REDUCTION OF HIGH ERROR RATE BY RADIOGRAPHERS IN RADIOLOGICAL INFORMATION SYSTEM (RIS)

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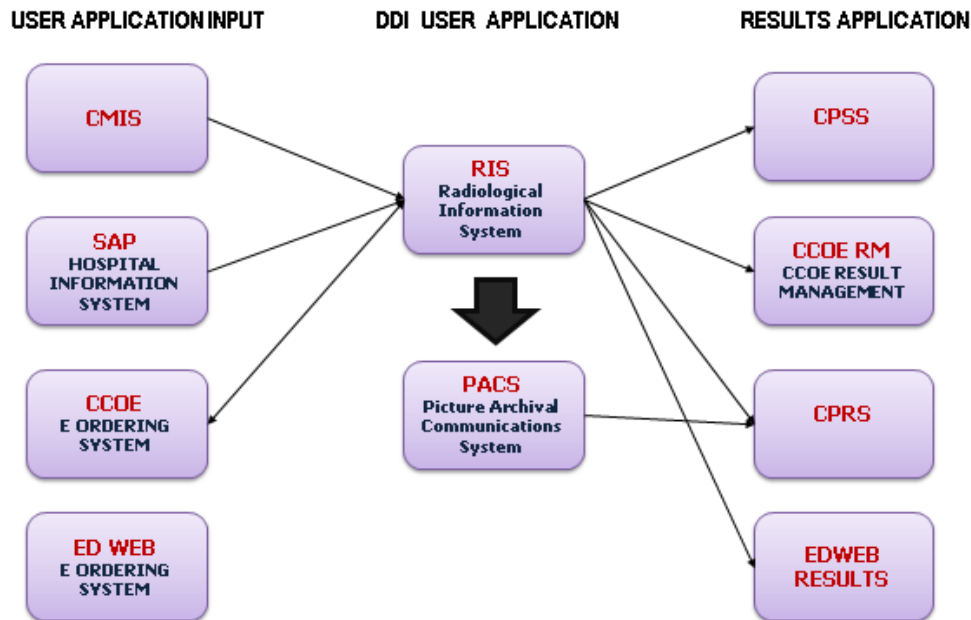30 October 2013

Research

Clinical Care

Education

A member of the NUHS

Background

- The Department of Diagnostic Imaging (DDI) operations interface with 4 main data system applications
  - SAP for patient information and billing transactions
  - Computerized Order Entry for electronic order requests
  - Radiological Information System (RIS) for Radiology related procedure information management including radiological reports
  - Picture Archiving Communicating System (PACS) as the radiological image database.

- RIS is the main DDI system which receives User Application inputs, records radiology procedure information and feeds data to the Results Applications.

- RIS drives the following functions:
  - Billing of patients: billing is triggered by SAP upon receiving instructions from RIS at the registration of procedures (in RIS) prior to procedure completion.
  - Reporting of procedures: radiologists can only generate reports is the procedure status in RIS is "Examined"

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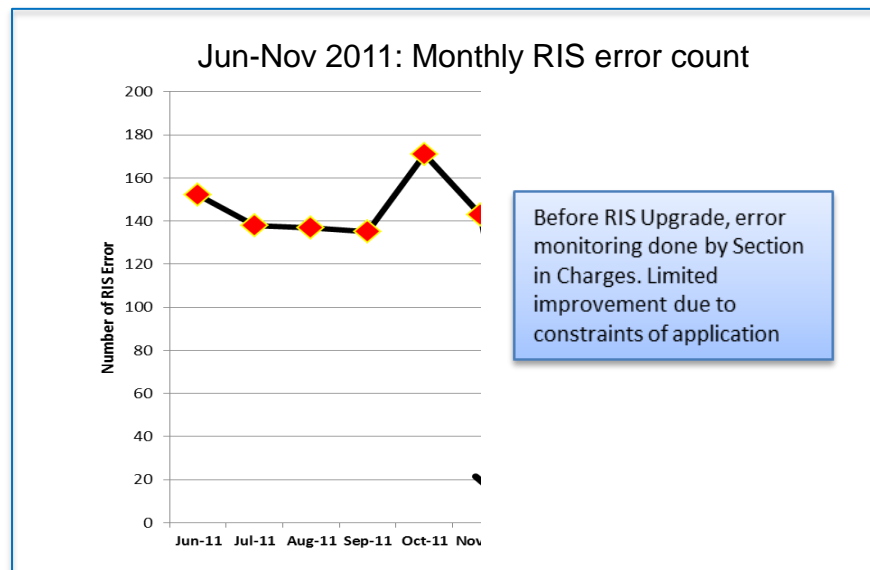

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Problem

- For efficiency and accuracy in the billing and reporting workflow of the Radiology Department, radiographers are responsible to ensure the following RIS data/functions are performed:
  - The correct patient is identified.
  - The correct procedure and consumables are registered in RIS.
  - Procedure and consumables electronic status is "Start"ed in RIS before commencement of procedure.
  - Procedure and consumables' status is changed to "Completed" in RIS after images are transferred to PACS for reporting.

