Project Title

Cost-Impact Analysis of Shifting Benign Prostate Hyperplasia (BPH) patients undergoing TURP or TUVP from Inpatient to Ambulatory Day Surgery Centre

Organisation(s) Involved

Tan Tock Seng Hospital

Project Period

Start date: May 2017

Additional Information

- NHG Quality Improvement Award Year 2017: Service Redesign & Delivery (Best Project Award)
- TTSH Quality Improvement Project Competitions 2017 (Commendation Award)

Project Category

Quality Improvement, Care Redesign, Process Redesign, Process Improvement

Keywords

Tan Tock Seng Hospital, Urology, Process Improvement, Care Redesign, Process Redesign, Ambulatory Day Surgery Centre , Inpatient Bed Saving, Clinical Pathway, Average length of stay, Benign Prostate Hyperplasia, Transurethral Resection of Prostate, Transurethral Vaporisation of Prostate, , Cost Reduction, Quality Improvement, Efficient Care

Name and Email of Project Contact Person(s)

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Asian Hospital Management Awards

*Required Fields

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Cost Reduction

(Cost reduction is good only if it is waste that is reduced or eliminated with benefits accruing to both the hospital and the patient.)

This award recognises the reduction of waste/ inefficiency in any area of hospital operations. Especially for projects that generated concrete savings that would continue into the future. More weight is given to the project that does not require capital investment and a large part of the savings was passed on to the patient.

Complete All Information Below:

Project Title (Maximum 256 Characters):
Cost-Impact Analysis of Shifting Benign Prostate Hyperplasia (BPH) patients undergoing TURP or TUVP from Inpatient to Ambulatory Day Surgery Centre

Date Project Started (Maximum 128 Characters) (i.e. May 24, 2015):
May 8, 2017

Department Name (Maximum 256 Characters):
Department of Urology, Case Management Unit and Office of Clinical Governance

Names of Key Staff Involved in this Project (Maximum 512 Characters) (Separate names with comma):
Adj Asst Prof Chong Kian Tai, Dr Hee Owen Kim, Adj Asst Prof Ronny Tan Ban Wei, Ms Hu Yalan, Ms Lin Weiqian Jacqueline, Ms Ong Ee Ling

1. **Provide some background as to how the project originated e.g. what problem/opportunity were you faced with. (Maximum number of words – 350)**

Background

Benign Prostate Hyperplasia (BPH) affects about 50% of men between the ages of 51 and 60 and up to 90% of men who are aged 80 and over (WebMD, 2018). This is a chronic and common condition among aged men, with frequent urination and excessive pain being the major symptoms. Transurethral Resection of Prostate (TURP) and Transurethral Vaporisation of Prostate (TUVP) are the surgical treatments of choice for men with BPH who have failed conservative management (Chaughtai *et al*., 2015; Skinder *et al*., 2016).

Traditionally, patients were admitted to our inpatient wards for post-operative care and monitoring after TURP/TUVP. Past data from Case Management Unit (CMU) database revealed that all of these patients utilised inpatient beds with an Average-Length-of-Stay (ALOS) of 3.0 days in 2012, 2.1 days in 2013 and 2.4 days in 2014. Among these over-stayers (>2 days), one-third were due to non-clinical reasons (for instance, the patient was not prepared for discharge on the following day), causing unnecessary additional hospitalisation costs for patients. A call for a change in care design was proposed to reduce the ALOS by shifting patients who had undergone TURP/TUVP from the inpatient wards to the ambulatory surgery setting in our Day Surgery Centre (DSC). Without compromising surgical safety or high quality nursing and medical care, beds in the inpatient wards could be freed up for patients with acute medical issues, potentially solving the bed-crunch issues in our institution.

Opportunity

Since May 2015, new care redesign was successfully implemented, primarily by shifting post-TURP/TUVP patients from inpatient wards to DSC. The ALOS was significantly reduced from 3.0 days between October 2014 to March 2015 (pre-implementation) to 1.5 days from October 2016 to March 2017 (post-implementation). In May 2017, following the successful implementation of this shift, our team took the opportunity and decided to evaluate the actual cost-impact (6-month pre and post intervention) of our service redesign. The objective of the analysis was to identify the effects of our work to the institution and patient in financial terms.

2. **Describe what was required to address the aforementioned problem/opportunity. Outline what your targets/goals were and whether any distinction was made between costs and waste. Also, provide an overview of the team that was put together to undertake this. (Maximum number of words – 250)**

As we had no prior experience on cost analysis, we sought advice from the senior management who supplemented us with a cost expert to guide us through. Hence, the newly formed team consisted a clinical champion, case managers, financial cost advisor and executive.

