To Improve The Efficiency Of Clinical Pathway Records Tracking
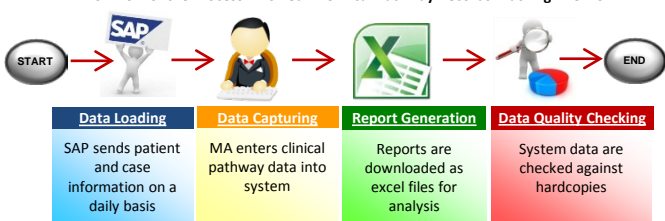
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INTRODUCTION & BACKGROUND

KKH's vision is to be the healthcare leader for women and children. Potential projects identified were scored based on criteria taken from KKH's strategic objective for "Internal Process". The subject of improving the efficiency of clinical pathway record tracking was ranked the highest and selected.

Clinical Pathways (CP) define the best sequence and timing of interventions for patients with a particular diagnosis or specific procedure. The **Clinical Pathway Tracking System (CPTS)** was rolled out since year 2004 for users to input the CP indicators and tracking purpose. The study aims to improve the efficiency of CP record tracking in **Medical Affairs (MA)**.

Workflow of the Process Involved In Clinical Pathway Records Tracking in CPTS

Data Loading	Data Capturing	Report Generation	Data Quality Checking
SAP sends patient and case information on a daily basis	MA enters clinical pathway data into system	Reports are downloaded as excel files for analysis	System data are checked against hardcopies

PROBLEM STATEMENT & MOTIVATION

Annually, up to **138 work days (WD)** were spent on enhancing the system that captures CP data and data entry into the system.

The problems faced in the CPTS are :
1. The technology that was used to develop the system is obsolete.
2. Due to the limitation of the technology that was used to develop the system, it is time consuming and costly to add new forms templates to the system. Estimated effort for **Information Systems Department (ISD)** staff is **30 work days** per year.
3. The system stores highly sensitive patient information but the system doesn't have audit trails function.
4. MA staff spends time tracing missing data in the pathway forms as they had to call ward by ward to retrieve the information.

Improving the efficiency of CP records tracking will enable action plans that leads to the improvement in the quality of care and services which the patients receive at KKH.

TOOLS & METHODOLOGY

We used the **Ishikawa diagram** to identify the root causes for "inefficiency in CP records tracking" and a **Pareto diagram** to determine the final root causes.
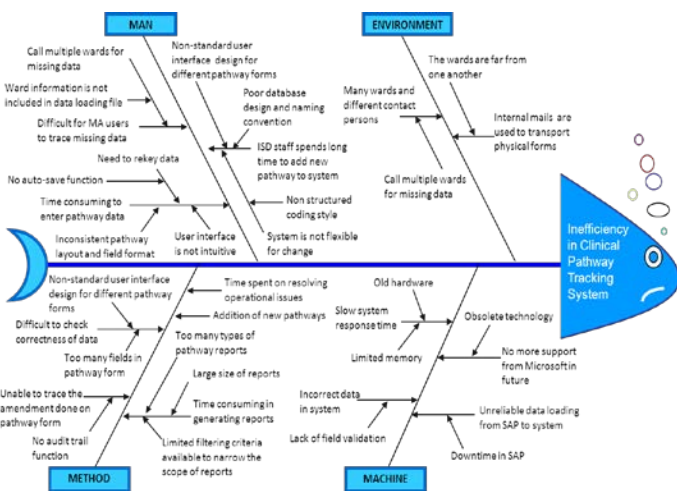
Pareto diagram - time spent on Clinical Pathway Tracking System activities **BEFORE** process improvement
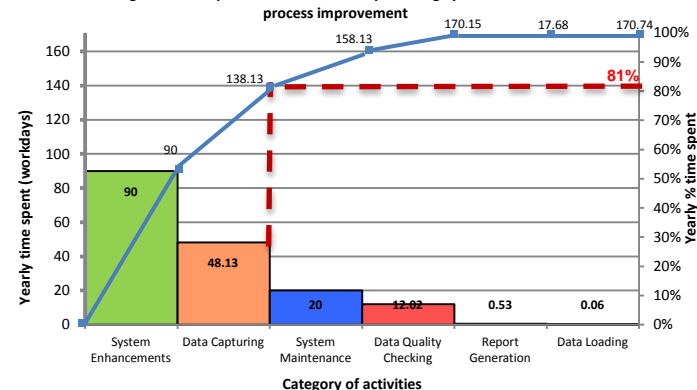
From the pareto diagram above, the processes in **"System Enhancements"** and **"Data Capturing"** are selected as the final root causes. We **target to reduce 50%** of the time spent in the final root causes: System enhancements and data capturing.

The workgroup developed the possible solutions using **brainstorming**. A **decision matrix** was used to select the final solution based on 4 criteria: 1. cost effectiveness, 2. operational support, 3. user-friendliness and 4. use of state of the art technology.

A: Cost Effective	The solution is able to provide the long term consistent benefit
B: Operational Support	The solution is able to achieve seamless integration of processes
C: User-Friendliness	The solution can ensure excellent medical care and patient safety
D: State of the Art Technology	Provide latest technology to support learning and growth for staff

Rating Scale:

1	2	3	4	5
Does Not Meet Criterion	Meet Criterion Least	Meet Criterion Fairly Well	Meet Criterion Well	Meet Criterion Fully

Propose product	Description of Solution	Evaluation Criteria				Total
		A [W: 0.3]	B [W: 0.3]	C [W: 0.2]	D [W: 0.2]	
1	Upgrade existing CPTS	- Redesign the software architecture - Integrate with SAP	3	3	2	3	2.5
2	Revamp to new CPTS	- Create new architecture for database and application that ease addition of new pathways. - Integrate with SAP	4	4	4	3	3.5

As **"Revamp to a new Clinical Pathway Tracking System (CPTS)"** ranked the highest for the evaluating criteria while solving the root causes, it was chosen as the final solution.

