

Introduction

How is Predictive Analytics being applied?

It is used to predict patients with high risk of not showing up for appointments. We call them no-shows or defaulters for short.

Operational Inefficiency

Clinic no-shows results in inefficient use of precious hospital resources and it denies other needy patients timely appointments.

Identifying Relevant Data Sources

Patient Data Source

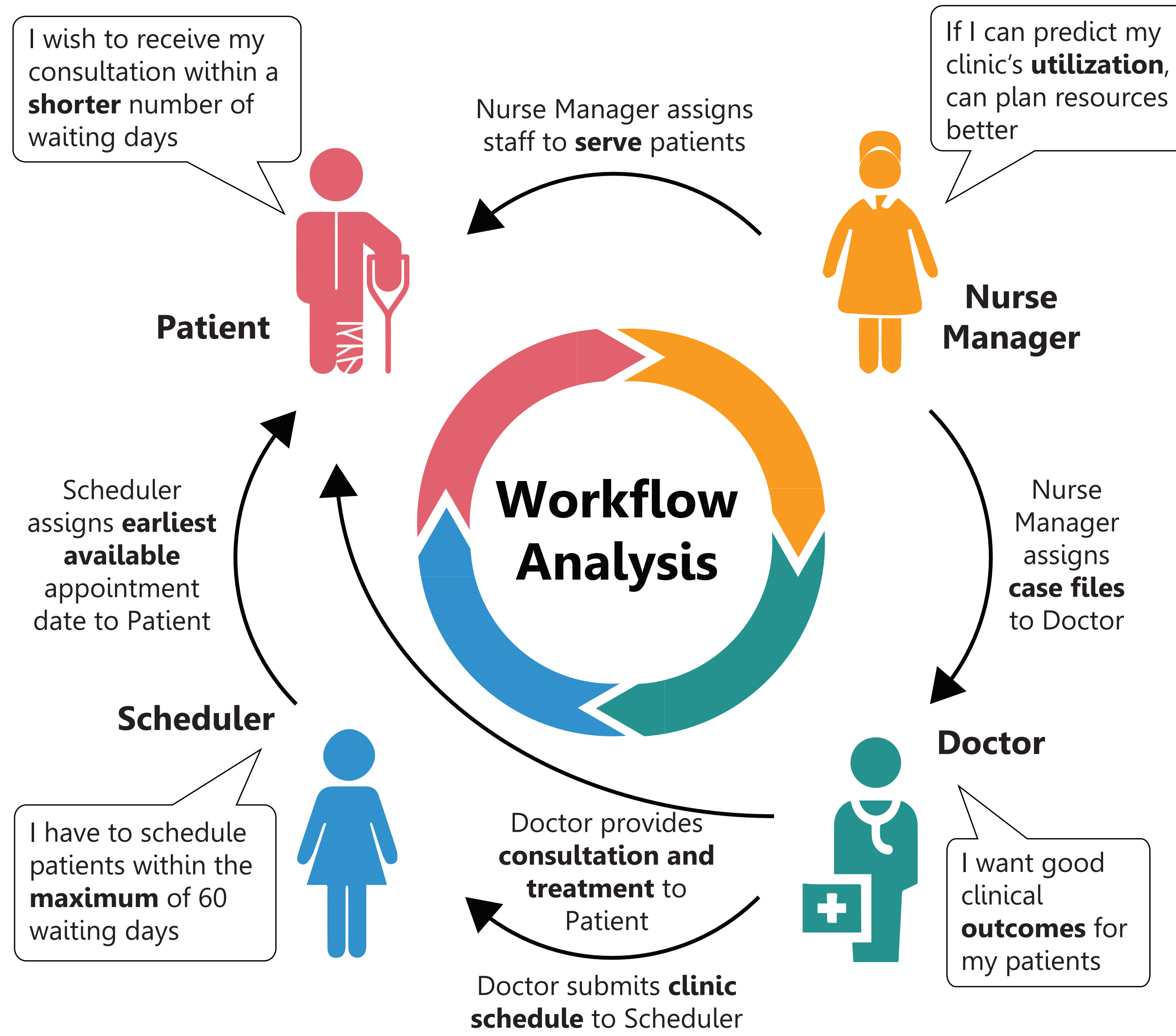
Patient data such as

- age
- gender
- address
- medical history

Appointment Data Source

Appointment data such as

- time and date
- month of year
- appointment waiting days
- referral source



Nurse Manager's Expertise

Nurse manager's expertise such as

- clinic's workflows
- operation concerns
- feasible points of intervention

Doctor Data Source

Doctor's data such as

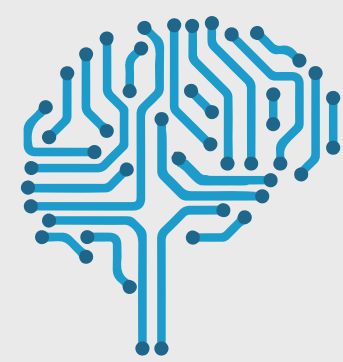
- doctor rank
- specialty
- resource type
- change of doctor