- However, many daily RIS errors in the form of cases left either in "Registered" (cases not performed) or "Started" (cases which were not changed to "Completed" status) status which contributed to the following operational issues:
  - Delay in radiological reports turnaround time caused by uncompleted status procedures.
  - Delay in billing or bill amendments for patients which results in dissatisfied patients and administrative re-work to raise bill amendments/waivers for discharged patients.

Problem

- To circumvent the problems of patient billing and delayed radiological reports, daily lists of RIS errors were generated and circulated to the person in-charge of each modality for corrective action. To ensure the corrections were made in a timely manner, one person in each modality would correct the errors made by the whole team working the previous day. Therefore, many "offenders" were not aware of the errors they were making and the clean-up effort was a waste of resources.

- Despite these efforts, there was minimal impact in reducing the RIS error rates.

Jun-Nov 2011: Monthly RIS error count

Before RIS Upgrade, error monitoring done by Section in Charges. Limited improvement due to constraints of application
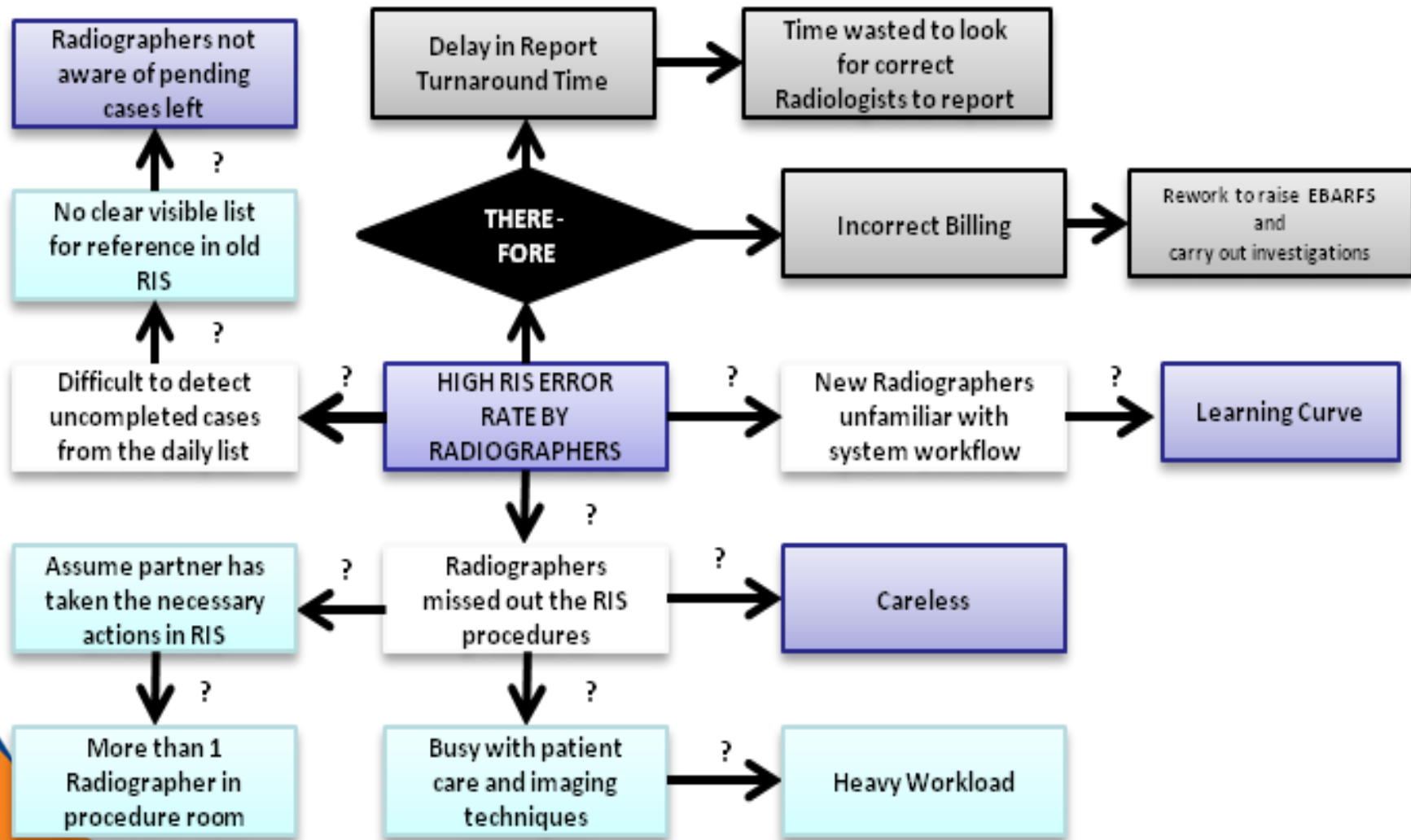
Purpose

- The purpose of this project was to reduce the RIS errors (cases left either in "Registered" or "Started" status) by 50%.

