



ASSESSMENT OF KEY BENEFITS OF INTRODUCING AUTOMATION IN CANTERBURY DISTRICT HEALTH BOARD, NEW ZEALAND

GUIDED BY :
DR. RUCHI GARG
(ASSISTANT PROF.,
THE IIHMR UNIVERSITY,
JAIPUR)

SUBMITTED BY :
DR. PRIYANSHI ARGAL
(MBA HM-21)



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INTRODUCTION

- A patient in today's world is a customer to the hospital who expects a similar level of services he/she gets from other industries like banking, logistics etc.
- Hospitals that seek to grow in today's economy intend to introduce higher level of automation to achieve better return on investment
- New Zealand has one of the best healthcare systems in the world and wants to maintain it by investing in highly automated Hospital Information System (HIS)
- South Island Alliance of New Zealand (comprising of 5 DHBs) has partnered with Orion Health (head quartered in Auckland) to roll-out a state-of-art Patient Administration System across all its DHBs

INTRODUCTION (contd.)

- This study focuses on the largest DHB in South Island i.e. Canterbury District Health Board (CDHB) and two of its major hospitals – Burwood Hospital and Princess Margaret Hospital
- This study determines the key drivers and motivation behind CDHB's initiative to allow greater hospital automation by replacing its legacy Patient Administration System (PAS) and,
- Evaluate the tangible benefits CDHB has already achieved (or will achieve) by replacing its legacy PAS
- The tangible benefits would be measured by inspecting the patient visit data in the hospitals before and after legacy PAS replacement

LITERATURE REVIEW

- Hospital Information System (HIS) provides a means to the hospital go essential go ***paper-less*** i.e. introduction of automation in all the hospital departments that minimizes manual errors, better reporting to senior management and more importantly improved patient care and experience
- Level of automation introduced in a hospital via HIS could be varied depending on the hospital's expectations and investment in technology
- Transition to a highly automated HIS requires close examination of patient workflow in the hospital environment, training of hospital staff and monitoring of patient's journey in the hospital
- Regardless of the scale of hospital operations, proper implementation of an HIS in a hospital leads to a considerable return on investment (ROI) for the hospital and enhances patient's experience

BACKGROUND

An elaborate 30-60-90 day upskilling approach was employed at Orion Health that involved:

- Induction in to the organization and extensive training in Orion Health Enterprise Hospital Information System (HIS) followed by
- A 2-day visit/workshop to two hospitals in Canterbury District Health Board (CDHB) i.e. Burwood Hospital and Princess Margaret Hospital located in Christchurch, New Zealand.
- Hospital visit/workshop involved a thorough tour of the hospital, detailed discussions with hospital staff and patients, evaluation of how efficiently and HIS was operational in the hospital and finally
- Collection and analysis of data collected during the 2-day visit, drafting conclusions and recommendations

RESEARCH QUESTIONS

- What motivated CDHB to shift to Orion Health Enterprise HIS from its existing legacy Patient Administration System (PAS)?
- Did turn-around time for patient visits in Outpatient, Inpatient and Emergency departments improve after the adoption of Orion Health Enterprise HIS?
- Was there a considerable Return on Investment (RoI) for the hospital management after the adoption of Orion Health Enterprise HIS?

AIMS & OBJECTIVE

- To determine the key drivers and motivation behind CDHB's initiative to allow greater hospital automation by replacing its legacy Patient Administration System (PAS)
- To evaluate the tangible benefits CDHB has already achieved (or will achieve) by replacing its legacy PAS by plotting the:
 - Patient volumes in IPD vs OPD vs ED (Patient Demographic Study)
 - Total turn-around time for a patient (admission all the way through to discharge) in OPD, IPD and ED visits during all the
 - Variance in the total cost borne by the hospital before and after the adoption of Orion Health Enterprise HIS after the adoption of Orion Health Enterprise HIS

OPERATIONAL DEFINITION

- **HIS:** Hospital Information System which is a software that is deployed in each department within the hospital environment
- **PAS:** Patient Administration System is a portion of HIS software that deals specifically with patient related tasks like appointment scheduling, patient queues, waitlists, admission procedures (IPD/OPD/ED), discharge etc.
- **Patient Turn-around Time:** Total time lapsed from the moment patient requested and appointment at the hospital to the time when he/she was discharged (excl. appointment reschedules)
- **Rol:** Difference between the total hospital expenditure before and after the adoption of Orion Health Enterprise HIS (excl. extra costs borne due to unforeseen hospital outages and other miscellaneous activities that were not executed prior to HIS adoption)

METHODOLOGY

- The form of study employed is Retrospective Cohort Study
- Conducted on 2 hospitals in Canterbury District Health Board (CDHB) – Burwood and Princess Margaret Hospital in Christchurch, New Zealand
- Complete duration of the study was from 5th February 2018 until 6th April 2018 (incl. visits to Burwood and Princess Margaret Hospital on 9th and 10th April 2018 respectively)
- Study participants:
 - See next slide..

METHODOLOGY (contd.)

