Increase in utilization of afterhours medical imaging: a study of three Canadian academic centres

Shivani Chaudhry, MD
Irfan Dhalla, MD
Gerald Lebovic, PhD
Patrik Rogalla, MD
Timothy Dowdell, MD

aDepartment of Medical Imaging, University Health Network, Toronto General Hospital
bDepartment of Medical Imaging, St. Michael’s Hospital
cApplied Health Research Centre, St. Michael’s Hospital
cInstitute of Health Policy, Management and Evaluation, University of Toronto
Disclosures/Consent

• No disclosures.
• There is no commercial interest of the authors in the subject of the study.
• No patient informed consent was required.
• Approval for this study was obtained from the St. Michael’s Hospital and University Health Network Research Ethics Boards.
Background Information

• Medical imaging has perhaps been one of the most influential factors in patient care over the recent years, particularly in the ED.

• Many studies performed in a variety of healthcare settings in the United States demonstrate increasing usage of CT during patient visits to the ED over the past ten years.

• No similar studies have been performed in the Canadian healthcare setting.
Objectives

- The objectives of our study were to assess trends in afterhours radiology utilization for emergency department (ED) and inpatient (IP) patient populations from 2006-2013, including analysis by modality and specialty and with adjustment for patient volume.
Hypothesis

• We hypothesize that medical imaging has also been increasing at our institutions.

• While it is likely that patient volumes are also increasing, we hypothesize that there is a statistically significant increase in the amount of medical imaging being performed per patient.
Methods

• For this retrospective study, we reviewed the number of CT, MRI, and ultrasound studies performed for the ED and IP patients during the afterhours time period (5pm – 8am on weekdays and 24 hours on weekends and statutory holidays) from 2006-2013 at three different Canadian academic hospitals.
Methods

- We used the Jonckheere-Terpstra (JT) test to determine statistical significance of imaging and patient volume trends. A regression model was used to examine whether there was an increasing trend over time in the volume of imaging tests per 1,000 patients.
Methods

• We chose to limit our evaluation to the on-call time period as it provides an additional educational point of consideration, given that the hospitals in our study are all academic centers.

• Trends in the volume of on-call medical imaging from 2006-2013 are a direct reflection of the changing workload for the on-call radiology resident as there was consistently single resident physician coverage afterhours for the years studied.
Results

- For all three sites from 2006-2013 during the afterhours time period:
- There was a statistically significant increasing trend in total medical imaging volume, which also held true when the volumes were assessed by modality and by specialty.
Results

• There was a statistically significant increasing trend in ED and IP patient volume.
• When medical imaging volumes were adjusted for patient volumes, there was a statistically significant increasing trend in imaging being performed per patient.
Total number of afterhours imaging studies performed per year by patient population for Hospital A, B, and C
Total number of afterhours imaging studies performed per year by modality for Hospital A, B, and C
Total number of afterhours imaging studies performed per year by specialty for Hospital A, B, and C
Total number of afterhours imaging studies performed per 1000 patients per year by patient population for Hospital A, B, and C
Discussion

• Causes for increased utilization:
  • Growing clinical indications for imaging usage
  • Increased sensitivity, specificity and diagnostic capability of imaging
  • Increased speed and availability of imaging
  • Correlation of imaging use with decreased morbidity/mortality (i.e. significant reduction in the negative appendectomy rate & number of appendectomies accompanied with a significant increase in the use of preoperative abdominal CT)
Discussion

• According to the Canadian Institute for Health Information (CIHI), the Emergency Room Wait Times Strategy, which was launched in 2008 in Ontario, was designed to reduce total ED length of stay, with use of financial incentives.

• Our results demonstrate rising ED imaging correlating with the launch of the provincial wait time strategy in 2008.

• The CIHI report indicates that in recent years, all jurisdictions across Canada have worked toward shortening ED wait times with pay-for performance incentives – resultant generalized increased medical imaging trends?
Discussion

• While medical imaging is indicated and beneficial in many clinical settings, it is important to recognize the issues of:
  • Increased cost
  • Increased radiation risk
  • Lack of consistent correlation of imaging with improved patient outcome
Conclusion

- Afterhours medical imaging volumes demonstrated a statistically significant increasing trend at all three sites from 2006-2013 when assessed by total volume, modality, and specialty.
- During the same time period and at all three sites, the ED and IP patient volumes also demonstrated a statistically significant increasing trend with more medical imaging, however, being performed per patient.
Conclusion

• Our study is the first to formally study trends in afterhours medical imaging in the ED and IP setting in recent years in Canada.

• We suspect that the trends may be generalizable to other parts of Canada, but this requires further study.

• Additional study is also needed to evaluate the appropriateness of medical imaging over the recent years in our country, given that there are serious implications associated with its rise.
Conclusion

• Finally, the trends in the volume of on-call medical imaging from 2006-2013 are a direct reflection of the changing workload for on-call radiology residents.

• Further study into the impact of these trends is required for issues of patient and resident safety and resident education.
References


(Last accessed: October 30, 2014)


References


