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MONITORING VARIOUS INDICATORS TO MEASURE TIMELINESS AND EFFICIENCY OF CARE IN HOSPITAL: SHARING MALAYSIA EXPERIENCE

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Abstract: Hospital A is a private Hospital in Malaysia. Various indicators were monitored in this hospital for year 2014 and 2015. For timeliness of care, four indicators were monitored consisting of:Ensuring100% of patients are in OT complex within 30 minutes from the time ward was informed by OT, Ensuring 90% of case notes to be retrieved one day before the appointment date, Ensuring 85% of the laboratory result will be produced within the stipulated turnaround time (TAT) and Ensuring 95 % of new admission will be served with prescribed medication within one hour upon admission. For efficiency of care, sixth indicators were monitored consisting of: Percentage of elective operation cancellation, Ambulatory Care cases cancellation rate,Unplanned admission of ambulatory care patients,Less than 2.5 cross match to transfusion ratio, Less than 3% expired red cells and Rejection rate of specimen. For the indicator related to OT complex, there were 4 cases of non-compliance in 2014 but for 2015 the number of non-compliance had increased tremendously to 48 cases. Quality objective of 90% case note retrieved was achieved for both years of 2014 and 2015. For laboratory result the objective was not achieved in July and August of 2014 due to shortage of manpower .However for 2015, the quality objective was achieved for the whole year and much higher compared to 2014. Regarding the new admission, only Dahlia ward failed to achieve the targetin 2014.However Lavender ward and Flora ward failed to achieve the target in 2015. In term of efficiency of care,forPercentage of elective operation cancellation, the Mean for cancellation rate was 5.03 % (181 cases) for 2014 and 4.78% (164 cases) for 2015.Ambulatory Care cases cancellation rate for 2014, were 2 cases and 8 cases in 2015. For Unplanned admission of ambulatory care patients, in year 2014total unplanned patients were 29 cases where as in 2015 were 41 cases.Blood Transfusion Services managed to achieve target for less than 2.5 cross match to transfusion ratio for the whole year of 2014 and 2015.In term of expired red cells,the Blood Transfusion Services had achieved the target for less than 5% in 2014. However in 2015, the target was reduced to 3% instead of 5% and due to this change,in June, July and October 2015, the target was not achieved. For Rejection rate of specimen, the Mean for 2014 was 0.65% which is smaller compared to 1.11% in 2015.

Keywords: Timeliness of care, efficiency of care, indicators, quality objective, target

I. INTRODUCTION

Hospital A is a private hospital in Malaysia. This hospital started business in 2009 and had been certified by various certification bodies for standards such as TUV for Integrated Management System, hospital accreditation by MSQH(Malaysia hospital accreditation body) and Joint Commission International , USA. This hospital are monitoring four indicators for timeliness of care consisting of the following indicators: toensure 100% of patients are in OT complex within 30 minutes from the time ward was informed by OT, to ensure 90% of case notes to be retrieved one day before the appointment date,to ensure 85% of the laboratory result will be produced within stipulated turnaround time (TAT) and to ensure 85% of the laboratory result will be produced within stipulated turnaround time (TAT). For efficiency of care, Hospital A are monitoring 11 indicators consisting of the following indicators : elective operation cancellation rate, ambulatory care cases cancellation rate, unplanned admission of ambulatory care patients, less than 2.5 cross match to transfusion ratio, less than 3% expired red cells, rejection rate of specimen, monthly retake exposure for general radiography not more than 3% of total exposure, 95% of approved purchase requisition to be issued purchase order within a working day, to ensure 100% of requisition for medical supplies are replenished within a working days except for non- stock items, to ensure average 2.5 training hours per employee is achieved monthly towards achieving 30 hours of training for the year and average number of training hours per employee (clinical and Clinical support) have attended in a year (at least 30 hours).

According to Institute of Medicine, 2001, timeliness in health care is the system's capacity to provide care quickly after a need is recognized. Measures of timeliness include time spent waiting in doctors' offices and emergency departments (EDs), and the interval between identifying a need for specific tests and treatments and actually receiving services.

The impact of timeliness of care can be seen in the following issues such as : lack of timeliness can result in emotional distress, physical harm, and higher treatment costs (Boudreau, et al., 2004),timely delivery of appropriate care also can help reduce mortality and morbidity for chronic conditions such as kidney disease (Kinchen, et al., 2002),stroke patients' mortality and long-term disability are largely influenced by the timeliness of therapy (Kwan, et al., 2004),timely antibiotic treatments are associated with improved clinical outcomes (Houck &Bratzler, 2005) and timely delivery of childhood immunizations helps maximize protection from vaccine-preventable diseases while minimizing risks to the child and reducing the chance of disease outbreaks (Luman, et al., 2005).

Timeliness will have direct impact of the cost of treatment where early care for comorbid conditions has been shown to reduce hospitalization rates and costs for medicare beneficiaries (Himelhoch,et.al.2004) . Over 30 years some research had shown that the costs of treating diabetic complications can approach $ 50,000 per patient (Caro,et.al.,2002) and early care for complications in patients with diabetes can reduce overall costs of the disease (Ramsey,et.al.,1999). Timely outpatient care also can reduce admissions for paediatric asthma, which account for $1.25 billion in total hospitalization charges annually (Agency for Healthcare Research and Quality, 2009).

Medicare.Gov had produced quality measures to monitor how often or how quickly hospitals recommended treatments known to get the best results for people with certain common conditions for various types of medical problems such as heart attack care, heart failure care, pneumonia care, surgical care, emergency department care, preventive care, children's asthma care, stroke care, blood clot prevention and treatment, pregnancy & delivery care, and colonoscopy follow-up. For heart attack care, it measures the average number of minutes it takes for hospitals to identify patients who need specialized heart attack care the hospital cannot provide and begin their transfer to another hospital. Pneumonia care, monitor how hospitals use blood test to choose the most effective treatment for pneumonia patients. In term of surgical care,hospital staff should make sure surgery patients get antibiotics at the right time. This measure shows the percentage of patients who got an antibiotic in the appropriate time period. Long waits before a patient is treated may be a sign that the emergency department is understaffed or overcrowded. Patients who leave the emergency department without being seen may be seriously ill, putting themselves at higher risk for poor health outcomes. Timeliness of care for asthmatic patients is related to the measure on the percentage of children with asthma and their caregivers who were given a home management plan of care document while hospitalized. For stroke care the measure shows the percentage of patients admitted with ischemic stroke who arrived in the emergency department (ED) within 2 hours of the onset of their symptoms and who got t-PA within 3 hours after the onset of their symptoms. The measure on patients receiving drugs to prevent blood clot is related to the percentage of patients who received treatment to prevent blood clots on the day of or day after hospital admission or one the day of or day after having surgery. For services related to pregnancy and delivery of care the measure on the timeliness of care is related to the percentage of pregnant women who had elective deliveries 1-2 weeks early (either vaginally or by C-section) whose early deliveries were not medically necessary. Higher numbers may indicate that hospitals aren't doing enough to discourage this unsafe practice.