- Study participants:
 - Orion Health Enterprise HIS product management team
 - Orion Health Education Team
 - IT managers in Burwood and Princess Margaret Hospital
 - Clinicians/General Physicians
 - Cardiac Surgeons
 - Nursing staff assisting physicians and surgeons
 - Front desk receptionists and clerks
 - Radiologists
 - Laboratory technicians
 - Pharmacists
 - Cyber security experts
 - IT help desk staff
 - Board members of Canterbury District Health Board (CDHB)
 - Product Director - Enterprise

SAMPLING AND SAMPLE SIZE

- Audited record of patient visits for the following three periods:
 - ***2nd February 2015*** until ***27th November 2015***
 - ***29th July 2016*** until ***28th July 2017*** and
 - ***7th July 2017*** until ***30th March 2018*** with specific focus on the following
 - Patient volumes in IPD vs OPD vs ED (Patient Demographic Study)
 - Total turn-around time for a patient (admission all the way through to discharge) in OPD, IPD and ED visits during all the
 - Variance in the total cost borne by the hospital for each of the periods above

EXCLUSION AND INCLUSION CRITERIA

- Referrals from hospitals outside of Canterbury District Health Board (CDHB) were not considered
- Patient visit data for holiday periods were excluded due to difference in the hospital staff available during holidays
- Days for scheduled annual hospital outages for events such as fire drills etc. were excluded
- IPD visits for patients with prolonged illnesses (more than 5 years) and undergoing special treatments were excluded

PROCESS

- The complete study (conception to conclusion) was conducted in 3 stages in the following sequence:
 - Training on **Orion Health Enterprise Hospital Information System (HIS)** software and a typical hospital workflow in a New Zealand public hospital from **5th February 2018** until **6th April 2018** (both online and classroom modes)
 - A full day visit and workshop in **Burwood Hospital, Christchurch** (New Zealand) on **9th April 2018** and in **Princess Margaret Hospital, Christchurch** (New Zealand) on **10th April 2018** that involved a tour of all the hospital departments, detailed discussions with the hospital staff, hospital senior management, cyber security experts and occasionally patients and viewing the Orion Health Enterprise HIS software in operation at different stages of patient workflow within the hospital environment
 - Various workshops with Enterprise product management team over a period of 2 weeks to better interpret all the conversations and observations gathered during 2-days hospital visits and drafting conclusions

DATA COLLECTION METHOD

- Complete patient workflow explained (from admission all the way through to discharge) in both the hospitals.
- Introduction to all the hospital staff responsible for various stages of patient journey through the hospital e.g. front desk clerk, nursing staff, clinician, pharmacist, radiologist, lab technician, IT help desk etc.
- Explanation of their roles, work-procedures during emergency hours, manuals they use when the hospital is switched to a *manual mode*
- Exhibition of how Orion Health Enterprise was operational at various kiosks, on front desk reception, in radiology rooms, operation theatres etc.
- Interaction with the patients to understand their experience on a regular day to the hospital