The major goal of the analysis was to identify the actual cost-savings to the institution and patient between the pre- (October 2014 to March 2015) and post-implementation (October 2016 to March 2017) of shift redesign, with the following key performance indexes calculated:

1. Number of bed days saved;
2. Estimated cost of care saved based on ALOS;
3. Estimated cost of care saved due to readmission;
4. Estimated cost savings for patient.

We identified that the cost associated to the new shift included additional manpower, logistics, equipment or facilities required, which were all negligible in our scenario. There was also no wastage of aforementioned resources associated with the new shift.

As no additional resources were required, it was reported that the benefits of new shift were sustainable through a period of 1 year, following a TURP/TUVP annual report which was submitted to the institution's clinical governance office. This would mean that the new care redesign was able to reduce ALOS without increasing the financial or manpower burden to our institution. This reduced length of stay could be translated into savings in patients' hospitalisation bill, reducing economical resources waste as well as freeing up more inpatient beds which could eventually address our frequent bed-crunch situations.

3. **Outline the steps or stages of the project and how these were executed by the team. (Maximum number of words – 200)**

The evolution of the inpatient-ambulatory shift began in February to April 2015. Before February 2015, a project team was formed to identify the factors leading to high ALOS. After numerous discussions, the team decided on the intervention by shifting medically-appropriate TURP/TUVP patients to DSC based on the centre's selection criteria without inducing any surgical or nursing compromise. The motivation for this transition also included: (i) saving precious inpatient beds to reduce bed-crunch situations; (ii) reducing inpatient ALOS; and (iii) cost-saving for patients and hospital. In order to facilitate this new workflow in DSC as well as inpatient wards, the TURP clinical pathway (a set of standardised tool with patient care algorithms and best evidence-based practice) was also revised to assist and guide healthcare providers in the post-care of TURP/TUVP patients. This care redesign began its pilot programme in DSC and selected surgical wards. As the preliminary results during the pilot phase were promising, full implementation of our programme continued from May 2015 to present. Subsequent reviews also demonstrated positive trends indicating sustainability with no vast difference in clinical variances. Thus, a follow through on cost-impact study was then proposed.

4. **Demonstrate the results of the project e.g. provide details of what costs (wastes) were reduced and the impact. How did you measure this? How was the project beneficial from the patient's perspective? Were any savings passed onto the patient? Present quantifiable information such as before and after measurements and percentage improvement. (Maximum number of words – 200)**

This work redesign was carefully implemented and reviewed to reduce ALOS without any patient compromise. A total of 149 non-subsidised patients' bill profiles were manually retrieved, and analysed by the finance department from October 2014 to March 2017. Calculations were based on an ALOS 3.0 days (n=74) pre-implementation and ALOS 1.5 days (n=75) post-implementation.

The comparative annual estimated cost-savings in this care redesign reported:

1. 215 bed days saved – a 48%-reduction
2. S$107,175 bed days saved – a 61%-reduction
3. S$515,498 total costs of care saved (e.g. surgeon fees, consumables etc.) – a 47%-reduction
4. S$3500 per patient – 47%-reduction

We strive to make healthcare costs affordable. Besides savings for hospitalisation bills, our patients can now expect an earlier discharge without a urinary catheter, recovery in the comfort of their own homes, reduced risks of hospital acquired infections from unnecessary prolonged hospital stay and uncompromised high-quality, cost-effective medical and nursing care.

These differential costs between inpatient ward and DSC placed a deep impact of change in the institution's healthcare system. Our reduced ALOS (waste) could considerably help our hospital's frequent bed-crunch situations by freeing up beds for patients who require acute medical attention and inpatient stay.

5. **Please outline how sustainable the improvements are, and give any other information, including third party testimonial regarding your project which you think would help convince the judges that this project (or program) should win this category. (Maximum number of words – 300)**

Sustainability

As defined by the National Health Service's Sustainable Development Unit (2018), a government agency which governs health determinants across the healthcare system in England, sustainability in healthcare is achieved by delivering high quality care and improved public health without exhausting our limited healthcare resources. Our improvement project had shown promising and sustainable results following our pilot shift in May 2015, achieving the goals of the project without increasing financial or workload burden to our institution, on top of greatly reduced patients' hospitalisation bills. These successful outcomes were also reflected in 2016 and 2017 TURP/TUVP annual reports.

The annual reports for the past two years revealed that:

1. More than ¾ of the patients (76% in 2016 and 77% in 2017) were admitted to DSC;
2. A persistent ALOS of < 2 days (1.7 days in 2016 and 1.6 days in 2017);
3. 74% of patients discharged within POD 1 in 2016 and 75% in 2017 from DSC;
4. 30-day readmission rate was kept to <8%;
5. Complication rates of Haematuria with clot retention requiring manual bladder washout (1% in 2016 and 3.6% in 2017) and Urinary Tract Infection/Sepsis were kept low (2.9% in 2016 and 4.1% in 2017).