Timeliness of care is also known as the process of care which is related to the percentage of hospital patients who got treatments known to get the best results for certain common, serious medical conditions or surgical procedures, how quickly hospitals treat patients who come to the hospital with certain medical emergencies, and how well hospitals provide preventive services (medicare.gov)

Time delays in healthcare can come in the form of waiting time, travelling time, or the ease ofcompleting a medical task such asfilling a prescription. Waiting time is most commonly associated with thereception and treatment room. Although delays will naturally occur, the way in which they are managed determines patients' perception. Proper handling of delays include providing an explanation of the extended waiting time and minimizing total waiting time in the reception and treatment room. Patients will tolerate the delay when they can see medical personnel preparing for anexamination, delays become more tolerablebecause progress is observable (Le Mayet al.,2001).

Studies show that hospitals that operate efficiently not only save money for their patients and for themselves, but that they actually tend to provide better overall care.The goal at UK Healthcare is to provide the best possible care in the most efficient manner, and they are continually working to improve and streamline their processes (UKHealthcare).

Efficiency of care is important to manage cost and improve the quality of services. According to the report produced by Mobile healthcare communications firmVocera Communications, healthcare leaders must incorporate four best practices to move forward on patient experience while improving efficiency consisting of : strategy where healthcare organizations must have a clear plan in place that centres the variability of patient experiences, hospital leaders must have specific behavioural expectations and standards in place within their

organizations' culture and performance management tools, to properly implement experience-improvement strategies, providers must first create the necessary organizational infrastructure and healthcare leaders must identify specific gaps in efficiency and empathy during the care process and implement evidence-based best practices (FierceHealthcare).

The study conducted by the commonwealth fund in 2011 on four selected hospitals had found the following outcomes:

i. Efficiency will improve with the pursue of quality
ii. Reinforce goals through communication, clinical leadership, alignment of purpose, and celebration of success
iii. Implementing quality improvement strategies through close monitoring of performance indicators against benchmarks to motivate physicians and frontline staff and promote a culture of continuous quality improvement
iv. Use of technology including electronic medical record
v. Improve handoffs and promote teamwork to meet patient needs
vi. Emphasize communication among providers with families
vii. Standardize processes and supplies to reduce errors
viii. Integrate care, systems and providers

Same-day cancellation rate measures the percentage of surgical procedures cancelled on the day of surgery which will be rescheduled to another day or cancelled altogether. How the surveyed hospitals define "same-day" cancellations various from one hospital to another where in some cases, this refers only to cancellations on the day of surgery, whereas in other cases it refers to any cancellations after 12:00 pm or 1:00 pm the day before the scheduled day of surgery. Some hospitals capture only elective cancellations, whereas others capture all cancellations. However all types of cancellations, including those cancelled the previous day, with explicit categories need to be captured.

Time accuracy measures started with the first cases of that day. An on-time case is typically defined as the patient being in the OR at the scheduled start time; however a grace period is allowed for this indicator (i.e., the patient must be in the room within a certain number of minutes of the scheduled start time for the case to be considered on time). This grace period varies and can range from 0 to 15 minutes (Heiser R, 2009 and McKesson Corp.2009). In some hospitals the cases that start late owing to access to a postoperative bed are excluded. An alternative definition of start time offered in the literature is the time of incision (in lieu of patient in the OR) which has been suggested as a superior benchmark for start time since the patient and all OR staff must be present before the incision can be made (PubMed).

A major cause of inefficient use of operating-room time and a waste of resources is late cancellation of scheduled operations .Based on the studies done on elective operating theatre bookings in general surgical discipline it was found that on the day of surgery the intended list and a list of cancellations with the reason was noted by the attending anaesthesiologist.1590 patients were scheduled for elective surgical procedures in 458 operation roomswhere 30.3 % patients were cancelled on the day of surgery. Due to lack of availability of theatre time,59.7% were cancelled and10.8% were cancelled due to medical reasons whereas 16.2% did not turned up on the day of surgery. In 5.4% patients, surgery was cancelled by surgeons due to a change in the surgical plan, 3.7% were cancelled because of administrative reasons, and 4.2% patients were postponed because of miscellaneous reasons (Rakesh Garg. 2009).

Potentially preventable hospital admission where an admission deemed to be potentially preventable if appropriate care in the community were given based on the healthcare setting has been a topic of international research attention for almost three decades. This issue has been largely driven by the imperative to reduce ever-increasing unplanned hospital admissions. However, it is difficult to identify potentially preventable admissions. Due to this reason, the population level indicator of admissions for ambulatory care sensitive conditions (ACSCs) has been used as a proxy measure for potentially preventable admission. In Australia, the adoption of this measure has become common, wherethe rate of admissions for chronic ACSCs is now an important component of measuring health system performance and accountability, and is directly linked to funding. Admission for a chronic ACSC is also used to identify individuals for targeting of interventions to reduce preventable admissions.

Blood wastage may occur due to a number of reasons such as time expiry, wasted imports, blood medically or surgically ordered but not used, stock time expired, haemolysis, or miscellaneous reasons. Based on the data collected it was found that approximately 77.9% of wasted pack cell units were wasted for the reason of time expiry. Pack cell wastage in hospitals is reported to range from 1.93% to 30.7%. Among 30,913

of blood products issued, wastage at all hospitals averaged 9.8%. Overall blood and blood product (packed red cells, plasma, platelets, and cryoprecipitate) wastage was 3048 units and average total wastage per participant hospital for all blood groups was 254 units per year.

In order to improve compliance and understanding of staff on the guidelines and protocols, training plays a major role in any organization. Training is any planned activity to transfer or modify knowledge, skills, and attitudes through learning experiences. Training are required by staff for a variety of reasons, such as the need to maintain levels of competence and respond to the demands of changing circumstances and new approaches and technologies. Training by itself cannot solve structural, organizational, or policy problems within an organization, although supportive supervision and the use of motivational strategies can help sustain performance improvement derived from training.The first step in the design of training involves an assessment of training needs. The assessment comprises observing workers performing normal duties, interviewing workers and others and studying routine reports or performance reviews, along with job descriptions and identifying performance problems.

