Ultrasound self-referral does not increase utilization in pediatric urology

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Introduction: *Costs of radiologic imaging are rising. The goal of this study is to examine the utilization practices of pediatric urologists who have access to in-office ultrasound imaging when managing children with primary hydronephrosis.*

Materials and methods: *A retrospective cross sectional study was performed of children ≤ 5 years old with an isolated diagnosis of hydronephrosis. Ultrasound utilization was evaluated by tallying the number of ultrasounds obtained during the time each child was followed. Imaging frequency was determined from orders given by each overseeing physician. Ultrasounds were performed at either the practitioner's clinic or at outside radiology facilities based on insurance regulations. Analysis compared ordering frequency between imaging completed at the clinic versus outside radiology facilities.*

Results: *Of 1,816 ultrasounds ordered, 1,102 were performed at the practitioner's clinic and 714 at outside radiology centers. Overall, the number of ultrasounds obtained in the practitioner's clinic was 0.33 ultrasound studies per patient per month, in contrast to 0.38 obtained in outside radiology settings. Ultrasound utilization for low, intermediate and high grades of hydronephrosis in practitioner's clinic versus outside was 0.39 versus 0.31, 0.31 versus 0.31, and 0.37 versus 0.39 respectively. There were no significant differences in ultrasound ordering frequency for all groups compared.*

Conclusions: *There is no increase in ultrasound utilization for managing primary hydronephrosis in children, regardless of whether the study was self or outside referral. Honest and ethical utilization of self-owned radiologic equipment is possible and allows for timing monitoring, physician and patient convenience, and potential cost savings.*

Key Words: ultrasound, imaging, pediatrics, cost, utilization, hydronephrosis

Introduction

In the current era, medical imaging has become an essential tool to aid in both the diagnosis and management of patients and their clinical conditions. As a result, access to imaging has expanded from hospitals and emergency rooms to specialized imaging centers and also to physicians' offices where there is quick access to services such as ultrasound and x-rays. Patients experience multiple benefits by having imaging readily available for their office visit as the study can be easily obtained and read in the physician's office. Some of these benefits include avoidance of traveling between sites, the convenience of a single office visit (or doctor contact) for the study and the discussion of the results and thus a reduction in the need to take time from work, and less stress that may occur while waiting for the imaging to be completed and results communicated.

The utilization of ultrasound in urology is widespread from fetal ultrasound to detect prenatal hydronephrosis, scrotal ultrasound with Doppler flow for the acute scrotum, transrectal ultrasound guidance for in-office prostate biopsy, bladder ultrasound to measure post-void residual urine, renal ultrasound for the work up of hydronephrosis/azotemia/hematuria/urinary tract infections, and even intraoperative ultrasound usage to delineate a tumor from normal renal parenchyma during partial nephrectomy.

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While the benefits of having imaging performed in the physician's office are clear, detractors exist who infer ulterior motives. Some studies have shown a propensity for increased utilization of services including imaging, when referring physicians have ownership interest in these services. Radiologic imaging and its costs are rising in the United States and claims that the utilization of imaging by non-radiologists are increasing at a rate faster than by radiologist have been raised. Specifically, this has brought into question the potential conflict of interest of having a financial incentive to over-utilize imaging and its effect on the ethical use of imaging.[1-6]

The goal of this study is to examine the utilization practices of pediatric urologists who have access to in-office ultrasound imaging when managing children with primary hydronephrosis. We will examine the degree of utilization of ultrasound imaging performed on children in the physicians' own clinic (self-referral) verses outside of the physicians' clinic setting (radiologist referral).

Materials and methods

A retrospective cross sectional study was performed on children 5 years and younger with the diagnosis of hydronephrosis from 2008-2010. Patients with any anatomical abnormalities or confounding diagnosis such as posterior urethral valves, vesicoureteral reflux, ureteropelvic or ureterovesical junction obstruction, neurogenic bladder, urinary retention, meatal stenosis and/or stones were excluded from the study.

For each child with the primary diagnosis of hydronephrosis, ultrasound utilization was evaluated by calculating the number of ultrasounds obtained during the time each child was followed as determined from the orders given by each of the overseeing physician. The physicians consisted of a single group of pediatric urologists who owned their own ultrasound equipment. The utilization data were obtained from the "full" partners who would theoretically be most incentivized by self-referring the ultrasound imaging. Each child was followed by the same practitioners throughout their course of management during the allocated time period. Ultrasounds were performed at both the practitioner's clinic and at outside radiology facilities, which were owned and operated independently from the practitioner's practice. Whether the ultrasounds were obtained at the clinic or referred to the outside radiology facility was independently based on the insurance company's imaging cost reimbursement policies. Thus, if the specific insurance carrier's reimbursement for the ultrasound was restricted to outside facility, then prescriptions were given for the ultrasound to be done at an outside facility (hospital-based or private). In contrast, for patients having insurance carriers that did not have such limitations, ultrasound was performed in the urologist's office.