Methodology

- A Root Cause Analysis (RCA) was performed using the Why – Therefore method.

- Root causes were identified and the team held a brainstorming session for possible interventions to attain our goal.

- Interventions were then planned and implemented at various checkpoints to reduce the RIS errors made.

Problem analysis

Root causes

From the RCA, the following root causes were identified:

- New radiographers were not familiar with the system workflow and were not aware of the downstream effects if errors.

- Radiographers made RIS errors due to carelessness, heavy workload and miscommunications when working in teams (everybody thought somebody would complete the RIS documentation and in many cases, nobody completed the system documentation when more than one person performed the procedure).

- No individual accountability:
  - Radiographers might not be aware of the RIS errors (outstanding cases) left as there was no individual person or room error list for their reference/action.
  - To ensure the corrections were made in a timely manner, one person in each modality would correct the errors made by the whole team working the previous day.

Solutions

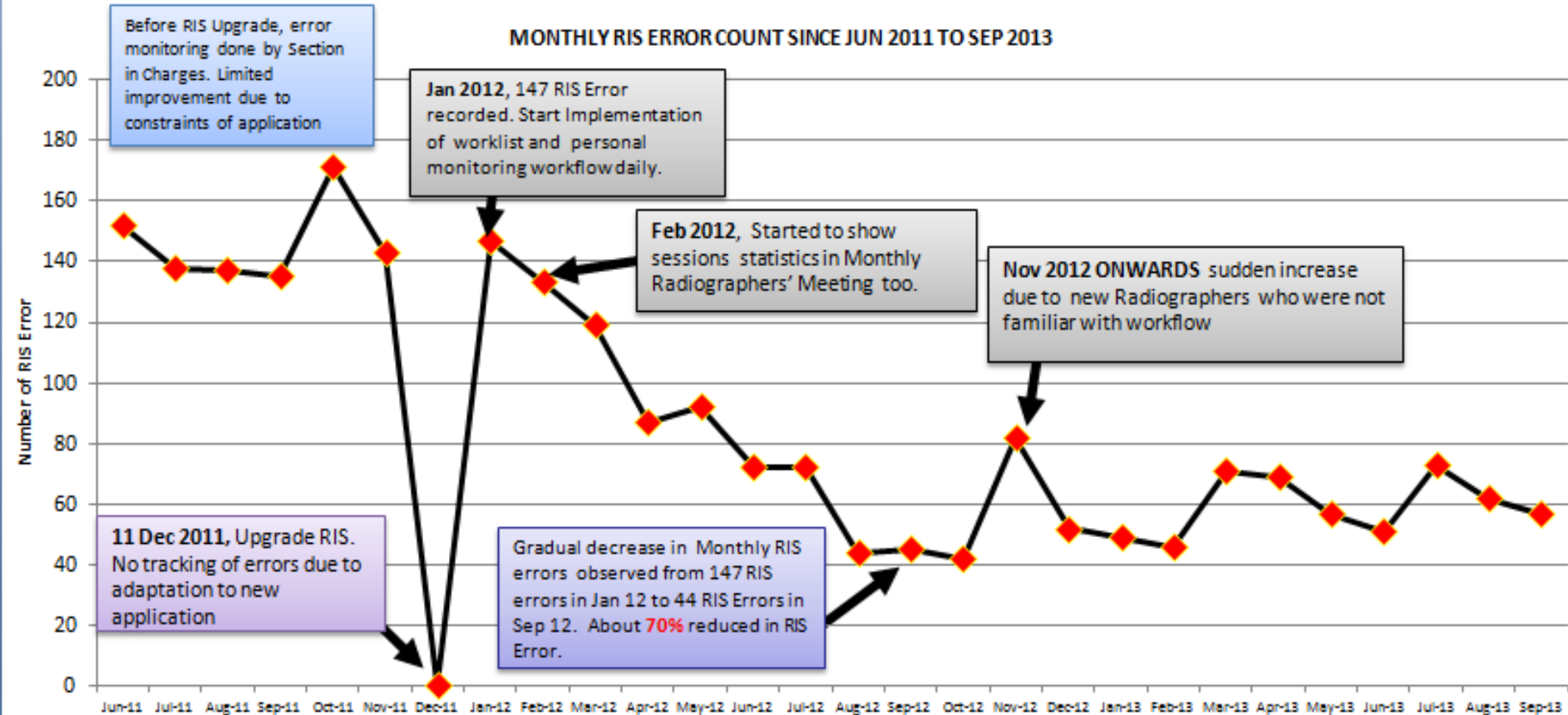| Problem	Solution
Radiographers were not aware of RIS errors	The purchase of an upgraded RIS solution was proposed to DDI management. The upgraded RIS would be able to segregate errors by sections and error types and show pending cases clearly.
	The person In-Charge of each modality was instructed to check daily system generated error lists at the end of day after the implementation of the upgraded/new RIS system installation (December 2011).
Carelessness and lack of individual accountability	Administration staff generated the individual RIS error lists daily by 930am.
	After new RIS implementation in Dec 2011, the PACS Administrators acted as the third party controller instead of the modality person In-Charge, to work with individual radiographers on the outstanding cases, which includes personal coaching/education sessions on specific errors. This intervention was targeted to be completed by the end of following working day.
Learning Curve for new Radiographers	It is expected that new radiographers have a learning curve while familiarizing themselves with the system workflow after on-the-job training sessions. Consistent monitoring and coaching for new radiographers could help in shorten the learning curve and reduce error rates.

