



The New ERA of Outpatient Lab Billing

Enhanced Experience ■ Revenue Recovery ■ Accelerating Automation



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Kaye Peh Kai Yi¹, Jennifer Yong Chui Lan¹, Siong Guan Cheng¹, Shevir Tan², Chiew Pei Pei², Sarina Bte Mohamed Abdullah², Alden Tan Yuan Siang², Chua Hui Min³, Fiona Chan Seet Ling⁴, Eugene Sim⁵, Karen Shiu⁵, Kemas Muhamad Zulhaimi Bin K A Omar⁵, Poonam D/O Vas Dev Bajaj⁵, Kelly Kang Geok Kee⁵, Shawn Poh Kiat Keong⁵, Chan Wai Ching⁶, Natalia Fernandez Heng⁶, Isabella Tan⁷

1. Finance & Accounting, 2. Patient Financial Services, 3. Histopathology, 4. SOC Clinical Laboratory, 5. Specialist Outpatient Clinic-Operations, 6. Department of Future Health System, 7. Process Transformation and Improvement

Background of the Problem

Annually, there are over 1 million laboratory tests performed for our outpatients. However, the lack of integration between Laboratory Information System (LIS) and Outpatient Administrative System (OAS) results in patients and staff relying on paper-based process, which is time-consuming and requires manual effort, to ensure that lab tests are billed accurately and timely.

Our Staff

- Over 672 man-hours spent per month across 3 departments to complete lab billing.
- Human errors resulting in inaccurate / incomplete billing.

Our Patients

- Reduced patient experience from bill disputes.

Our Organization

- \$0.5mil revenue leakage in FY20 due to missed / inaccurate charges.

Mission Statement

To review and optimize the outpatient lab billing process to improve billing accuracy and timeliness, and enhance the experience of both patients and staff.

Analysis of Problem

A multi-department workgroup was formed consisting of representatives from Finance, Ambulatory Services, Pathology to review the existing lab billing process. A process mapping exercise helped to identify key steps involved in the current billing process and the following areas for improvement.

- Better manage patients' expectations on lab services
- Improve billing accuracy and completeness of lab services

The workgroup subsequently used a Driver Diagram to brainstorm for potential interventions to address the improvement areas.