Data Driven Methodology



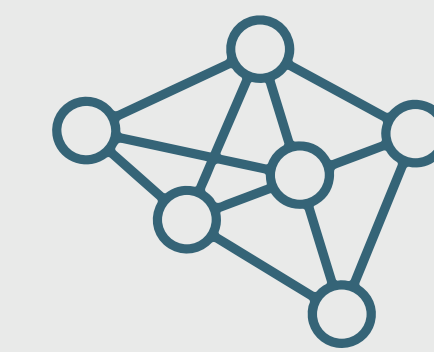
1. Merged Data Sources

Normalize all data into a flat file



2. Prediction Model

Extreme Gradient Boosting Tree



3. Model Evaluation

Test AUC averages at 0.81



4. Dashboard Development

Build decision support tools from prediction scores



5. Deployment Evaluation

Deployment AUC averages at 0.77

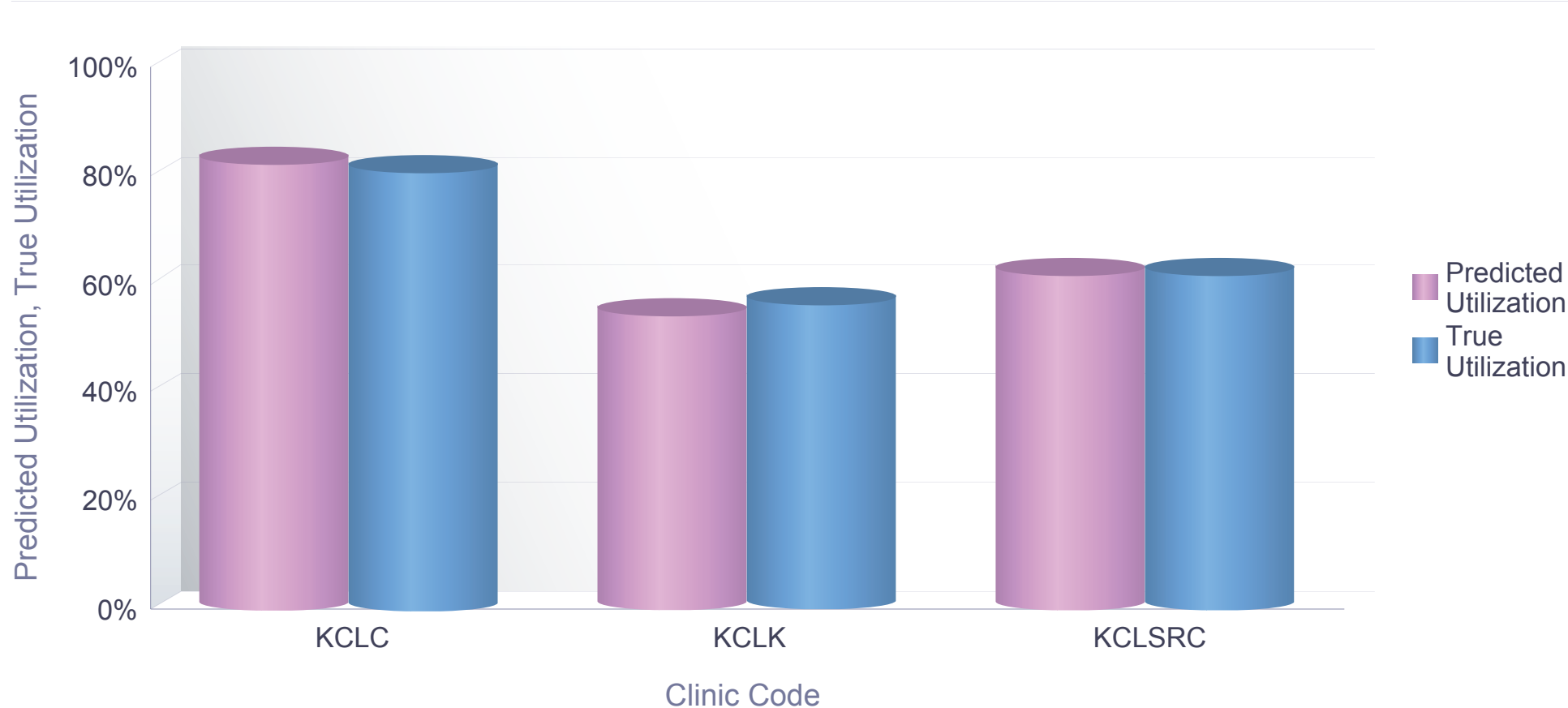


6. Success Measurement

Estimates suggest 14% increase in clinic capacity

Disseminating Prediction Scores Through Dashboards

Predicted Utilization, True Utilization