The second step involves defining the training program's learning objectives. The learning objectives, which are derived from the needs assessment, specify the observable,
measurable actions that each learner will be able to demonstrate as a result ofparticipating in the training activities.

The third step is the creation and implementation of atraining program to improve performance, taking into account the experience and educational levels of the personnel and the time and resources available for training. Options range from short courses to long-term placements in academic institutions in the country, in theregion, or overseas, and non–classroom-based interventions, such as on-the-job training, coaching, and mentoring. All options must be weighed against the immediate operational needs of the program or institution, because facilities may not have enough personnel to operate when staff members go for training

II. OBJECTIVES

i. To tabulate all data that had been collected for year 2014 and 2015
ii. To analyse all data for 2014 and 2015
iii. To develop trending by comparing data collected in 2014 with 2015
iv. To find out what are the reasons for not achieving the set targets.

III. METHODOLOGY

Retrospective study was conducted for a period of two years from 2014 to 2015. All data collected will be tabulated based on various types of indicators. A trending will be done to compare the data collected in 2014 again data collected in 2015. Analysis will be done to see the outcome of indicators' monitoring. Analysis will also be done using the Mean and Standard deviation for each indicator.

1V. RESULTS

1. TIMELINESS OF CARE

1.1. Ensure 100% of patients are in OT complex within 30 minutes from the time ward was informed by OT

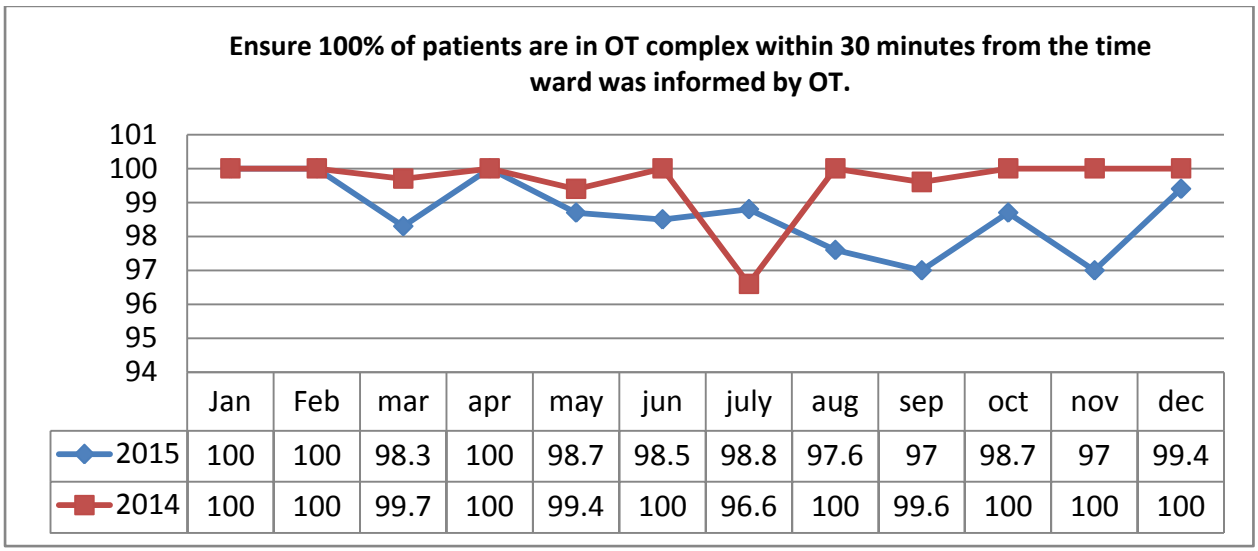
Total Number Of Operation Cases

Month	Year			
	2015	Total Cases More Than 30 Minutes	2014	Total Cases More Than 30 Minutes
January	331	0	242	0
February	264	0	259	0
March	291	5	310	1
April	316	0	313	0
May	308	4	311	1
June	336	5	335	0
July	249	3	268	1
August	293	7	327	0
September	271	8	291	1
October	314	4	288	0
November	332	10	306	0
December	316	2	357	0
TOTAL	3621	48	3607	4

Number Of Surgeon

Month	Year	
	2015	2014
January	15	14
February	15	14
March	15	14
April	15	14
May	16	14
June	16	14
July	16	14
August	16	14
September	16	14
October	16	14
November	16	15
December	16	15

