Project Title

An automated system to track and remind for timely ureteric stent removal (TRACER)

Project Lead and Members

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Project members: Ye Shuqin, Khoo Pei Fong, Moarie Grace Tan, Tang Gui Feng, Chia Sing Yi, Michelle Tan Siok Keow

Organisation(s) Involved

SengKang General Hospital

Healthcare Family Group(s) Involved in this Project

Medical, Allied Health, Nursing

Applicable Specialty or Discipline

Medical & Laboratory Technology, Urology

Project Period

Start date: July 2021

Completed date: August 2021

Aims

To develop an automated ureteric stent tracing system (TRACER) to ensure:

1. Comprehensive tracking of every stent inserted within patients.
2. Reliable and automated reminder to users when implant removal has not been performed within a user defined time period.

Background

- Medical implants are commonly deployed but the process of tracking, tracing and reminding of removal is manually based.

- Such manual processes require significant resources and also prone to omissions which may lead to medical complications from prolonged implant retention.
- We adopt ureteric stents as a pilot implant as they are commonly deployed and the clinicians utilise between 500-800 stents per year. They are also deployed in a wide variety of clinical patients and scenarios.

Methods

See poster appended/below

Results

See poster appended/below

Conclusion

- TRACER is a novel automated system with the ability to accurately track and remind clinicians on the status of ureteric stents used during surgery.
- Use of TRACER is associated with significant time and manpower savings.
- There are NO significant infrastructural upgrades needed for TRACER.
- **Future plans:** TRACER is scalable to the tracking of all medical implants besides stents, and also implementable in other institutions easily.

Project Category

Technology

Digital Health, Data Management, Data Platform, Automation

Care & Process Redesign

Productivity, Quality Improvement, Time Saving, Job Effectiveness

Keywords

Medical Implants, Automated Ureteric Stent Tracing System, Dual-Prong system, Tracking System, Electronic medical records,

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An automated system to track and remind for timely ureteric stent removal (TRACER)

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BACKGROUND

- Medical implants are commonly deployed but the process of tracking, tracing and reminding of removal is manually based.
- Such manual processes require significant resources and also prone to omissions which may lead to medical complications from prolonged implant retention.
- We adopt ureteric stents as a pilot implant as they are commonly deployed and the clinicians utilise between 500-800 stents per year. They are also deployed in a wide variety of clinical patients and scenarios.

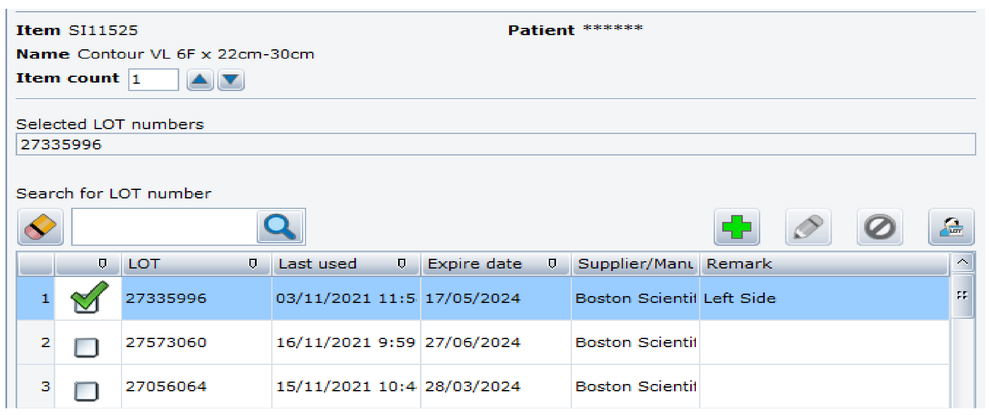
AIMS

- To develop an automated ureteric stent tracing system (**TRACER) to ensure:**
  1. Comprehensive tracking of every stent inserted within patients.
  2. Reliable and automated reminder to users when implant removal has not been performed within a user defined time period.

METHODOLOGY AND INTERVENTION

- The project team led the conceptualisation and implementation of the automated stent tracing system **TRACER.**
- TRACER uses a dual-prong system for stent tracking during each intra-operative insertion of ureteric stent:

1. Input of stent used and side via **T-DOC instrument tracking system** by the **nursing team**:



T-DOC instrument tracking system: *Lot number of the stent, date of use and laterality (left/right side) will be documented by nurses prior to use of each ureteric stent.*

2. **Electronic medical records (EMR)** documented by the **surgical team**.

