for improved documentation by our faculty include ongoing education (Q-path navigation, indications for POC ultrasound, required components of documentation including medical necessity, description of organs studied, and study findings) and productivity reports.

Timely QA review is another key component of ultrasound billing. This enabled us to audit ultrasound examinations by sending billing reminders to faculty, rectifying errors, and providing appropriate feedback to faculty and residents when appropriate. This is challenging to accomplish and depends on the dedicated time of ultrasound faculty and support from ED leadership. The Web-based archival system increased the efficiency of QA review process at our institution. Ultrasound revenue is also linked to faculty credentialing, since the hospital may restrict a physician from using POC ultrasound if they do not have the privileges to perform ultrasound. An increase in the number of faculty credentialed to use ultrasound generally leads to an increase in utilization of POC ultrasound resulting in increased ultrasound revenue. Another key driver that can increase the ultrasound billing revenue is the efficiency of ED coders. Working closely with ED coders, ensuring ongoing education of ED coders and addressing billing issues are critical for reimbursement. Our ultrasound section faculty regularly reviewed ultrasound billing volume, reimbursement rates, and collections regularly with the ED coders.

POC ultrasound differs from traditional radiology department ultrasound since the ultrasound is both performed and interpreted by a physician at the bedside. Emergency physicians using POC ultrasound are generally reimbursed through two mechanisms: 1. The E & M code which includes the history, physical examination, and medical decision-making process and 2. Reimbursement for POC ultrasound billed in addition to the E & M codes as a separate CPT code. Additionally, the use of POC ultrasound can influence the E & M code by increasing the complexity of medical decision making [11]. The use of POC ultrasound in the management of trauma patients increased the overall E & M fee substantially at our institution.

Our study has several limitations. This is a single institution study that limits generalizability of our study results. The collection rates and reimbursement rates at other institutions may be significantly different based on payer mix and the patient population. Despite increases in ultrasound billing revenue, only 75% of our faculty were compliant with documentation and billing procedures. We did not control for other variables which could have affected the study outcomes. Our institution was equipped with sophisticated wireless and workflow solutions, which may not be the case with other institutions.

5. Conclusions

Within 1 year of inception, our novel POC ultrasound billing and reimbursement program generated significant revenue through ultrasound billing. The key components of our billing program included Web-based image archival system for documentation, ongoing faculty and resident education, timely QA review with continuous billing reminders, regular interaction with ED coders, productivity reports, and support from the ED leadership and hospital administration.

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