Clinic Code	Predicted Number of Actualized Appointments	Number of Appointments	Predicted Utilization	True Utilization
KCLC	267	324	82%	81%
KCLK	134	246	54%	57%
KCLSRC	13	21	62%	62%

Resource Optimization

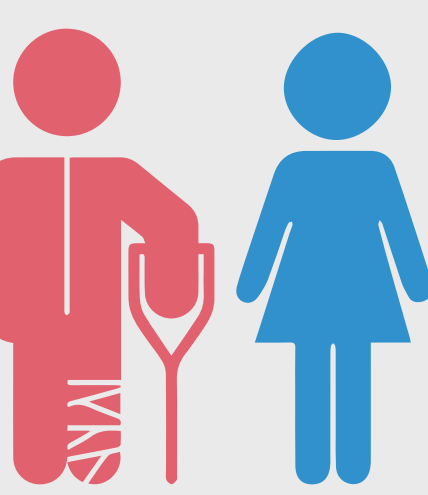
For whom:



Purpose: Gives an overview of the clinic's utilization so as to plan resources better and reduce inefficiencies.

Scheduling

For whom:

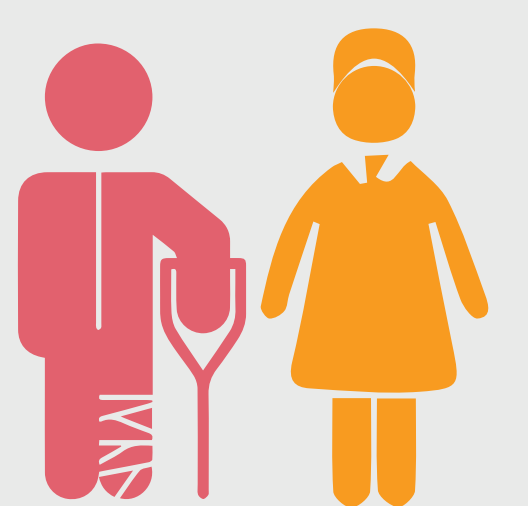


Purpose: Allow schedulers to assign patients the earliest available appointment slot on days with lower clinic utilization.

