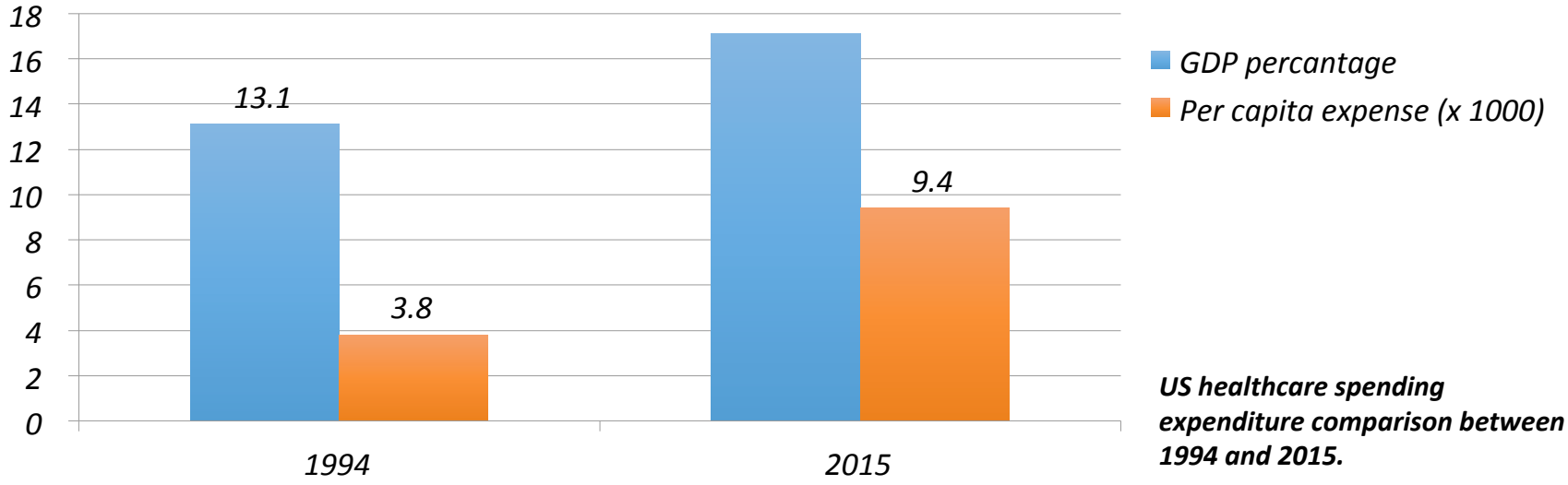
Radiologists as consultants in providing imaging decision support for appropriate utilization of inpatient MRIs.

- Authors:
- Ghasan Ahmad, MD; Soniya Pinto, MD; David Bader, MD; Priyanka Prakash, MD.

- Department of Radiology, St. Vincent Hospital, Worcester, MA.

- Disclosures: None.

Introduction

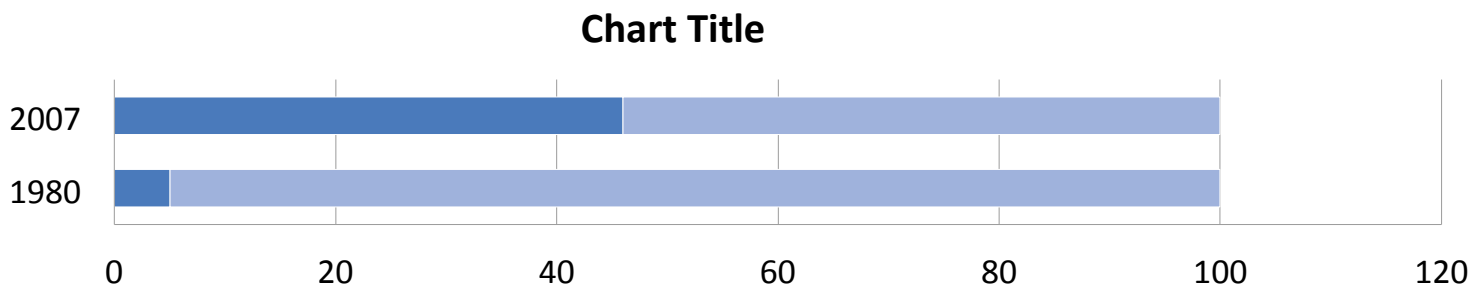


US healthcare spending expenditure comparison between 1994 and 2015.

- US hospital expenditures grew by 5.6% to $1036.1 billion in about 20 years.
- Imaging was the highest contributor responsible for expenditure escalation.
- Although number of overall imaging procedures has decreased, number of complex procedures like CT and MRI has increased.

Introduction

- According to an IMV report, there has been a remarkable shift to Non-Hospital based Imaging.