Solution: New work list configuration

- In the new RIS system, worklists were configured for respective work areas which would display "Registered" and "Started" status procedures and consumables in the last two days.

- These lists would allow individual radiographers to view same-day and previous days' outstanding cases or errors easily.

- Radiographers are instructed to ensure NO outstanding/erroneous cases are displayed in the worklists at the end of the work day.

BREAST IMAGING – in last 2 days
CT (EMD) – in last 2 days
CT (DDI) – in last 2 days
CT (KRW) – in last 2 days
CT (NMC) – in last 2 days
DENTAL – in last 2 days
EMD X-RAY – in last 2 days
FLUOROSCOPY – in last 2 days

Results

MONTHLY RIS ERROR COUNT SINCE JUN 2011 TO SEP 2013

Before RIS Upgrade, error monitoring done by Section in Charges. Limited improvement due to constraints of application

Jan 2012, 147 RIS Error recorded. Start Implementation of worklist and personal monitoring workflow daily.

Feb 2012, Started to show sessions statistics in Monthly Radiographers' Meeting too.

Nov 2012 ONWARDS sudden increase due to new Radiographers who were not familiar with workflow

11 Dec 2011, Upgrade RIS. No tracking of errors due to adaptation to new application

Gradual decrease in Monthly RIS errors observed from 147 RIS errors in Jan 12 to 44 RIS Errors in Sep 12. About 70% reduced in RIS Error.

Results & Discussion

- An average of 149 RIS errors was noted from June 2011 to November 2011 before new RIS application was implemented in December 2011. Limited improvement was observed due to constraints in system applications.

- The 1st intervention of upgrading the RIS system occurred in November-December 2011.

- No significant improvement of error rate was observed in January 2012.

- In January 2012, the 2nd intervention was performed where the PACS Administrators took the role of the person In-Charge of the modalities to follow up with errors made and conduct individual coaching. E-mail reminders with error lists were also sent to individuals.

- A slight improvement of 10% was observed in February 2012.

Results & Discussion

- In order to further reduce the error rate, the 3rd intervention was performed:
  - ➢ Each modalities' error statistics were routinely shown in the Monthly Radiographers' Meeting to create awareness.
  - ➢ Individual error rates were shared with each radiographer at during the open appraisal exercise.
  - ➢ The error rate was made a PACS/RIS quality indicator and each individual was informed that the error target is 5%.

- A gradual improvement was observed from February 2012 onwards with a significant decrease in the number of RIS errors recorded after the third intervention. 70% reduction rate was achieved by September 2012.

- After which, occasional increase in errors were observed whenever new radiographers came on board.

- In June 2012, the team reviewed the error rate target from 5% to 0%.

Results & Discussion

- The quality improvement effort was sustained with a monthly average of 61 RIS errors clocked after November 2012.

- An observation was made from September 2012, 90% of the outstanding cases were consumables and second opinion cases which were in separate work lists from the common work areas.

- From September 2012, the team observed that 90% of the RIS errors which perpetuated were from consumables codes and second opinion cases which were viewed separately from room/work area worklists, which radiographers used to track RIS errors.

- Efforts are still ongoing to reduce the error rates.

CONCLUSION

Continuous monitoring of RIS errors, individual coaching and using RIS errors rates as a key performance indicator (PACS/RIS quality indicator) are required to drive quality improvement and sustain the low error rates.

Review of quality target challenges the team to attain better results.

Thank you
for your attention