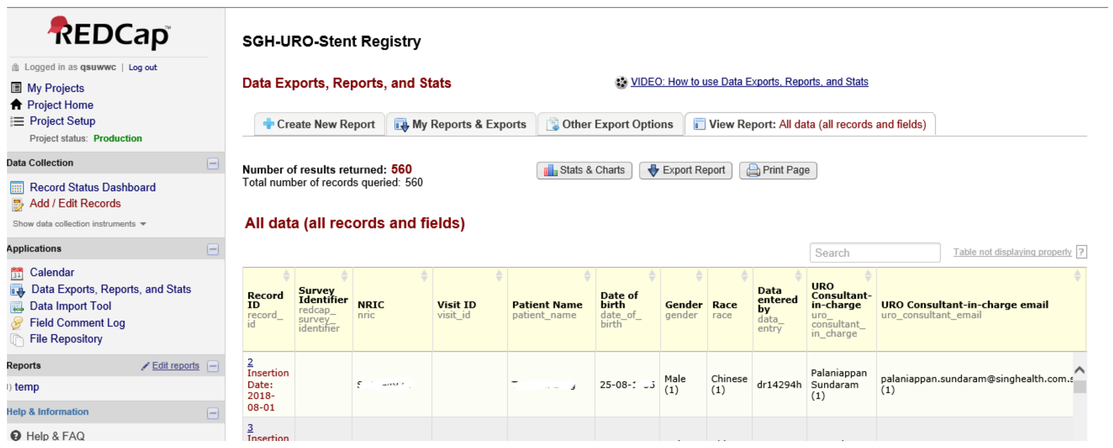
Summary of Operation cystoscopy and insertion of left DJ stent
Type of Operation Medical
Method of Operation Min. Invasive (MIS)
Findings
stentL

RPG: left small radioopaque stone at L4, left mild hydronephrosis
bladder normal
urethra slightly tight, but no stricture
prostate not enlarged
bilat UO normal

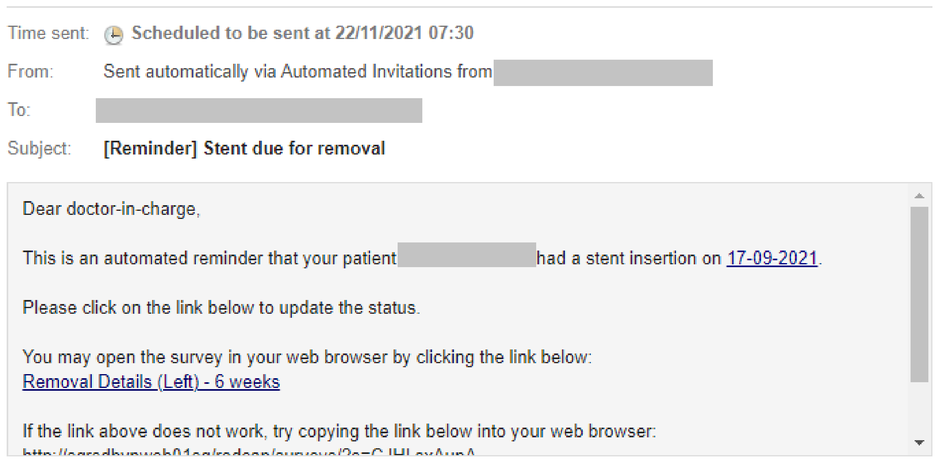
Electronic Medical Records (EMR): *Maintained by surgeons – documentation of either "StentL", "StentR", or "Stent2" triggers registration on the TRACER system as a stent inserted on the left, right and both ureters respectively.*

- By having **two independent parties** trigger the tracking system, the **number of potentially missed entries are minimised**.
- The system can be **easily configured** to include new clinicians joining the department, or remove clinicians no longer in the department.
- This data is then uploaded onto REDCAP, which automatically sends an email reminder to the physician if stent removal has not been performed before a defined time period.

- The email reminder is **repetitive**, until data entry for stent removal is completed by the clinician, to further ensure timely removal of stents.



REDCAP System: *Each stent inserted is linked to the primary clinician, and email reminders are triggered from this system, based on stent insertion date and date of expected stent removal.*



Example of email reminder sent to clinicians: *Stent insertion date and patient's identifiers are sent to ensure timely removal of ureteric stents.*

- The TRACER system was piloted in the Urology operating theatre between July to August 2021.
  - The total number of stents tracked with TRACER were compared to the number of urologic procedures on eHINTS involving stent insertion.
  - Manpower required and time spent implementing the TRACER system was compared to the existing system of manually uploading stent data to the REDCap stent registry.

RESULTS

1. ACCURATE TRACKING

- **All 82 ureteric stents used accurately tracked** with complete linkage of data between eHINTS and TRACER. 7 stents not accounted for by clinician documentation detected by the algorithm, and surgeons were automatically informed to update the records.
- **All stents removed on time**, except 2 patients who were transferred to another hospital for continuation of care.

2. MANPOWER SAVINGS

- Time spent for uploading stent data to REDCap per patient shortened from an average of **4 minutes** (when performed manually) to **30 seconds,** equal to an **87.5% savings** in man hours spent tracing stents.

CONCLUSIONS

- TRACER is a novel automated system with the ability to accurately track and remind clinicians on the status of ureteric stents used during surgery.
- Use of TRACER is associated with significant time and manpower savings.
- There are NO significant infrastructural upgrades needed for TRACER.
- Future plans:
  - TRACER is **scalable to the tracking of all medical implants** besides stents, and also implementable in other institutions easily.

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