	1980	2007
Non Hospital	5	46
Hospital	95	54

Trends of Non Hospital based imaging over the past 30 years

Introduction

- Inpatient imaging leads to:
  - Longer hospital stays
  - Increased cost
  - Longer outpatient wait times
  - Misutilization of invaluable resources such as MRI.
- At our institution, inpatient MRI utilization was noted to be an area for improvement.
- Radiologists reviewed and provided consultative opinions for the ordered/scheduled inpatient MRIs.
- Purpose was to identify if the MRIs were necessitated as inpatient or whether an alternative exam could answer the question at hand.

Materials and Methods

- Inpatient MRI (iMRI) orders placed between May 1, 2016 to Feb 28, 2017 were reviewed by a radiologist for:
  - Appropriateness of indication.
  - Necessitation of studies as inpatient.
- Cases were discussed by the radiologist with clinical team to:
  - Provide direct consultation.
  - Obtain additional information if needed.
  - Suggest alternative/better study options if possible.
- All cases were categorized as follows:

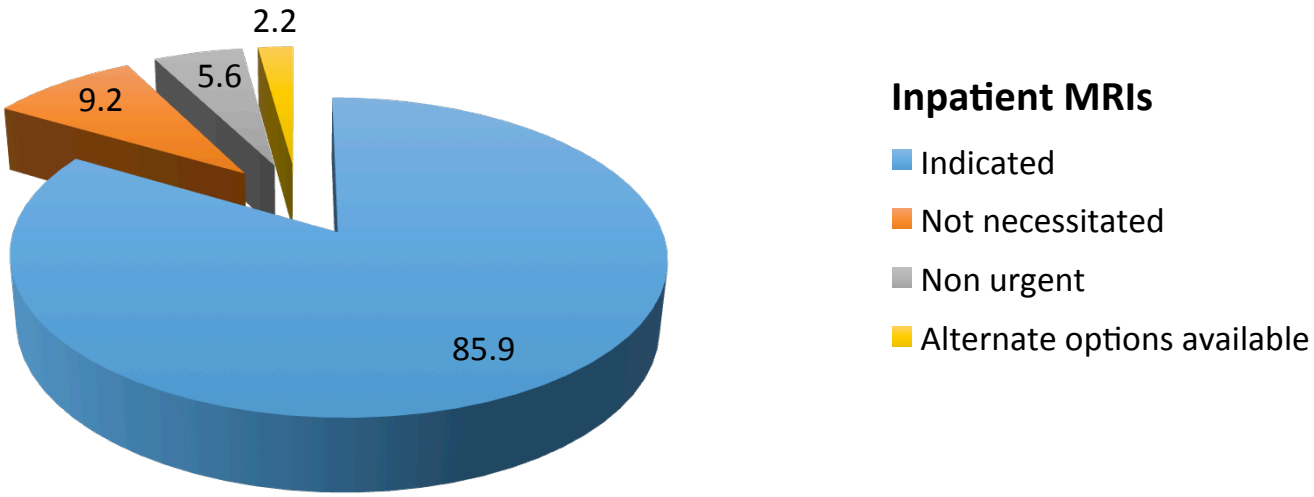
M0	M1	M2	M3
Inappropriate inpatient order	Appropriate inpatient study	Appropriate but not necessitated as inpatient	Alternative study better or would answer the question at hand

- Cases further subcategorized by body organs, ordering physicians, reviewing physicians, combination studies, team discussions and end result of the studies.
- Data recorded and analyzed using Microsoft excel.

Results

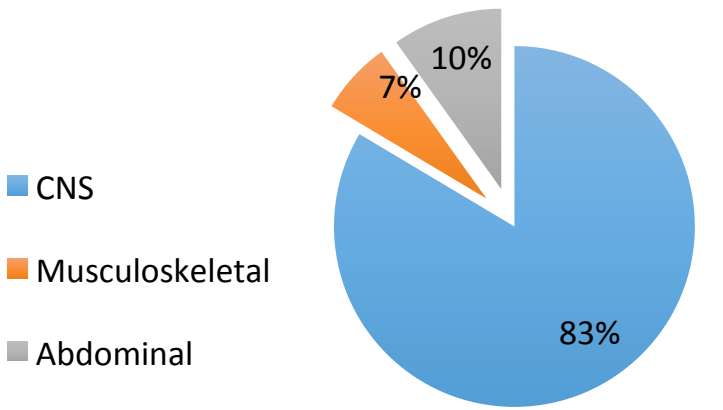
- A total of 1121 inpatient MRI orders received during the time.
- 549 orders reviewed by a radiologist.