Appointment Time	Appointment Date	Clinic Code	Patient ID	Patient Name	Specialty	Sub Specialty	Patient Tel Mobile	Patient Tel Home	Appointment Status	No-Show Probability
08:10	13/05/2016	KCLC	S5123466G	APPLE	OBSTETRICS	OBSTETRICS	94567980	62234524	ACTUAL	0.76
08:10	13/05/2016	KCLC	S2345661G	BERNICE	GYNAECOLOGY	GYNAECOLOGY	93454366	66234524	ACTUAL	0.52
08:10	13/05/2016	KCLC	S2576991I	CARRIE	OBSTETRICS	POST-NATAL	83454676		ACTUAL	0.29
08:10	13/05/2016	KCLC	S0896553J	DENISE	GYNAECOLOGY	Expected Unknown	92345484		CANCELLED	0.19
08:10	13/05/2016	KCLC	S5469743B	EUNICE	OBSTETRICS	Expected Unknown	91254355	65632577	ACTUAL	0.13
08:10	13/05/2016	KCLC	S3425784Z	FELICIA	GYNAECOLOGY	Expected Unknown	95334533	65678221	CANCELLED	0.07
08:10	13/05/2016	KCLC	S3467829H	GERMAINE	GYNAECOLOGY	GYNAECOLOGY	98412346	67543788	CANCELLED	0.03
08:15	13/05/2016	KCLC	S9876538H	HELEN	OBSTETRICS	OBSTETRICS	93251445	67574296	ACTUAL	0.48
08:15	13/05/2016	KCLC	S1345679G	JASMINE	OBSTETRICS	POST-NATAL	94578055		CANCELLED	0.21
08:15	13/05/2016	KCLC	S9876543J	KATERINE	GYNAECOLOGY	Expected Unknown	87538845	67500007	ACTUAL	0.13
08:15	13/05/2016	KCLC	S6776548Z	LAUREN	GYNAECOLOGY	GYNAECOLOGY	91234574	63362893	ACTUAL	0.09
08:20	13/05/2016	KCLC	S3467872Z	MAURICE	GYNAECOLOGY	Expected Unknown	97546722	62345678	CANCELLED	0.70
08:20	13/05/2016	KCLC	S1230983Z	NATASHA	GYNAECOLOGY	Expected Unknown	92456457	62345689	ACTUAL	0.42
08:20	13/05/2016	KCLC	S1234564G	OLIVIA	GYNAECOLOGY	GYNAECOLOGY			ACTUAL	0.26
08:20	13/05/2016	KCLC	S6543098H	PATRICIA	OBSTETRICS	Expected Unknown	83456790		ACTUAL	0.18
08:20	13/05/2016	KCLC	S9876234Z	REBECCA	OBSTETRICS	OBSTETRICS	96578000		ACTUAL	0.14
08:20	13/05/2016	KCLC	S2345765E	SAMANTHA	GYNAECOLOGY	Expected Unknown	96574594	63456789	NO-SHOW	0.09
08:30	13/05/2016	KCLC	S876534D	TINA	GYNAECOLOGY	Expected Unknown			ACTUAL	0.73
08:30	13/05/2016	KCLC	S3446785E	VERONICA	PAEDIATRIC GENERAL MEDICINE	P. GENERAL PAEDS		82345768	NO-SHOW	0.62
08:30	13/05/2016	KCLC	T4567894H	YANNI	PAEDIATRIC GENERAL MEDICINE	P. GENERAL PAEDS	92456589	63234523	NO-SHOW	0.58
08:30	13/05/2016	KCLC	T3457653A	JAMES	PAEDIATRIC GENERAL MEDICINE	P. GENERAL PAEDS	92345689	93456789	ACTUAL	0.56
08:30	13/05/2016	KCLC	T7654356E	ERIC	PAEDIATRIC GENERAL MEDICINE	P. GENERAL PAEDS	823434555	81346006	ACTUAL	0.41
08:30	13/05/2016	KCLC	S4567435J	JESSICA	GYNAECOLOGY	GYNAECOLOGY	923467722	83654845	ACTUAL	0.41

Patient Risk

For whom:



Purpose: Allow nurse managers to contact high no-show risk patients to reconfirm attendance or reschedule slot.

Clinic Utilization

For whom:



Purpose: Allow nurse managers to distribute case files to doctors evenly based on the daily predicted risk.

Achieved Business Goals

1. Mitigate wasteful appointment no-shows
2. Improve clinic resource planning
3. Enhance accessibility of patient care

AM Session