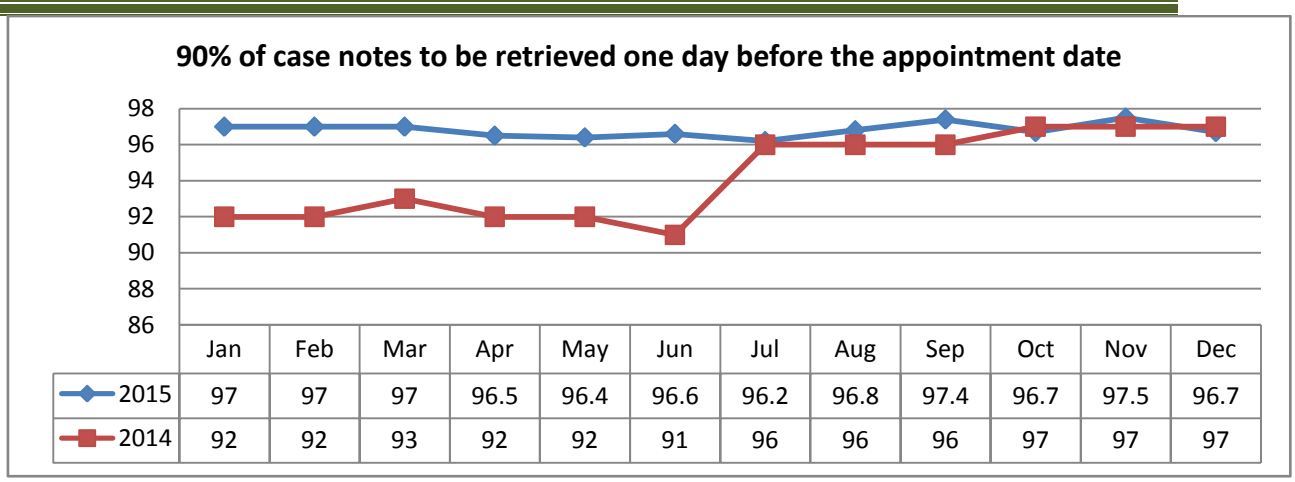
Data Collection



	MEAN	VARIANCE	STANDARD DEVIATION
2015	**98.7**	**1.06**	**1.03**
2014	**99.6**	**0.83**	**0.91**

1.2. To ensure 90% of case notes to be retrieved one day before the appointment date.

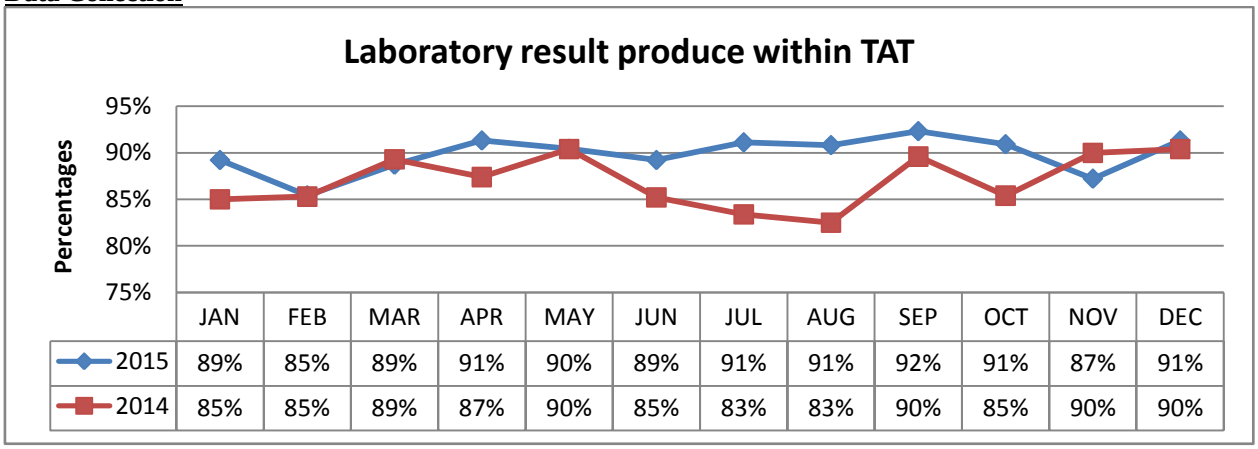
Year/Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2014	92	92	93	92	92	91	96	96	96	97	97	97
2015	97	97	97	96.5	96.4	96.6	96.2	96.8	97.4	96.7	97.5	96.7



	MEAN	VARIANCE	STANDARD DEVIATION
2015	**96.8**	**0.14**	**0.37**
2014	**94.3**	**5.35**	**2.32**

1.3. To ensure 85% of the laboratory result will be produced within the stipulated turnaround time (TAT).

Data Collection



	MEAN	VARIANCE	STANDARD DEVIATION
2015	**89.7**	**3.72**	**1.93**
2014	**86.8**	**7.31**	**2.70**

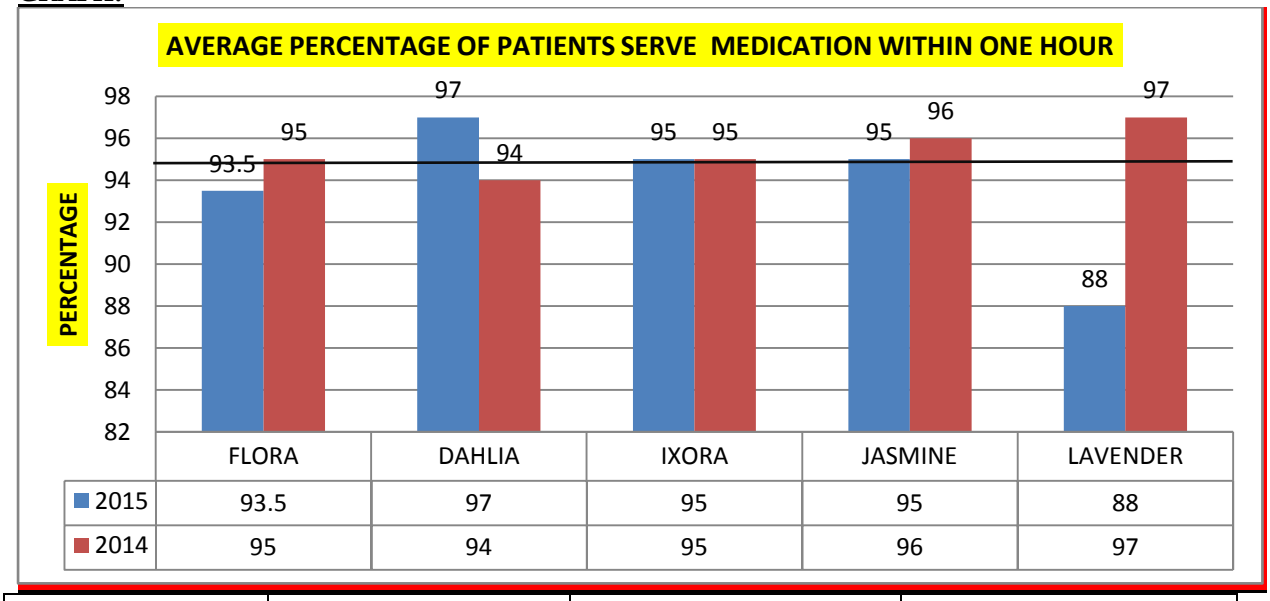
1.4. To ensure 95 % of new admission will be served with prescribed medication within one hour upon admission

TABLE:

Overall Percentage Of New Admission Will Be Served With Prescribed Medication Within One Hour Upon Admission						
	2015	**2014**	**2015**	**2014**	**2015**	**2014**

	Total Patient On Prescription		Total Medication Was Served Within An Hour		Average Percentage Of Patients Served Medication Within One Hour	
Flora	3256	2628	3045	2501	93.5%	95%
Dahlia	3186	3603	3088	3376	97%	94%
Ixora	3216	3464	3065	3279	95%	95%
Jasmine	3084	2349	2938	2544	95%	96%
Lavender	1083	1145	962	1109	89%	97%
Total	13825	13189	13098	12809	95%	97%

GRAPH:

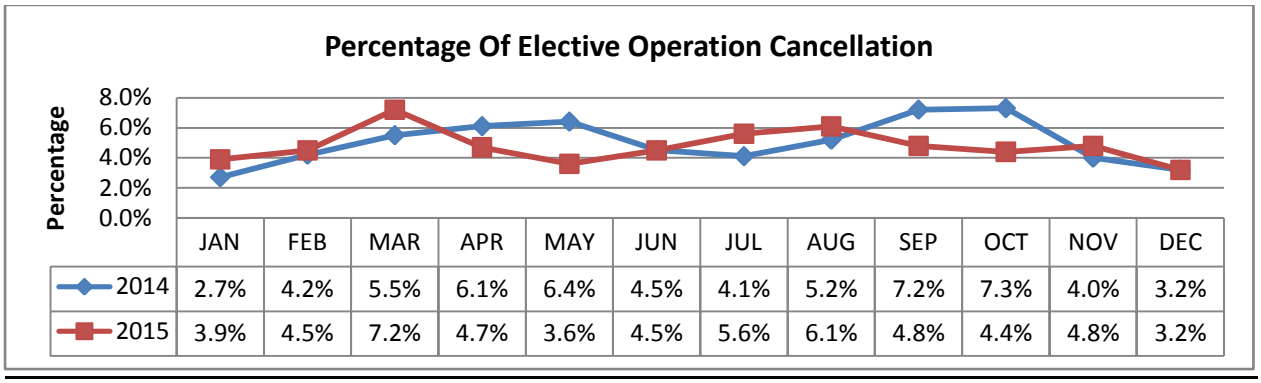


	MEAN	VARIANCE	STANDARD DEVIATION
2015	**93.7**	**7.24**	**2.69**
2014	**95.4**	**5.2**	**2.28**

2. EFFICIENCY OF CARE

2.1. Percentage of elective operation cancellation

Data collection

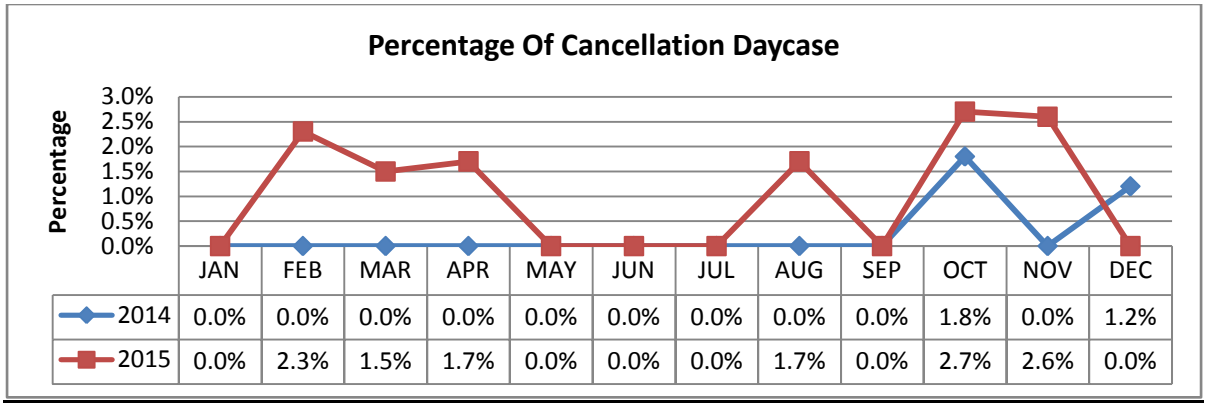


	MEAN	VARIANCE	STANDARD DEVIATION
2015	**4.78**	**1.11**	**1.05**
2014	**5.03**	**2.07**	**1.44**

2.2. Ambulatory Care cases cancellation rate

Data collection

PERCENTAGE of CANCELLATION DAYCASE		
	2015	**2014**
Total number of day cases	761	823
Total of cancellation day case	8	2
Average percentage of cancellation	1.1%	0.2%

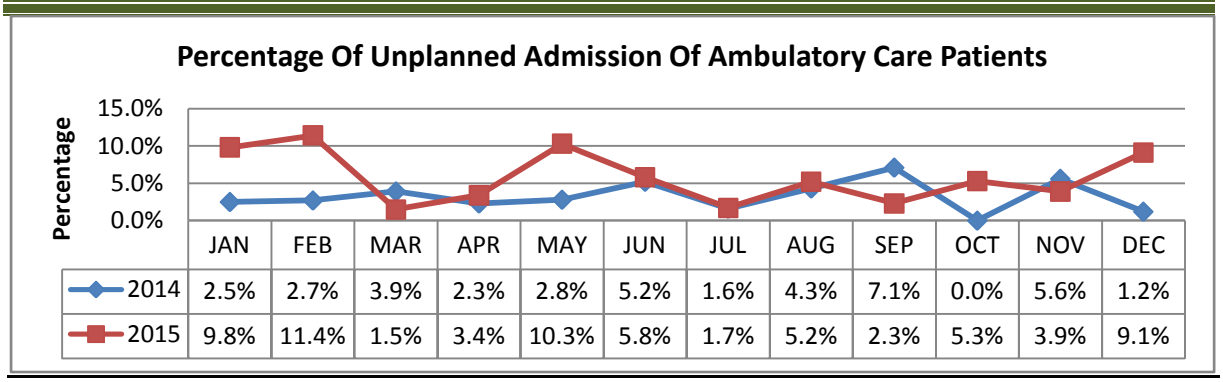


	MEAN	VARIANCE	STANDARD DEVIATION
2015	**1.04**	**1.20**	**1.10**
2014	**0.25**	**0.33**	**0.57**

2.3.Unplanned admission of ambulatory care patients

Data collection

PERCENTAGE OF UNPLANNED ADMISSIONS OF AMBULATORY CARE PATIENTS		
	2015	**2014**
Total day case	758	823
Total unplanned admission	41	29
Percentage of unplanned admission	5%	3%