The utilization data were stratified according to the facility (self or outside referral) where the images were performed, grade of hydronephrosis (defined as low for Society of Fetal Urology grades 1 and 2, intermediate for grade 3, and high for grade 4) and the individual providers. The analysis then compared the frequency of imaging between the self-referred imaging completed at the clinic to imaging performed at the outside radiology facilities. The comparison was conducted using a two-tailed t-test on the Excel software with significance set with a p value < 0.05.

Results

A total of 678 children (514 males, and 164 females) with 994 hydronephrotic kidneys met the criteria for inclusion. Insurance reimbursement dictated the location where each child's ultrasound was obtained and resulted in 405 children having the imaging performed in the practitioner's clinic while 273 children were required to have the study completed at an outside radiology facility. A total of 1,816 ultrasounds were obtained with 1,102 ultrasounds performed at the practitioner's clinic and 714 at outside radiology centers.

As the study looks at a cross section of time, utilization was calculated for each child by determining the average number of ultrasounds obtained per month. The number of ultrasounds obtained for individuals with insurance allowing the ultrasound to be performed in the practitioner's clinic was 0.33 ultrasound studies per patient per month. In contrast, 0.38 ultrasounds studies per patient per month were obtained in the outside radiology setting. The difference was not significant ($p > 0.05$).

Similarly, utilization was determined by stratifying individuals based on the degree of hydronephrosis. The hydronephrosis was categorized as low, intermediate and high grade and again the results were compared between sites where the imaging was performed. Utilization of ultrasounds for low, intermediate and high grades of hydronephrosis in comparing in-clinic verses outside was 0.39 versus 0.31, 0.31 versus 0.31, and 0.37 versus 0.39 respectively per patient per month. There was no significant difference in the ordering frequency of ultrasounds for all groups compared. Additionally, when each practitioner's data was compared against the others there was no significant difference in ordering practices.

Discussion

Ultrasonography is a wide-based and safe imaging modality that is readily available and can be found in portable units thus expanding availability. It is now standard of care to improve safety and accuracy as an adjunct in certain procedures such as central venous catheter placement and transrectal biopsy of the prostate. It has been found to be useful for general practitioners in deciding on whether to refer a patient to a specialist.[7] It is helpful in evaluating incomplete bladder emptying,[8,9] and has found to positively change the management of trauma patients prior to reaching the hospital.[10] Primary hydronephrosis is a common condition (1:100-500[11]) followed by pediatric urologists following prenatal ultrasound screening or after a clinical event requiring renal imaging, by sonogram. Postnatally these children need close follow up with serial renal ultrasound studies to monitor persistence or increase in grade, which could require surgical intervention if observational efforts fail.[12]

The increased availability of imaging has resulted in the identification of more pathology. A prominent reason for this is likely technological advances that have infused themselves into certain fields of medicine and are current standards of practice.[13] Neither malpractice liability risk nor any other patient or referring physician characteristics has proven to be a cause of this increased imaging.[14,15] Self-referral for imaging is regulated by the Stark Laws, and while there has been an increase in privately owned radiology equipment by non-radiologists, the Deficit Reduction Act decreased utilization of in-office imaging dramatically after taking effect in 2007.[1,5,13]

Several studies report self-referring physicians are 1.2-8 times more likely to obtain imaging studies than physicians who refer to radiologists.[2,4-6,10-19] Kilani and associates performed a meta-analysis in 2011 assessing the practice patterns of imaging utilization with regards to of self-referred verses radiologist referred ordering for x-ray, fluoroscopy, CT, MR, ultrasound, angiography and nuclear imaging. The authors concluded that self-referrers are greater than 2 times as likely to obtain imaging as radiologist-referrers, and that 60% of the $3 billion in overall cost of reimbursement to self-referring physicians was due to overutilization.[18] Strasser and colleagues comparing facilities of a single family practice group and reporting 2.4 times increased radiographs at the facility with imaging capability compared to the facility that does not.[20] Not surprisingly, the majority of the literature regarding self-referral and overutilization of imaging has been published by radiologists, whose predominant financial stake in this matter is a source of bias.[1,3-5,18,21] When labeling certain physicians as self-referring or radiology-referring for large reviews, these studies do not take into account practice patterns and preferences of certain physicians, along with their patient populations which could be comprised of complex presentations and increased comorbidities requiring more frequent imaging, and higher concerns for noncompliance to follow up after the radiology referral. They also do not take into account changes in referral patterns to other radiology facilities other than those of the authors. Furthermore, specialists may order more views to a radiograph due to a concern they have in that specific patient that a radiologist would not have knowledge of, which could account for overutilization estimations.[19]