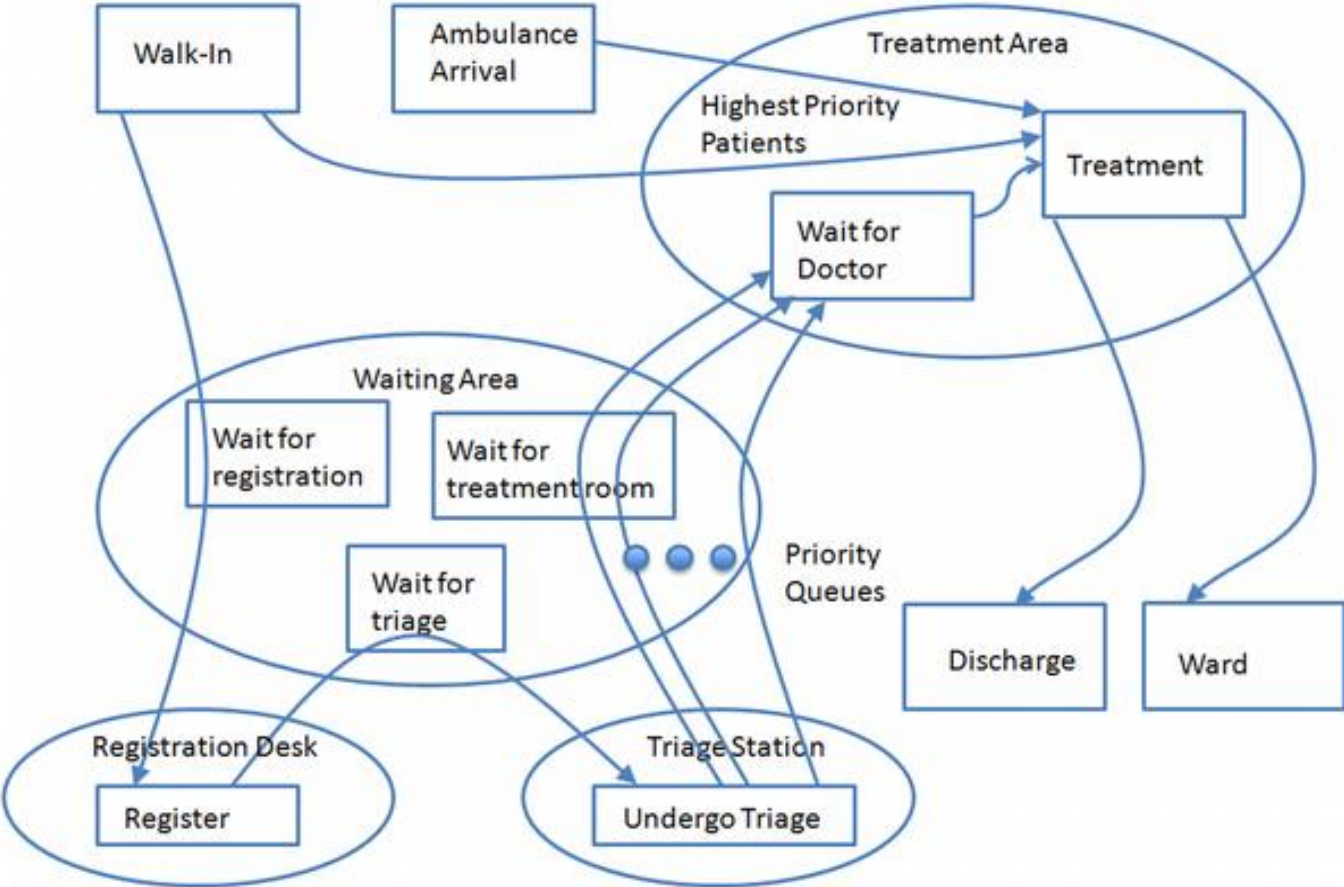
DATA COLLECTION INSTRUMENT

- **Orion Health Enterprise HIS software** - provision of a laptop with all the required software's installation and training for complete installation of the Orion Health Enterprise HIS. An investment of 2 weeks of the time during the internship to learn about the software was scheduled so that I am well-versed with the intended use of the software.
- **UX Wireframe, mock-ups and Proto-typing** – A methodology used within Orion Health where **User Experience (UX)** design team constructs a series of software screen mock-ups and collects user feedback to evaluate the suitability of the screen
- **Microsoft suite** namely MS Word, MS Excel, MS Powerpoint, MS Visio
- **Flowcharts and workflow diagrams on MS Visio**
- **Atlassian JIRA** (Configuration Management Tool)
- **Google Docs and Spreadsheet**
- **Mac Numbers** (Analogous to MS Excel in Apple Macbook)