M0	M1	M2	M3
Inappropriate inpatient order	Appropriate inpatient study	Appropriate but not necessitated as inpatient	Alternative study better or would answer the question at hand
9.2% (51/549)	85.9% (472/549)	5.6% (31/549)	2.2% (12/549)

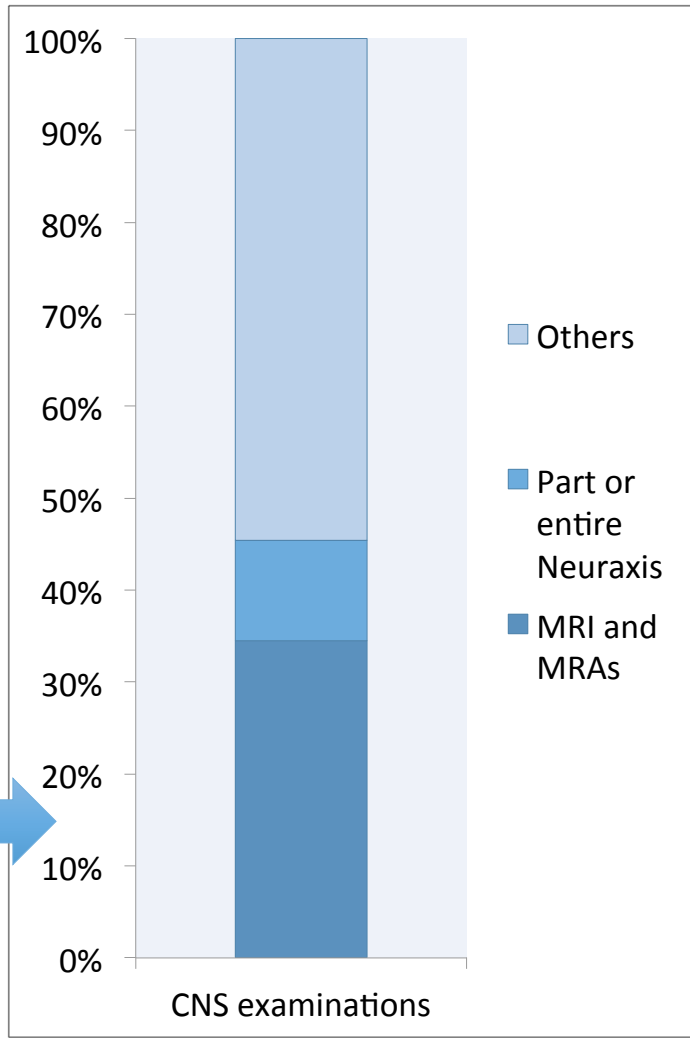


Results

- The data was further subcategorized by organ systems with the following split:
  - Neuro: 85.8%
  - MSK: 6.5%
  - Abdominal: 9.8%
- A considerable number of neuro exams were ordered as combination studies, i.e; MRI with MRA head and neck (n=157).
- Similarly, a trend for ordering the entire neural axis (MRI cervical, thoracic and lumbar spine) was also noted (n=50).



Inpatient MRIs by organ systems



Results

- 14.1% (n=94/549) (M0 + M2 + M3) of inpatient orders categorized by the radiologists were considered inappropriate to be done as inpatient status.
- Of these, 67% (n/94) 63 were neuro, 9 MSK and 22 abdominal
- 3.3% of these 14.1% cases still were performed as inpatients
- 2.7% MRIs were not performed either because an alternative study was performed or the study was scheduled to be performed as an outpatient

Conclusion

- Imaging in general and MRI specifically is a vital healthcare resource.
- Optimal utilization is critical for appropriate patient care without increasing the healthcare cost.
- This is more critical for community hospital like ours with one MRI scanner which presents unique challenges to resource utilization.
- Based on our study, the following trends were noticed:
  - Inpatient MRIs are being used most commonly for neuro imaging which seems appropriate.
  - There is however, a tendency to perform combination studies which are not always needed, especially during the inpatient stay
  - Based on the discussion with the clinical team, there was lack of realization that adding one additional study to an MRI increases the study time significantly unlike a CT.

Conclusion

- Intervention by the radiologists was useful in avoiding some of these studies while allowing timely patient care and better resource utilization.
- In addition, the discussion with the clinical team was also an opportunity for education and might alter the ordering habits of the clinicians.
- There were however certain limitations to our study including:
  - Earlier version of protocol forms did not allow detailed documentation, which was subsequently edited with increasing understanding of the process.
  - Radiologist reviews may not have been as uniform throughout the process which may be due to lack of concept of the need for the study across the department.

Conclusion

- This is however a continuous and iterative process meant to improve quality of patient care while ensuring appropriate utilization of available resources.
- Based on the results from the current study, we will launch the phase II of the study which will focus on:
  - Educating the clinical teams of the ACR appropriateness criteria.
  - Limited utility of MRA after a CTA head and neck
  - Better quality, less motion degraded scans are usually obtained as outpatients. So study results which do not affect inpatient management are better to be scheduled as outpatients.

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