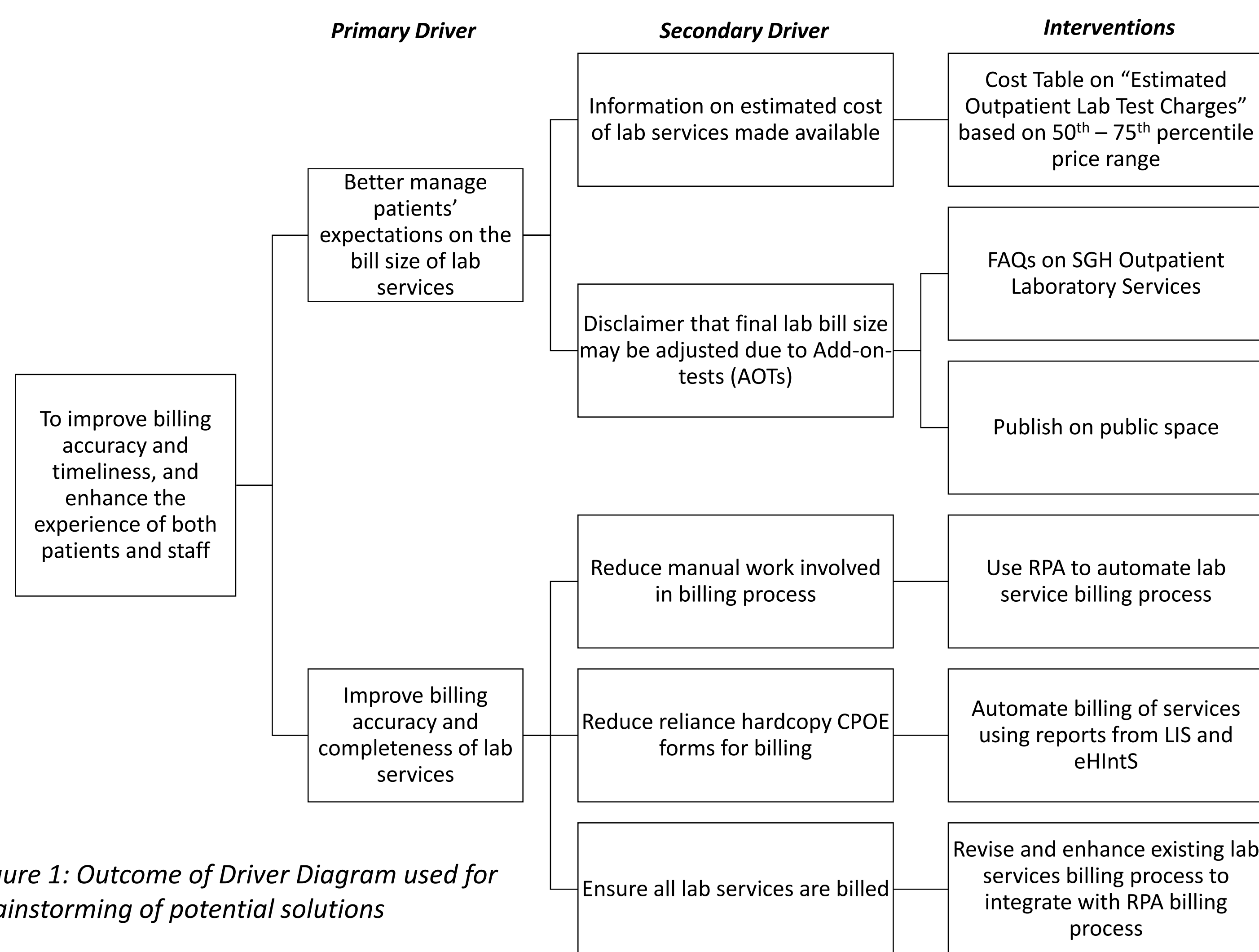


Figure 1: Outcome of Driver Diagram used for brainstorming of potential solutions

Interventions / Initiatives

- [Jul'22] Webpage (www.sgh.com.sg/labtest) on SGH Website consisting information on estimated lab test price range and answers to common FAQs on SGH lab services
 - Estimated cost of lab services for common specialties were generated based on 50th – 75th percentile of the bill sizes incurred by patients in FY2021.
 - The information was updated with inclusion of revised GST in Jan'23.

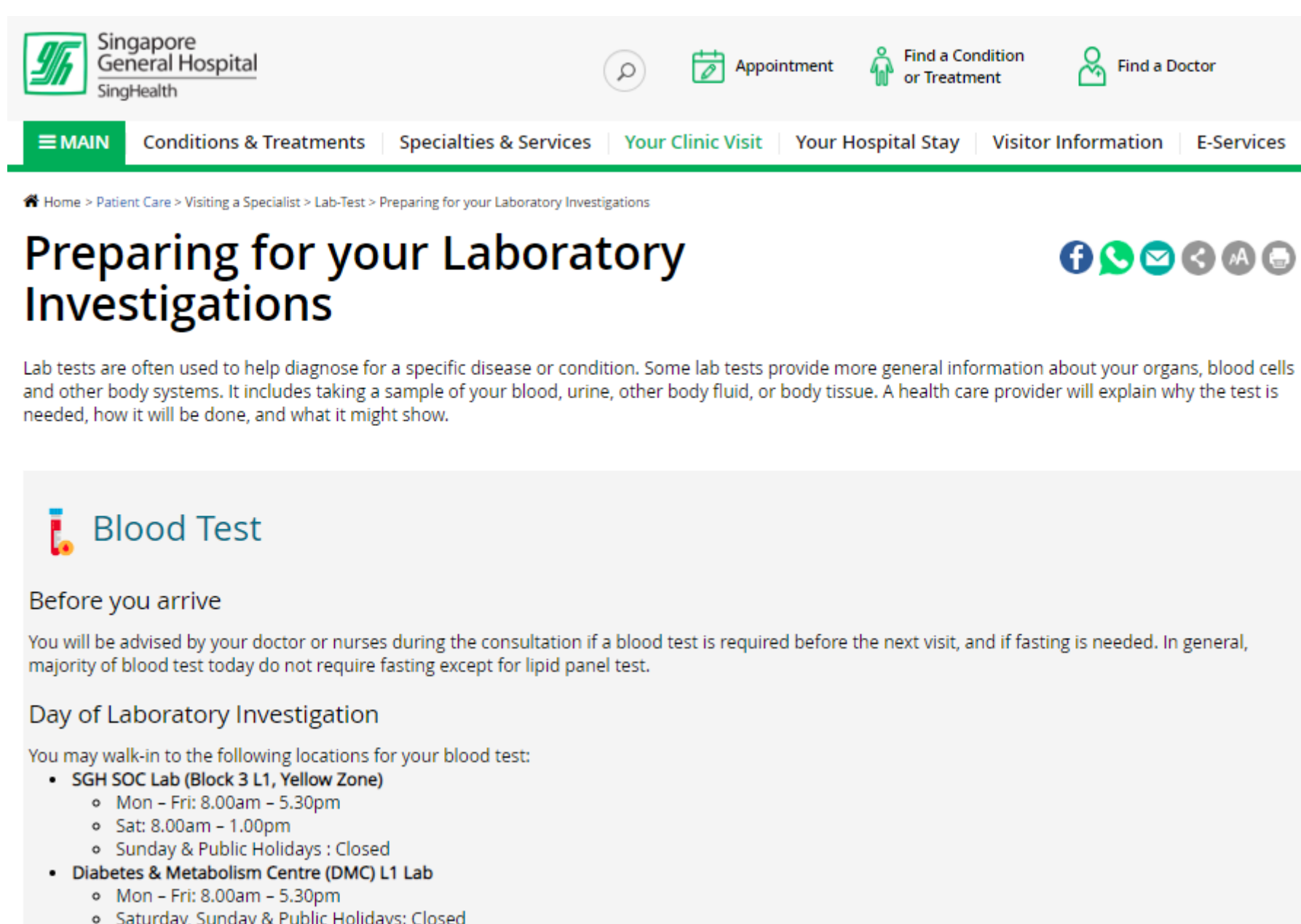
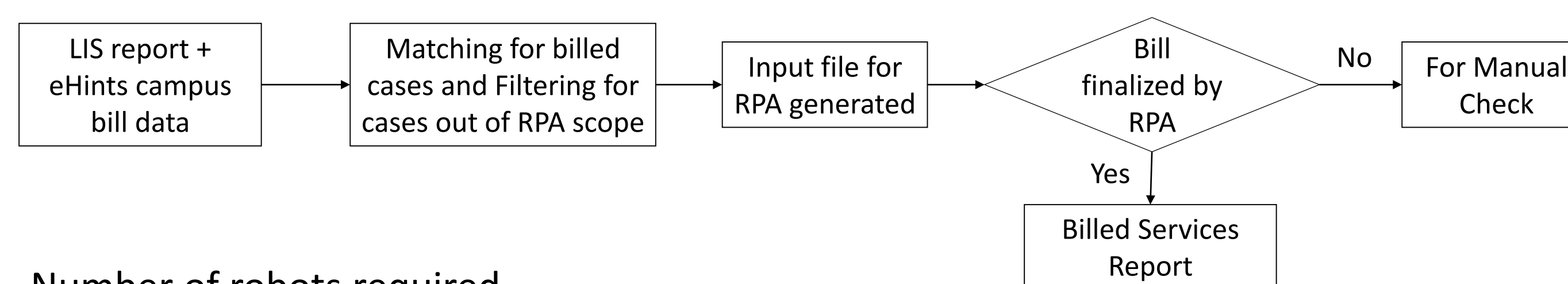