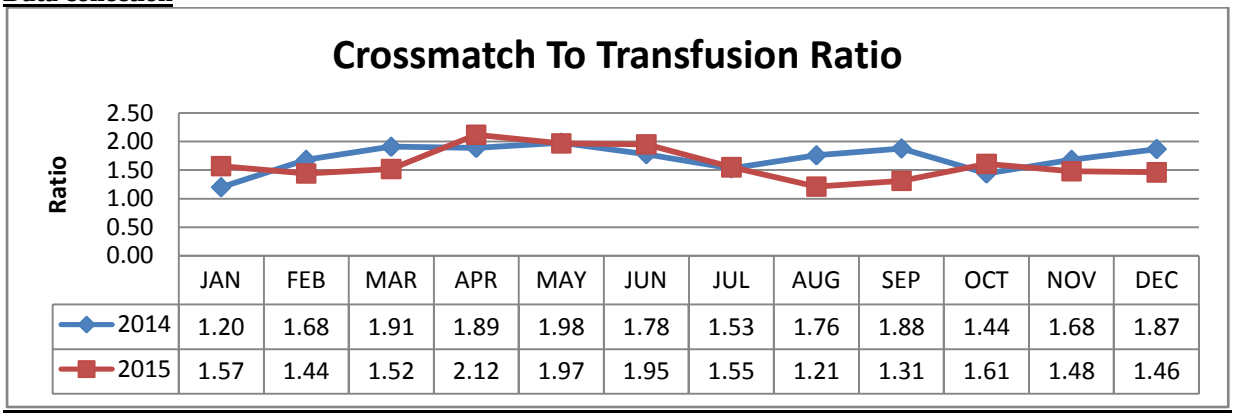


	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2014	2.5%	2.7%	3.9%	2.3%	2.8%	5.2%	1.6%	4.3%	7.1%	0.0%	5.6%	1.2%
2015	9.8%	11.4%	1.5%	3.4%	10.3%	5.8%	1.7%	5.2%	2.3%	5.3%	3.9%	9.1%

	MEAN	VARIANCE	STANDARD DEVIATION
2015	**5.81**	**11.35**	**3.37**
2014	**3.27**	**3.76**	**1.94**

2.4.Less than 2.5 cross match to transfusion ratio

Data collection

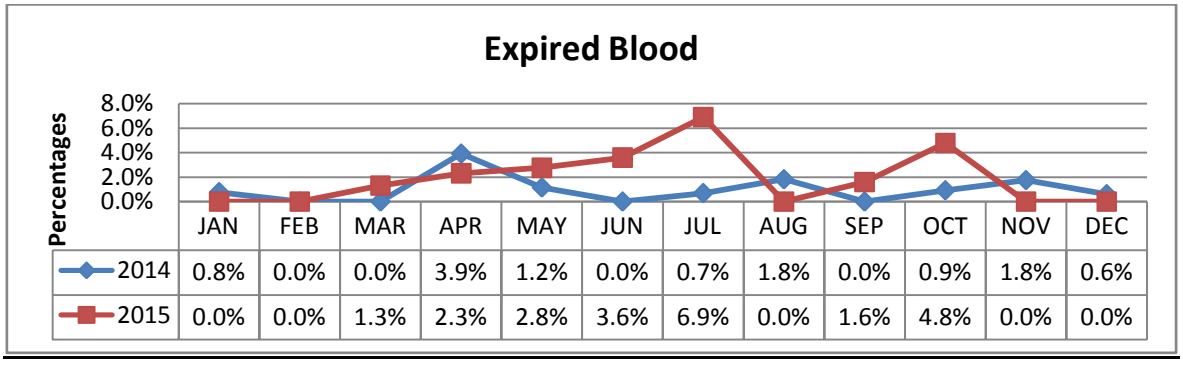


	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2014	1.20	1.68	1.91	1.89	1.98	1.78	1.53	1.76	1.88	1.44	1.68	1.87
2015	1.57	1.44	1.52	2.12	1.97	1.95	1.55	1.21	1.31	1.61	1.48	1.46

	MEAN	VARIANCE	STANDARD DEVIATION
2015	**1.60**	**0.07**	**0.26**
2014	**1.72**	**0.05**	**0.22**

2.5.Less than 3% expired red cells

Data collection

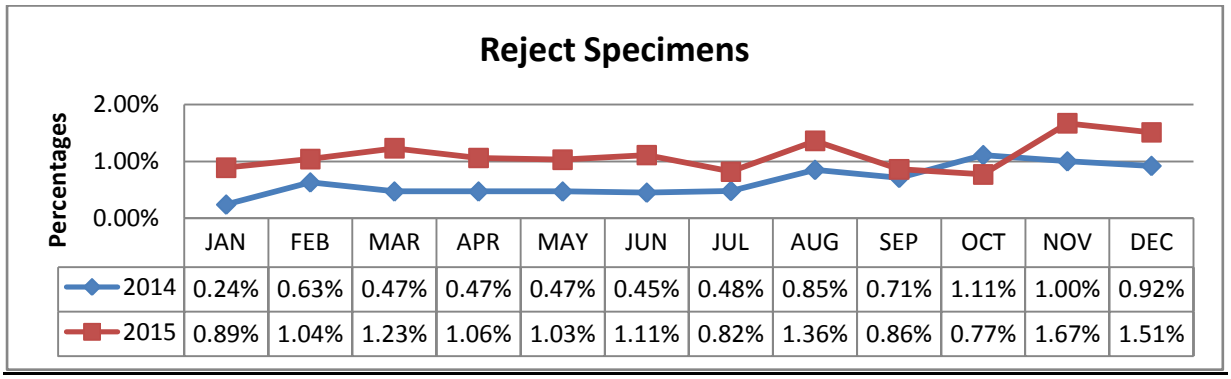


	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2014	0.8%	0.0%	0.0%	3.9%	1.2%	0.0%	0.7%	1.8%	0.0%	0.9%	1.8%	0.6%
2015	0.0%	0.0%	1.3%	2.3%	2.8%	3.6%	6.9%	0.0%	1.6%	4.8%	0.0%	0.0%

	MEAN	VARIANCE	STANDARD DEVIATION
2015	**1.94**	**4.65**	**2.16**
2014	**0.98**	**1.17**	**1.08**

2.6.Rejection rate of specimen

Data collection



	MEAN	VARIANCE	STANDARD DEVIATION
2015	**1.11**	**0.07**	**0.27**
2014	**0.65**	**0.06**	**0.25**

V. DISCUSSION

1. Timeliness of care

1.1. Ensure 100% of patients are in OT complex within 30 minutes from the time ward was informed by OT

For 2014, there were 4 cases of non- compliance with 1 case recorded in March, 1 case in May, 1 case in July and 1 case in September. For 2015 the number of non-compliance had increased tremendously to 48 cases where 5 cases recorded in March, 4 cases in May, 5 cases in June, 3 cases in July, 7 cases in August, 8 cases in September, 4 cases in October, 10 cases in November and 2 cases in December. The Mean for 2014 was 99.6 which are much bigger compared to 2015 with only 98.7. The Variance for 2014 was 0.83 which is much smaller compared to 1.06 in 2015. The Standard Deviation for 2014 was 0.91 which is smaller compared to 1.03 in 2015. Based on the data collected and supported by the Variance and Standard deviation it was found that the performance of 2014 was much better compared to 2015. The number of surgeons had increased to 15 in January 2015 and additional one more surgeon added into the number in May 2015. This may be the reason of higher non- compliance in 2015 compared to 2014. Further improvement can be achieved if patients are scheduled for operation only after getting the Guarantee Letter from insurance companies.