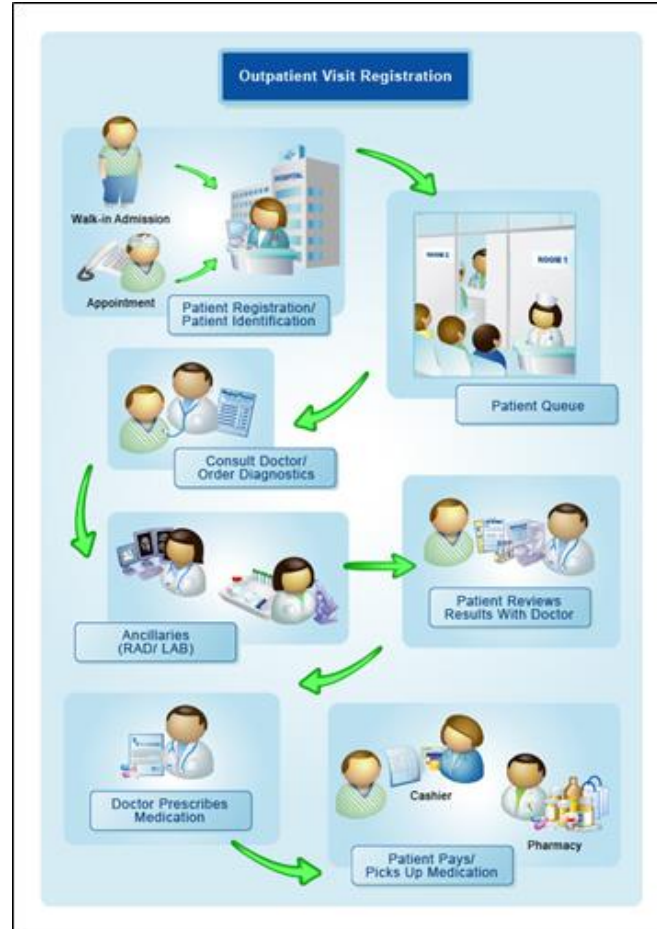


RESULTS & PROCESS FLOW

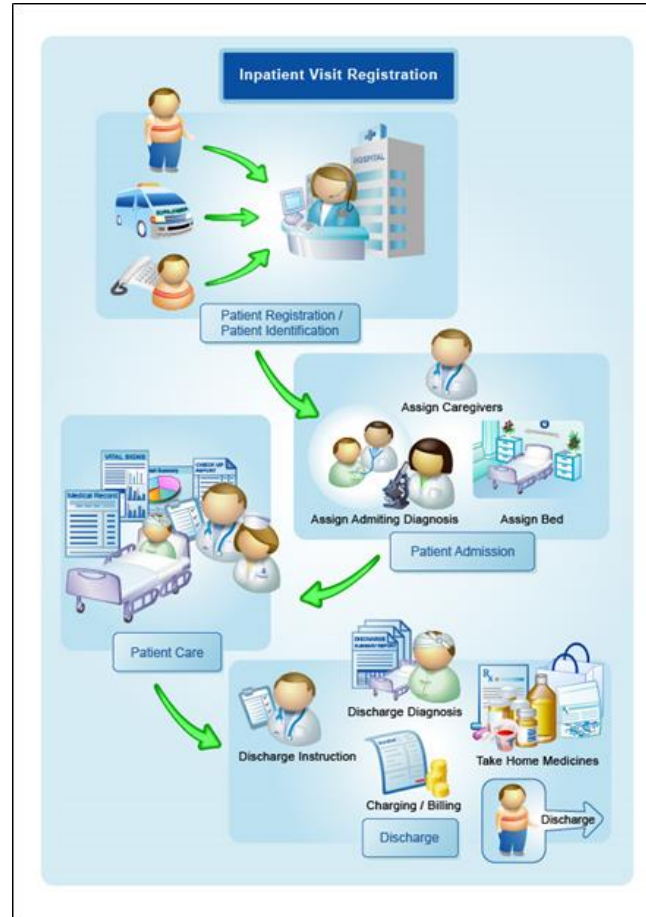
PATIENT JOURNEY IN BURWOOD/PRINCESS MARGARET HOSPITAL



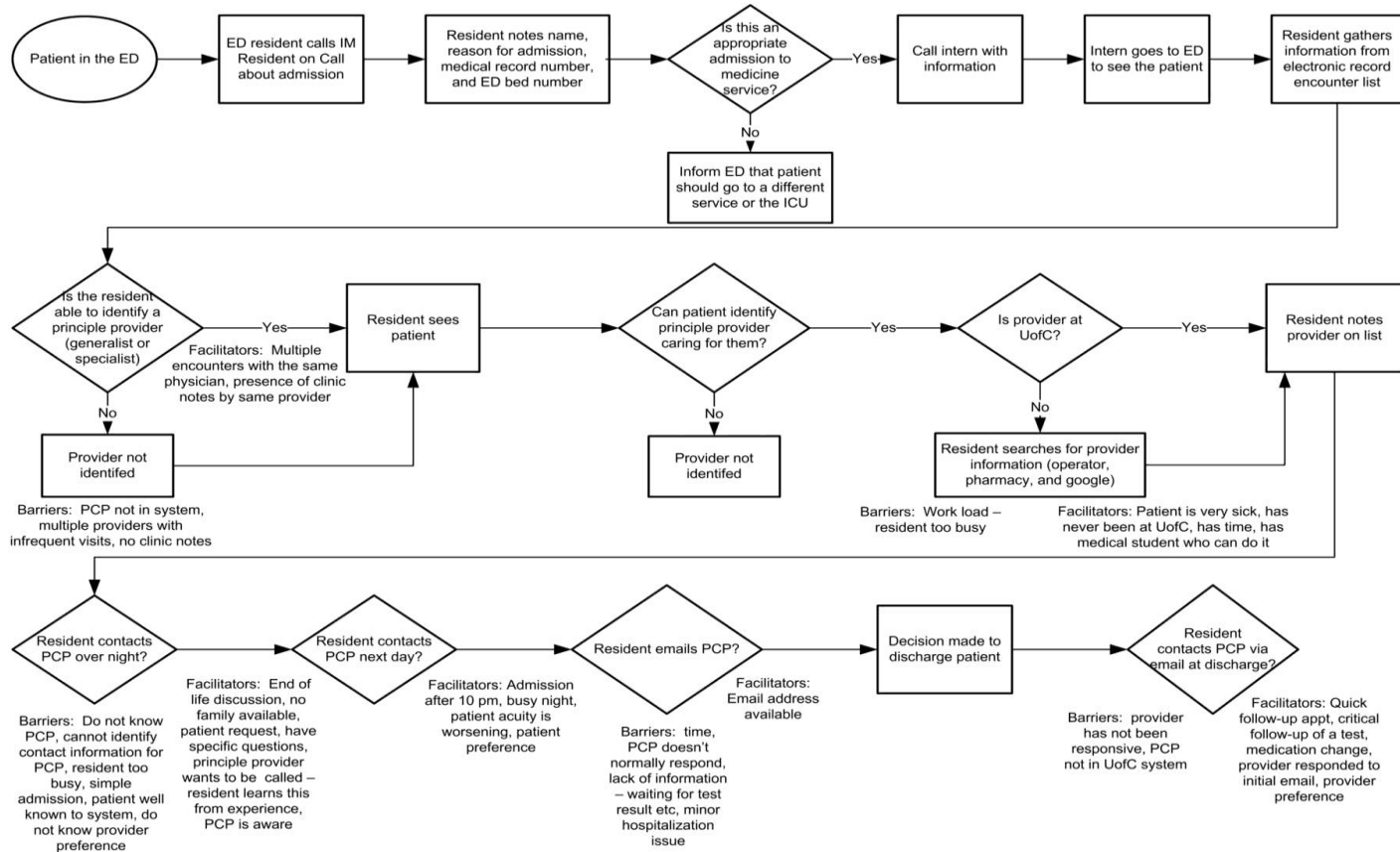
OUTPATIENT REGISTRATION WORKFLOW



INPATIENT REGISTRATION WORKFLOW



EMERGENCY DEPARTMENT WORKFLOW



A perspective view of a server room aisle. On both sides are tall server racks filled with equipment, many of which have colorful status lights (red, green, blue, yellow) illuminated. The floor is a light-colored, reflective tile. At the end of the aisle, a white door is visible, slightly ajar, with a bright light source behind it. The overall lighting is a cool blue, typical of server environments.

ORION HEALTH ENTERPRISE

PATIENT ADMINISTRATION OVERVIEW

Applications System Window Help

Quick Launch

User Profile ▾



84568-4564 John Q CARDINAL | Male | 65 y (DOB: 12-11-1949) 📷 ⚙️

Nationality New Zealand
Guarantor Self
Eligibility Unknown: Eligibility information has not been entered

Visit Details General IPD-CH – City Hospital
Doctor Francis McNamara (Dr)
Ward/Bed Ward Med 3 – Enders; 301d

Patient Administration Overview

Date Range

Unspecified ▾

From



To



Search



👁️ (2)

📄 My Referrals

Referrals

- 15-Sep-2015 ☹️
22918 Accepted
SPECIALTY Ophthalmology
REF TO Dr Edmond Germany
- 12-Aug-2015 ⚠️
22903 Pending
SPECIALTY Nephrology
REF TO Dr Enoch Thorn
- 01-Aug-2015 ⚠️
22611 Expired
SPECIALTY Hematology
REF TO Dr Shelley Jones

Wait List Entries

- 23-Sep-2015 ✨
Admitting Elective
SPECIALTY Ophthalmology
CLINICIAN Dr Edmond Germany
- 14-Sep-2015 ⚠️
Non-Admitting FSA
SPECIALTY Nephrology
CLINICIAN Dr Enoch Thorn
- 05-Sep-2015 ⚠️
Non-Admitting FUP
SPECIALTY Hematology
CLINICIAN Dr Shelley Jones
- 05-Sep-2015 ✓
Non-Admitting FSA
SPECIALTY Orthopaedics