RESULTS

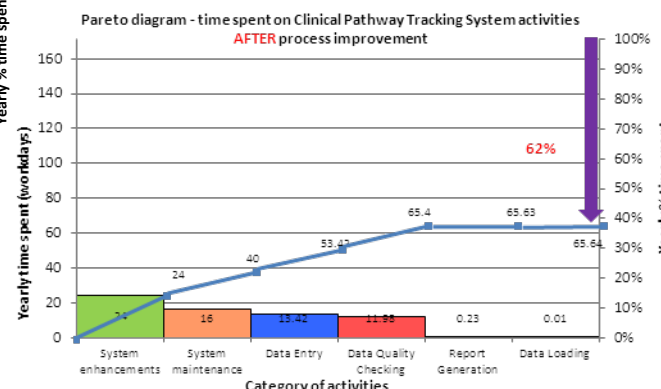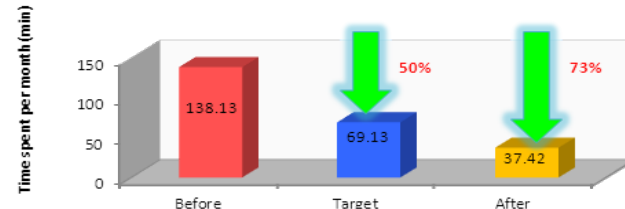### I. BEFORE AND AFTER TIME SPENT

We have made a significant achievement by reducing the total time spent in the root causes: data entry and system enhancements. The team **met its target of 50%** with an **improvement of 73%** (from 138 work days to 37 work days). This translates to an improvement in the overall time spent on CPTS activities.

The goal of improving efficiency in CP data capturing, led to a reduction in time spent on data capturing by **73%** (from 48 work days to 13 work days).

The overall time taken for CPTS activities has been reduced by **62%.**

CPTS (final root causes)	Before	Target		After	
	Time spent (WD)	Time spent (WD)	Reduction in time (%)	Time spent (WD)	Reduction in time (%)
Data Capturing	48.13	24.13	50%	13.42	72%
1 Search for a form based on case number	0.62	0.62	0%	0.21	66%
2 Call wards for missing information	34.72	10.72	69%	0.83	98%
3 Enter data into the system	12.79	12.79	0%	12.38	3%
System Enhancements	90.00	45.00	50%	24.00	73%
4 Addition of 3 new pathways	90.00	45.00	50%	24.00	73%
Total	138.13	69.13	50%	37.42	73%

Total time spent in CPTS root causes BEFORE, TARGET & AFTER

Pareto diagram - time spent on Clinical Pathway Tracking System activities **AFTER** process improvement

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II. VARIATION IN BEFORE AND AFTER TIME SPENT

CPTS activity	Reason
Data Entry	Ward information from SAP allows staff to trace missing information unambiguously.
System Enhancements	Revamped system architecture allows new forms to be added with 24 workdays per year instead of 60 workdays.
System Maintenance	Microsoft continues to support .Net 4.0 and the revamped system incurs lesser operational issues.

III. COST SAVINGS

With the revamped CPTS implementation, the project achieved cost savings of **S$199,355 over a 5 year period**.

IV. INTANGIBLE BENEFITS

1. **Improved data accuracy and completeness** - With patient information, case information and ward information interface from SAP, it eliminates the chances of data entry error by the staff from Medical Affairs. The automation of ward information from SAP allows for traceability of missing clinical pathway forms. This helps in contributing to the completeness of clinical pathway data as it is known which wards will have the missing data. Additionally, the flow of data from SAP ensures that the system is always updated with the latest patient data. More accurate and complete data can be used to improve care plan for patients.

2. **Improved system usability** - There is standardization in the user interface with the use of the internationally accepted **Microsoft Health CUI** for the user interface controls. As all clinical pathway forms have user interface controls with a similar look and feel, users find it easier to key in data.

3. **Improved accessibility and management of clinical pathway data** - With different access rights for different user profiles, it is easy for the administrator to manage the users' access to the system. This helps to prevent clinical pathway data from getting corrupted. Clinical pathway data can also be retrieved for researchers with a few clicks. Data archiving and expansion of the data storage can be completed easily. Better management of data accessibility contributes to protecting patient's privacy.

V. SUSTAINABILITY

The improvements are made sustainable through the following measures:

1. **System Measurement and Monitoring** – Argent was installed in the server to monitor system availability.
2. **Retrieval of Past Data from the Obsolete System** - Past data are retrieved from the database and placed in excel files. Hyperlinks to the excel files are present in the revamped system.
3. **System Enhancements** - The system was enhanced with the addition of 1 pathway form template called "Uncomplicated Febrile UTI pathway". The system common framework which the system resides on was also upgraded.
4. **Documentation and User Guide** – The system function specifications, operation manuals and other documentation have been prepared and uploaded to the server for easy reference.
5. **Security Access Matrix Review** – The security access matrix will be reviewed yearly to ensure they are up-to-date and fulfils the current requirement. Access is granted with need to have basis and with management approval.

SPIN-OFF FOR OTHER OPPORTUNITIES

The results of the project created spin-offs for:
1. Papsmear Letter Printing System
2. ProvenCare Project

Modules developed in CPTS could be re-used in other systems. The improvement in data management in CPTS provided a strong foundation for the study of evidence-based medicine in ProvenCare project.

CONCLUSION

The project's achievement supported KKH's goals in positive ways – CPTS leads to better coordination and quality of care for patients, services provided by MA and ISD are enhanced, and KKH brand is promoted.