1.2. To ensure 90% of case notes to be retrieved one day before the appointment date.

Quality objective of 90% was achieved for both years of 2014 and 2015. Monthly achievement for the whole year of 2014 and 2015 were higher than the target. The Mean for 2014 was 94.3% with a better achievement in 2015 with the Mean of 96.8%. The Variance for 2014 was slightly bigger with the figure of 5.35 but the variance for 2015 was much smaller which recorded a figure of 0.14. The Standard Deviation for 2014 was 2.32 followed by a smaller figure of 0.37 in 2015.

1.3. To ensure 85% of the laboratory result will be produced within the stipulated turnaround time (TAT).

For 2014, the objective was not achieved inJuly and August due to shortage of manpower . Instead of 9 Medical Lab Technologist (MLT), only 7 were fully functional because one was on sick leave for 2 weeks and one new replacement MLT just join in May 2014 and still undergoing training. For August 2014, the lower achievement was for biochemistry section due to new MLT in charge of Biochemistry. For 2015, the quality

objective was achieved for the whole year and much higher compared to 2014 because of 1 additional MLT and 2 additional Phlebotomist.

The Mean for 2014 was 86.8 which is lower compared to 89.7 for year 2015. The Variance for 2014 was 2.70 which reflect a bigger variation ranging from 83% to 90%. For 2015 the variance was smaller which reflect a more uniform achievement for the whole year.

1.4. To ensure 95 % of new admission will be served with prescribed medication within one hour upon admission

For 2014, only Dahlia ward failed to achieve the targetwhere achievement for Dahlia was 94%. For 2015, Lavender ward and Flora ward failed to achieve the target with Lavender ward only achieved 88% and Flora ward 93.5%. Based on the data analysis it was found that for Dahlia ward total prescription in 2014 was 3,603 but reduced to 3,186 in 2015 and because of the reduction in the number of prescription and the target was achieved in 2015. However for Lavender ward total prescription for 2014 was 1,145 which reduced to 1,083 in 2015 but the target for 2015 was not achieved due to shortage of staff. For Flora ward there was a big increased in the number of prescription from 2,628 in 2014 to 3,256 in 2015 and as a result the target for 2015 was not achieved in 2015. The performance for 2014 was better than 2015 with a Mean value of 95.4 in 2014 compared to 93.7 in 2015. The variance and standard deviation for 2014 also were much lower compared to 2015 with a variance of 5.2 compared to 7.24 and standard deviation of 2.28 compared to 2.69 in 2015.

2. Efficiency of care

2.1. Percentage of elective operation cancellation

Based on data collected, the Mean for cancellation rate was 5.03 % (181 cases) for 2014 and 4.78% (164 cases) for 2015.The cancellation rate was higher in 2014 compared to 2015. The Variance for 2014 was 2.07 which is much bigger compared to 1.11 in 2015. The Standard deviation for 2014 was 1.44 which is also bigger than 2015 which recorded a figure of 1.05. The contributing factors for cancellation are as below:

- Insurance declined and patient refused the surgery
- Patient never turn up as per schedule
- Patient request to post pone the schedule date and re-schedule due to the domestic issues.
- Financial problem
- Medical condition unfit for surgery

Base on the data provided by operation theatre, the highest factor for cancellation in 2015 with 44 cases is due to Guarantee Letter issue such as decline by insurances or company and exceeding the guarantee limit. The other contributing factors are patient refusal and did not turn up (44 cases), surgery being postponed (38 cases), and patient unfit for surgery (6 cases), personal problem such as financial problem (4 cases) and patient being transferred to other hospitals. In order to reduce the cancelation rate the following actions can be taken:

- Surgeon and clinic assistant to make confirmation with the patient on the date for surgery before sending the OT booking form.
- Suggest admitting patient's a day prior to surgery.
- To book case a week prior to the scheduled surgery.
- To discharge patients early to provide bed for admission of patients who require surgery.

2.2. Ambulatory Care cases cancellation rate

In year 2014, only 2 cases of cancellation because patients were unfit for surgery and transferred to General Hospital, and unavailability of equipment. In year 2015, 8 cancellation cases recorded due to:

1) 5 cases of medically unfit
2) 1 case insurance company decline
3) 1 case of no equipment available
4) 1 case of patient anxiety

The Mean was 0.2% in year 2014 and 1.1% in year 2015 with the Standard deviation of 0.57 in 2014 and 1.10 in 2015. The majority cancellation cases were due to patients' own medical problems, followed by decline of guarantee letter and 1 equipment issue. In order to reduce the rate of cancelation, the following actions will be implemented.

- To implement pre-operative assessment for medically unfit patient. According to American Society of Anaesthesiologists (ASA), patient classified in categories 1 and 2 are suitable for day cases and class 3 to be selected after consultation and assessment with anaesthetist.

- Billing staff to clarify insurance coverage for day case patient and informed consultant before they decided to give day cases treatment.
- To inform patient that the case need to be cancelled either by phone or text message within 24-48hrs prior to surgery if equipment is not available.
- To give pamphlet or education to patient to increase the awareness on the risk and benefit of the procedure and how the procedure will be done.

2.3. Unplanned admission of ambulatory care patients

In year 2014total unplanned patients were 29 cases due to:

1) Post OGDS bleeding
2) Patient having blood stain reflux
3) Patients requested to admit in hospital
4) Further investigation needed
5) Patient was find iron deficiency anaemic after doing OGDS and colonoscopy

In year 2015 total unplanned patients were 41cases due to:

1) Post procedure bleeding and transfusion needed
2) Consultant attending emergency case where procedure need to be postpone
3) Patient pain score was at 5 after the procedure
4) 6 Patients requested to admit in hospital
5) Patient diagnosis was acute gastritis but blood test platelet was 18.
6) Further investigation needed
7) Bleeding from post BCF site and persistent pain
8) Post mamocath patient unable to pass urine and develop haematuria
9) Day case was not covered by insurance
10) Post colonoscopy finding excessive inflammation and need to give IV antibiotic
11) Urine FEME finding have RBC
12) Patient complain of giddiness and unable to pass urine.
13) 3 Angiogram done and put stent to patient after discuss with family members.
14) Post BCF patient need to do haemodialysis
15) Patient discharge late from operation theatre
16) Patient done CT abdomen but finding need to go appendix operation.