⬆️ ⬆️ 16 items

OPD Activity

- 27-Sep-2015 09:00 AM
Follow Up
SPECIALTY Ophthalmology
CLINICIAN Dr Edmond Germany
- 14-Sep-2015 11:00 AM
Routine
SPECIALTY Nephrology
CLINICIAN Dr Enoch Thorn
- 05-Sep-2015 09:30 AM
Clinic Referral
SPECIALTY Hematology
CLINICIAN Dr Shelley Jones
- 02-Sep-2015 10:15 AM
Transfer
SPECIALTY Hematology

⬆️ ⬆️ 47 items

IPD Activity

- 12-Nov-2015 to 14-Nov-2015
City Hospital
BED SPECIALTY Ophthalmology
CLINICIAN Dr Edmond Germany
- 14-Sep-2015 to 15-Sep-2015
City Hospital Ward 6 North
BED SPECIALTY Nephrology
CLINICIAN Dr Enoch Thorn
- 14-Sep-2015 to 15-Sep-2015
Closed IPD Visit
BED SPECIALTY Nephrology
CLINICIAN Dr Enoch Thorn

Surgical Activity

- 12-Nov-2015
City Hospital
SPECIALTY Ophthalmology
SURGEON Dr Edmond Germany
- 14-Sep-2015 02:30 PM
City Hospital Ward 6 North
SPECIALTY Nephrology
SURGEON Dr Enoch Thorn

Functions ▾

Close

PATIENT ADMINISTRATION PATIENT QUEUE

→ RegistrationApplicationsSystemWindow? Help

Quick LaunchUser Profile ▾

Patient Queue

Work QueueCardiology (FSA)

ClinicianDr Francis McNamara

Search + 👁 (2) 🗨 McNamara Monday Mornings

Queue	Call Event	Elapsed	HN	Patient Name	Priority	Work Queue	Type	Clinician
8734	⌚ Waiting	-5 m	300000216	Ernst Schindler	Unknown	Cardiology	Request	Dr F McNamara
8722	👤 Ready	23 m	300000216	Ahmed Bahar	High	Cardiology	Allocate	Dr F McNamara
8712	📞 Called	25 m	300000216	John Martin	Unknown	Cardiology	Appointment	Dr F McNamara
8723	👤 Now Serving	29 m	300000216	John Q Cardinal	Unknown	Cardiology	FSA	Dr F McNamara
8745	📞 Missed Call	34 m	300000216	Jackie Stevenson	Unknown	Cardiology	Referral	Dr F McNamara
8732	✅ Completed	38 m	300000216	Bridgette Smith	Unknown	Cardiology	Transfer	Dr F McNamara
8716	⚙ Removed	45 m	300000216	William Carrie	Unknown	Cardiology	Unknown	Dr F McNamara