There are studies showing self-referring physicians do not over-utilize in-office imaging.[13,22] Hutchinson and colleagues saw no differences in MR ordering practices between neurologists who owned MR units and those who referred to radiologists.[13] Patel found a shift in utilization patterns towards hospital-based imaging with radiology referral, and away from self-referral utilization.[22] Decreases in physician fee schedule payments for imaging by 12.7% in 2007 resulted in declines in utilization,[2] which could be the cause of these new trends. Moreover, self-referral can possibly reduce cost. In-office imaging has the potential to expedite the work up process and treatment in acute situations, which could in effect decrease or prevent hospital admissions, as well as decrease additional clinic appointments for imaging review as the radiologic interpretation can be performed at the same visit.[13] Radiologists have been guilty of overutilization as well.[1,23,24] They have been criticized for recommending too much additional imaging in dictated reports, along with adding on unnecessary series or sequences. There has also been a surge in development of radiology benefits management companies.[1] From 2000 to 2004, radiology referrals accounted for almost all (86%) of the increase in Medicare imaging costs.[13] Blaivas and Lyon calculated at least $226 million worth of radiology self-referrals for abdominal CT scans per year can be expected by Medicare, thus, overutilization allegations can be made to extend past the managing physician.[23]

Our results demonstrate that we actually refer more patients for ultrasound outside to radiology than we perform in-office in our practice, which remained not significantly different after stratifying for degree of hydronephrosis and when analyzing each of the seven partners in the group. Our data supports the notion that self-referring physicians are able to practice medicine honestly without abuse for reimbursements on

imaging. Focused but stringent sonographic education is a component of most urology training programs, with some departments and organizations offering credentialed courses. Therefore, the utilization of in-office ultrasound in urology can be performed with high levels of accuracy which improves patient care.[25] The clinician is able to supplement information gathered from the history and physical with in-office ultrasound and make immediate decisions on further management or ancillary diagnostic testing in an efficient manner. The convenience of having imaging in-office precludes the need for additional visits which saves time, travel, cost, missed work days, and stress to the patient and his or her family. This improves patient satisfaction, of which the importance cannot be overemphasized.[26,27] Gazelle et al found patients seen by self-referring doctors were up to 2.5 times more likely to undergo their imaging on the same day as their office visit.[17]

One weakness of this paper, along with those of the existing literature, is its retrospective construct. However, it's retrospective nature as the data were collected and analyzed years after the ordering practices were set (indications and insurance regulations) and could not thus be altered so as to potentially garner additional financial benefit. We were able to show that despite insurance reimbursement policies or performing a self-referral study while having a potential financial benefit, one does not necessarily change their practice management. We also focused on one specific disease entity in the same group of physicians serving the same patient population, which removes practice management variations and can more accurately analyze overutilization. Our data is also more robust than prior studies in the fact that we analyzed patients with coverage from a wide variety of insurance companies with different policies, while most of the published articles investigating self-referral practices only involve a single health insurance plan or Medicare. This allows us to more effectively assess overutilization in a real-time setting when addressing this ongoing question. Limitations to this study are its relatively small sample size in a very specialized area of medicine utilizing just one imaging modality. Further retrospective studies focusing on individual medical groups revisiting their own practice patterns is paramount for a more valid assessment of overutilization in self-referring physicians.

Conclusions

In today's complicated system of financial reimbursement, it is necessary to consider the business aspect in any medical practice. Referral of imaging studies should be performed to in a manor to provide the patient and physician with convent, high quality care, and does not abuse or over-utilize resources. This study shows that there is no increase in ultrasound utilization for managing primary hydronephrosis in children, regardless of whether the study was a self or outside referral. Honest and ethical utilization of self-owned radiologic equipment is possible and allows for timing monitoring, physician and patient convenience, and potential cost savings. □

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