Figure 2: Webpage published on laboratory services

Interventions / Initiatives (continued)

- [Feb – Apr'23] Use of Robotic Process Automation (RPA) for lab billing
 - Summary of the RPA workflow for lab billing
 - Lab tests are now billed when the tests are performed, rather than when the specimen is collected, ensuring precise charges posted to the patients and accurate recovery of revenue for the services rendered.



- Number of robots required
 - 7 robots are utilized to complete the daily billing of outpatients lab cases (M = 512, SD = 71) on time
- Exclusions from RPA scope (process workflows remain status quo)
 - Orders from nuclear medicine, DDR, staff clinic, VVIP clinic, vaccination clinic
 - Orders for clinical trials and research project
 - Orders sent out for investigations at external vendor laboratories
 - Specimens drawn at SHP
- Selection of payer at bill finalization
 - The robot adopts the payment method from the most recent billed visit of the same case number and finalizes ONLY if the payment method is self-pay, staff benefit (all SingHealth institutions) and MCPS/CSC.
 - For all other payment methods, including Medisave (all schemes), the lab bill will be finalized by a staff.

Results

Lab Test Webpage Performance

Since its roll out in July 2022, the new webpage featuring details about SGH laboratory services and estimated costs has experienced a gradual increase in views.

- Close to **8,600** total views
- Highest monthly views: **1,046**
- 90.1%** of traffic came from Google search engine
- 72.8%** of viewers accessed via mobile device

RPA Billing Performance

From February to March 2023, 6 pilot tests were conducted on 20 working days to evaluate the performance of RPA.

- 80%** Manual workload alleviated^[1]
- 87%** Accuracy rate^[2]
- ~2.07 minutes** Processing time per case

[1]: 20% of workload are managed manually due to the complexity.
[2]: 13% attributed to system lag or errors encountered during 3rd party payer validation

Benefits of the Implementation

- \$124K annual savings** resulting from **45% reduction** in man-hours involved in lab billing processes^[3]
- 28% reduction in revenue leakage** due to billing oversights and variations in practices^[3]
- Increased staff satisfaction** as a result of reduced manual repetitive tasks, enabling them to concentrate on value-added responsibilities, promoting Joy at Work.
- Enhanced patient satisfaction** as a result of consistent work processes and reduced bill disputes from billing errors

[3]: Estimated based on pilots conducted in Feb – Mar 2023.

Sustainability Plans

System (SCM, LIS, eHints, OAS) downtime protocols have been established to ensure continuity of the operations and timely resolution to the disruptions. The workgroup has also crafted and circulated the FAQs on the implementation of automated billing for lab services to relevant stakeholders to ensure everyone is aware of the initiative and can collaborate effectively to resolve issues.

Learning Points

The Process to Automation

Justification of ROI on RPA implementation based on consideration of repetitive and high volume manual processes

Cross-Department Coordination

Inputs from different process owners allowed for holistic view of entire process

Harmonized Workflow

Elimination of variations in practice to maximize efficiency of RPA robots

Not the end but the start of a NEW workflow

Constant reviews and updates of RPA Bot logics in accordance to hospital policies & processes