CALL EVENT 🧑 Now Serving

📞 📞 📞 !! 🗨 📞 ⚠

🧑 CARDINAL, John Q (Mr)

HN 1001130857

DATE OF BIRTH 12-Nov-1949 (66y)

GENDER Male (Married)

NATIONALITY New Zealand

RESIDENCE New Zealand (Citizen)

ADDRESS Unknown

🧑 Non-Admitting Appointment

SUBTYPE FSA

SPECIALTY Cardiology

CATEGORY Stress, Hypertension

👤 Arrive📞 Call👤 Service📞 Missed✅ Complete🗨 ↶ ⌛

Waiting 23 | Arrived 10 | Missed 2 | ✅ 53 | ⚙ 1 | Total 91

Functions ▾📞 Voice on | ⌛ Auto refresh on

Close

PATIENT RADIOLOGY VIEW

Radiology (Orion Health DEMO 112 - Network) - radhailey - [Workspace]

Radiology

- Main
 - Workspace
- Imaging
 - Acquisition
 - Print Log
 - Query Retrieve
 - DICOM Editor
 - Audit Trail
 - Import DICOM
- Teaching
 - Create Teaching Case
 - Import MIRC Document
 - Teaching Cases
 - Take a Test
 - Test Management
 - Teaching Setup
- Transcription
 - Transcription Work List
- Setup
 - Department Setup
 - Equipment Setup
 - Inaging Display Preferences
 - Inaging Display Settings
 - Procedure Setup
 - Storage Format Setup
 - Report Template List Admin
 - User Defined Schema Maintenance
 - Print Setup
 - Media Export Setup
 - Transcription Setup
 - Migration Task Setup
 - Inaging Storage Setup
 - User Procedure Preferences
 - Item Billing Code Mapping
 - Proxy Rights Setup
 - Download Manager Setup
 - Icon Display Setup
- Reports
 - User Procedure Preferences Summary
 - Remote Patient Search Audit Viewer

Reception | Scheduling | Vetting | Protocolling | Image Acquisition | Reporting | Verification | **Louisa CHAN**

300000135 Louisa CHAN ♀ Female 84 y

Allergies: Nuts, Penicilins
Visit Details: General IPO/CH - City Hospital; Medical ICU Bed ICU3; Dr. Paige Chen;
Problem List: Congestive heart failure, Diabetes
BSA: 1.50 m²

TBW: 41.52 kg
Height: 148 Centimetre
Weight: 55 kg
[Portal Applications](#)

Date: All Modality: CT (3) MG (1) CR (2)

Study
 Imaging service request: CH120000556
 Study date/time: 25-01-2009 09:52:05 AM
 Assigned radiologist: Madeline Haley
 Report indicator: Abnormal

Date	Modality	Study
2007	CT	CH12000015601
2008	MG	CH1200004901
2009	CR	CH12000055601
2009	MG	CH1200005201
2009	CR	CH1200005401
2010	CT	CH12000055601
2011	MG	CH12000055601
2012	CR	CH12000055601
2013	MG	CH12000055601
2014	CR	CH12000055601
2015	MG	CH12000055601



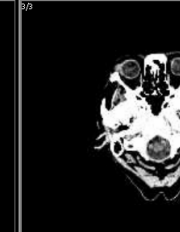
CH12000015601
CT01
13-11-2013 05:15:40 AM
CT
CT BRAIN



CH1200004901
CT01
01-04-2012 02:15:16 PM
CT
CT Abdomen/Pelvis Coriography



CH12000055601
MG01
18-08-2010 01:32:01 PM
MG
MG Left Breast



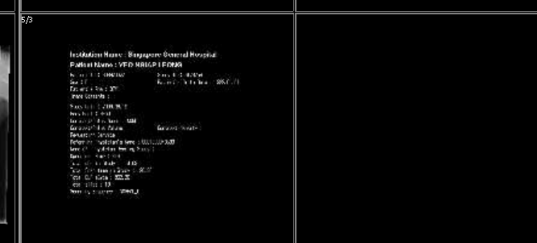
CH12000055601
CT01
25-01-2009 09:52:05 AM
CT
CT Left Wrist