The Mean for 2014 was 3.27 which are much smaller compared to 5.81 in 2015. The Variance for 2014 was also smaller than 2015 with the value of 3.76 in 2015 and 11.35 in 2015. With a smaller Mean and Variance , the Standard deviation for 2014 was also smaller compared to 2015 with a value of 1.94 in 2014 compared to 3.37 in 2015. The following actions will be carried out in order to reduce the percentage of unplanned admission to ambulatory care patients:

- Identify the requirement for admission as pre-operative assessment such as status, age and medical illness
- Explain to patient and relative regarding the purpose of direct admission and day cases so that customers can have clear understanding and can decide for admission before proceeding with the procedures.
- Clarify insurance coverage for day case patient before decided to get day cases treatment.
- Distribute pre-operative instruction for day care anaesthesia brochure to patient and relative for more information and understanding about procedure.
- Fitness for a procedure should be related to the patient's health
- Proper screening assessments by respective consultant before admitting the patient.
- Share the finding from this study in surgical and medical meeting in order to improve patient clinical outcome.

2.4. Less than 2.5 cross match to transfusion ratio

Blood Transfusion Services managed to achieve target for less than 2.5 cross match to transfusion ratio for the whole year of 2014 and 2015. This data reflect a good clinical judgments about the risk and benefits of transfusion are being made wisely. The clinicians are making their best judgment and decide not to request for unnecessary cross match. The Mean for 2014 was 1.72 which is slightly higher than 2015 with the value of 1.60. However the Variance for 2014 was lower than 2015 with the value of 0.05 in 2014 compared to 0.07 in 2015 followed by a smaller Standard deviation in 2014 compared to 2015 with the value of 0.22 compared to 0.26. The performance can be further improved with the following actions:

- To educate consultants on appropriate use of blood and blood products
- To encourage consultants to request for Group Screen and Hold instead of Group Cross Match when transfusion is unlikely to be done.

2.5.Less than 3% expired red cells

Based on the data collected, the Blood Transfusion Services had achieved the target for less than 5% in 2014. In 2015, the percentage was reduced to 3% instead of 5%. Due to this change in June, July and October 2015, the target was not achieved because of the increasing number of CABG cases where each case will reserved at least 4 pints of pack cell, but not all pack cells requested being transfused. Most of the pack cells received from public hospitals have a short expiry date which lead to higher percentage of blood expired which is beyond our control. The Mean for 2014 was 0.98 which is lower compared to 2015 with the value of 1.94. The Variance for 2014 was also smaller compared to 2015 with the value of 1.17 in 2014 compared to 4.65 in 2015. With the smaller variance recorded in 2014, the Standard deviation for 2014 was also lower than 2015 with the value of 1.08 in 2014 compared to 2.16 in 2015. The rate of expired blood can be reduced by implementing the following strategies:

- To call consultants a day after the surgery to confirm on the status of blood either to be released or not
- To request for longer expiry blood from public hospitals

2.6. Rejection rate of specimen

Based on the data collected, the Mean for 2014 was 0.65% which is smaller compared to 1.11% in 2015. The percentage for 2015 had increased compared to 2014 due to the increasing number of test on sputum sample, where many samples contained saliva instead of sputum, which falls under incorrect specimen. The urine sample rejected due to no request or sent twice is also increasing in 2015, which lead to higher percentage in 2015. However, the rejected urine did not require re- sampling. The Variance for 2014 was 0.06 which is slightly smaller compared to 2015 with the value of 0.07. The Standard deviation for 2014 was 0.25 which is also slightly smaller compared to 2015 with the value of 0.27.
Table below shows the number of rejected specimens which fall under the incorrect samples category:

Category	2014	2015	Variance
Incorrect specimen	92	181	89

The increasing number of rejected specimen in 2015 was parallel with the increasing number of test requested. In 2014, 494 AFB smear were requested while in 2015, 655 AFB smear were requested. The recruitment of Respiratory Physician in 2015 had increased the number of test. Giving education to nurses on sample collection will reduce the rejection rate.

VI. CONCLUSION

For the indicator related to OT complex, there were 4 cases of non- compliance with 1 case recorded in March, 1 case in May, 1 case in July and 1 case in September 2014 but for 2015 the number of non-compliance had increased tremendously to 48 cases where 5 cases recorded in March, 4 cases in May, 5 cases in June, 3 cases in July, 7 cases in August, 8 cases in September, 4 cases in October, 10 cases in November and 2 cases in December. Quality objective of 90% case note retrieved was achieved for both years of 2014 and 2015. Monthly achievement for the whole year of 2014 and 2015 were higher than the target. For laboratory result the objective was not achieved in July and August of 2014 due to shortage of manpower.However for 2015, the quality objective was achieved for the whole year and much higher compared to 2014. Regarding the new admission, only Dahlia ward failed to achieve the targetin 2014where achievement for Dahlia was 94%. For 2015, Lavender ward and Flora ward failed to achieve the target with Lavender ward only achieved 88% and Flora ward 93.5%. In term of efficiency of care, forPercentage of elective operation cancellation, the Mean for cancellation rate was 5.03 % (181 cases) for 2014 and 4.78% (164 cases) for 2015.Ambulatory Care cases cancellation rate for 2014, were 2 cases because patients were unfit for surgery and transferred to General Hospital due to the unavailability of equipment and 8 cases in 2015due to medically unfit, insurance company decline, case of no equipment available and case of patient anxiety. For Unplanned admission of ambulatory

care patients, in year 2014total unplanned patients were 29 cases where as in 2015 were 41 cases. Blood Transfusion Services managed to achieve target for less than 2.5 cross match to transfusion ratio for the whole year of 2014 and 2015.In term of expired red cells, the Blood Transfusion Services had achieved the target for less than 5% in 2014. However in 2015, the target was reduced to 3% instead of 5% and due to this change, in June, July and October 2015, the target was not achieved. For Rejection rate of specimen, the Mean for 2014 was 0.65% which is smaller compared to 1.11% in 2015.

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