CH1200005201
CT01
25-01-2009 08:42:41 AM
CT
CT Left Wrist



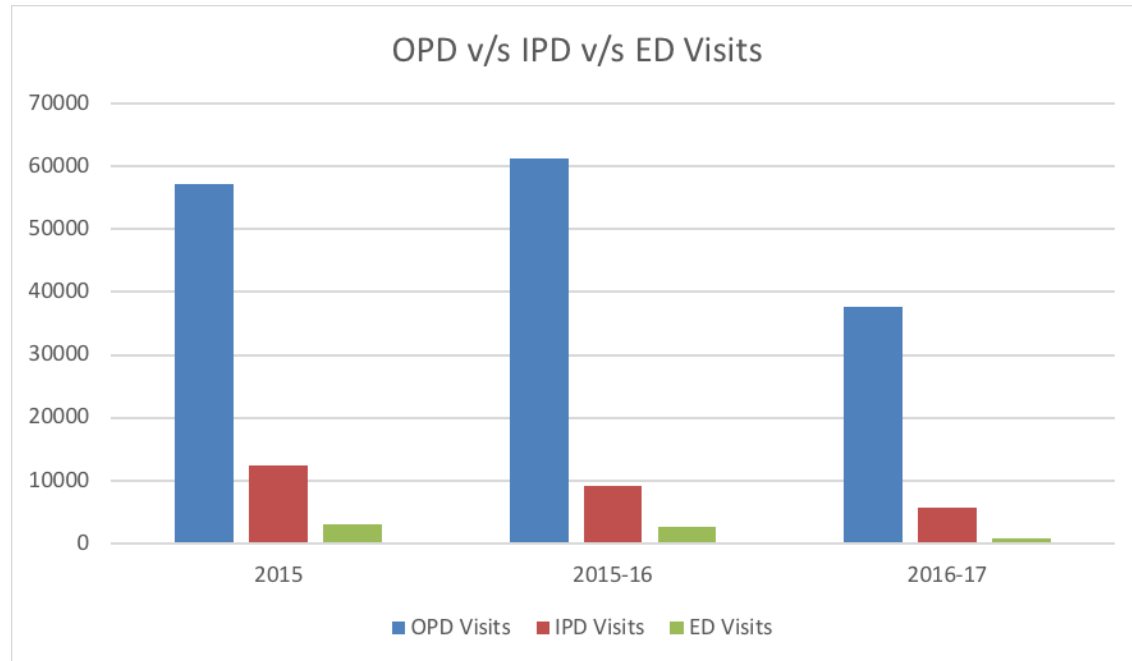
CH1200005401
CR01
17-09-2007 11:02:11 AM
CR
CR Chest PA



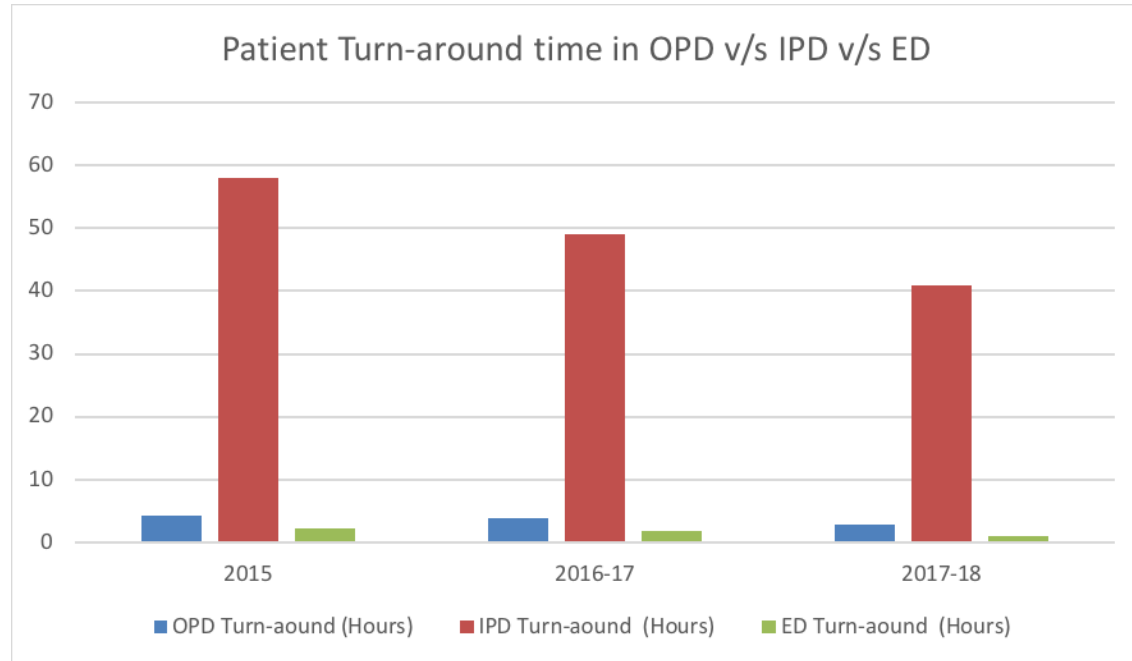
Examination Name: Bioprogram General Hospital
Patient Name: VIDU MALAP (F004)
Ref ID: 123456789
Exam Date: 2007-09-17
Exam Time: 11:02:11 AM
Exam Location: Radiology Department
Referring Physician: Dr. John Doe
Referral Indication: Chest pain
Technique: Standard PA view
Findings: The lungs are clear without evidence of consolidation or interstitial disease. The heart size is within normal limits. The diaphragm is well defined.
Impression: No acute cardiopulmonary abnormality detected.
Recommendations: Follow up as clinically indicated.

City Hospital | radhailey | TANYAH-NB | 2:38 PM 3/16/2011

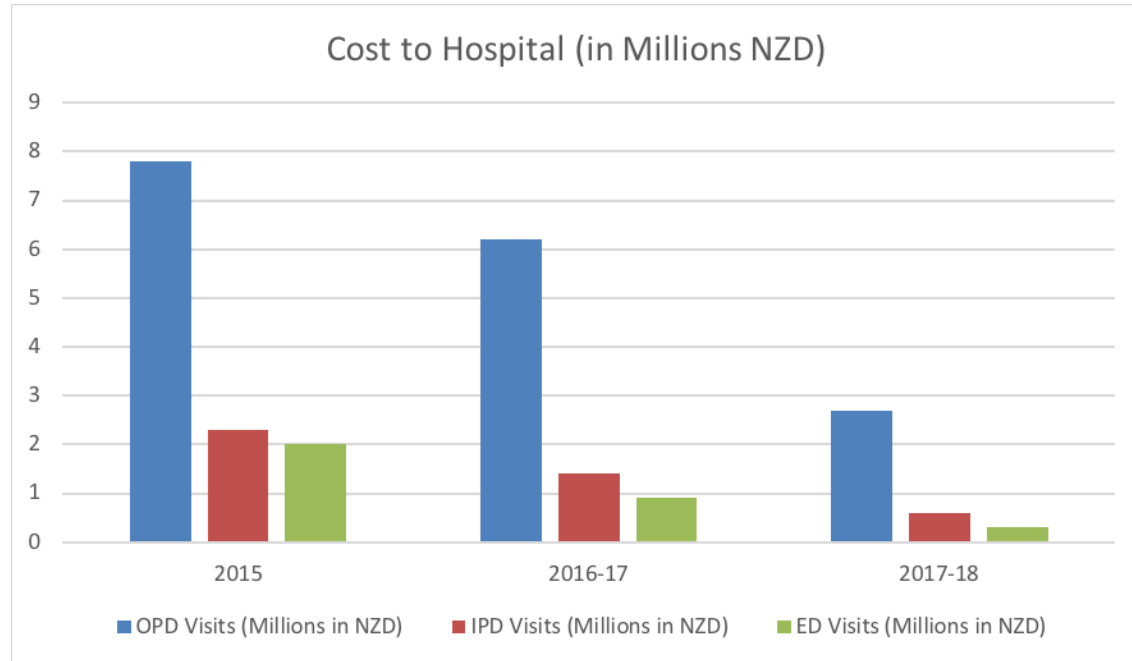
PATIENT VISITS IN OPD v/s IPD v/s ED



PATIENT TURN-AROUND TIME IN OPD v/s IPD v/s ED



COST TO HOSPITAL – INSIGHT IN TO RoI



DISCUSSION

Following were noticed as key benefits of Orion Health HIS adoption by Burwood and Princess Margaret Hospital:

- Better patient schedule management
- Easy patient record accessibility
- Patient record safety
- Less human errors
- Better coordination between hospital departments
- Better resource utilization
- Better operational efficiency
- Valuable insights for senior hospital management
- HIS adoption is valuable for hospitals of all scales

CONCLUSION

Adoption of Orion Health Enterprise HIS was clearly a wise decision and led to

- Better patient experience and less grievances/complaints
- Considerably higher return on investment that allows CDHB to invest in other key healthcare areas
- Better monitoring of hospital performance and availability of hospital reports for hospital management staff
- Transition to an HIS with higher level of automation was successfully achieved by CDHB

RECOMMENDATIONS

All the previous software releases of Orion Health Enterprise were studied and combined with interactions with hospital staff, following improvements to the software is recommended

- Additional Data Validation – Referral Prioritization Workflow
- Additional Data Validation – Service & Service Sub-Type Filtering
- Introduction of Capture for Un-Structured Appointments & Visits
- Workflow Improvements – Use of Prompts to Invoke Optional Triggering of Forms
- Workflow Improvements – Linking of Appointments to the Waiting List
- Additional Data Validation – Appointment / Visit Value Filtering
- Additional Data Validation – Reference Table Effective Dates

REFERENCES

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- District health boards of New Zealand - <https://www.health.govt.nz/new-zealand-health-system/my-dhb>
- South Island Patient Information Care System (SI PICS) - <https://www.sialliance.health.nz/our-priorities/information-services/si-pics/>
- Release of new patient information system at Burwood hospital - <https://www.sialliance.health.nz/news-/new-patient-information-system-completes-the-rounds-at-burwood-hospital/>
- Quality improvement at CDHB - [2017 Canterbury District Health Board Quality Improvements/](#)

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- Burwood hospital's enhanced automation attempt with their inpatient facility - <https://www.pulseitmagazine.com.au/new-zealand-ehealth/3641-canterbury-goes-live-with-si-pics-in-inpatients-finishes-medchart-roll-out>
- CDHB's transformation program as a case study - [International report encourages health systems to learn from CDHB](#)
- South Island Alliance and its objective <https://www.sialliance.health.nz/> Canterbury District Health Board's mission and values <http://www.cdhb.health.nz/About-CDHB/Who-We-Are/Pages/Vision-Mission-and-Values.aspx>
- Details on South Island Patient Information Care System (SI PICS)
- <https://www.sialliance.health.nz/our-priorities/information-services/si-pics/>

THANK YOU

Q&A