Third Party Testimonial

Finally, this work had also recently won us the Singapore's National Healthcare Group (NHG) Quality Improvement Award 'Best Project – Service Redesign and Delivery' as well as Tan Tock Seng Hospital Quality Improvement Project 'Commendation Award' in 2017. In addition, our team is extremely honoured to be shortlisted for poster presentation at the International Forum on Quality & Safety in Healthcare in Amsterdam in May this year. We strongly believe that this is a very good opportunity to present our project on an international platform to showcase our good work.

You can submit up to 4 file attachments such as:

- Press reports
- Awards won
- Commendations received
- Comments and testimonials from stakeholders
- Measurable results achieved

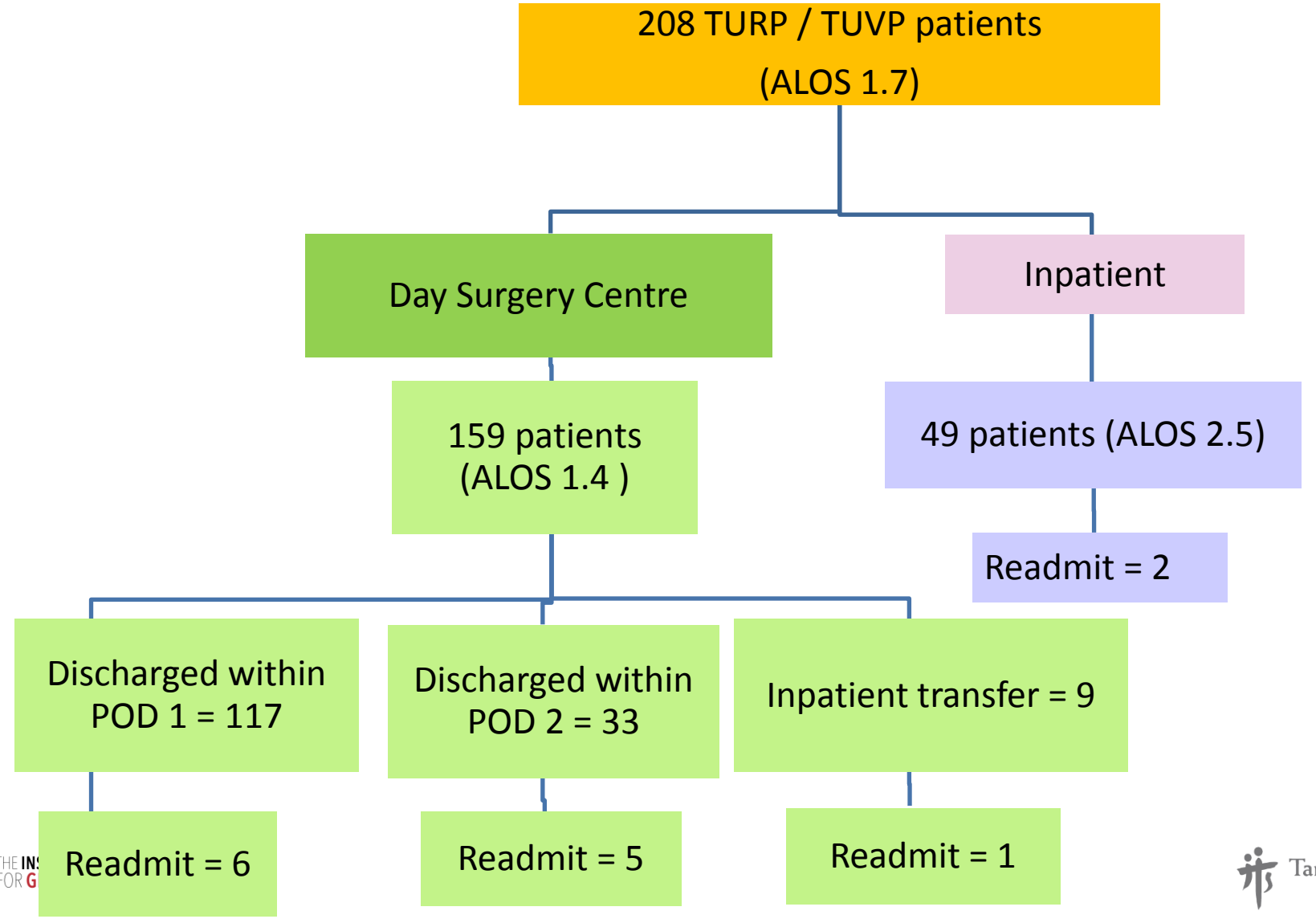
Files must not exceed 2 Megabytes in size

Allowed file types are:

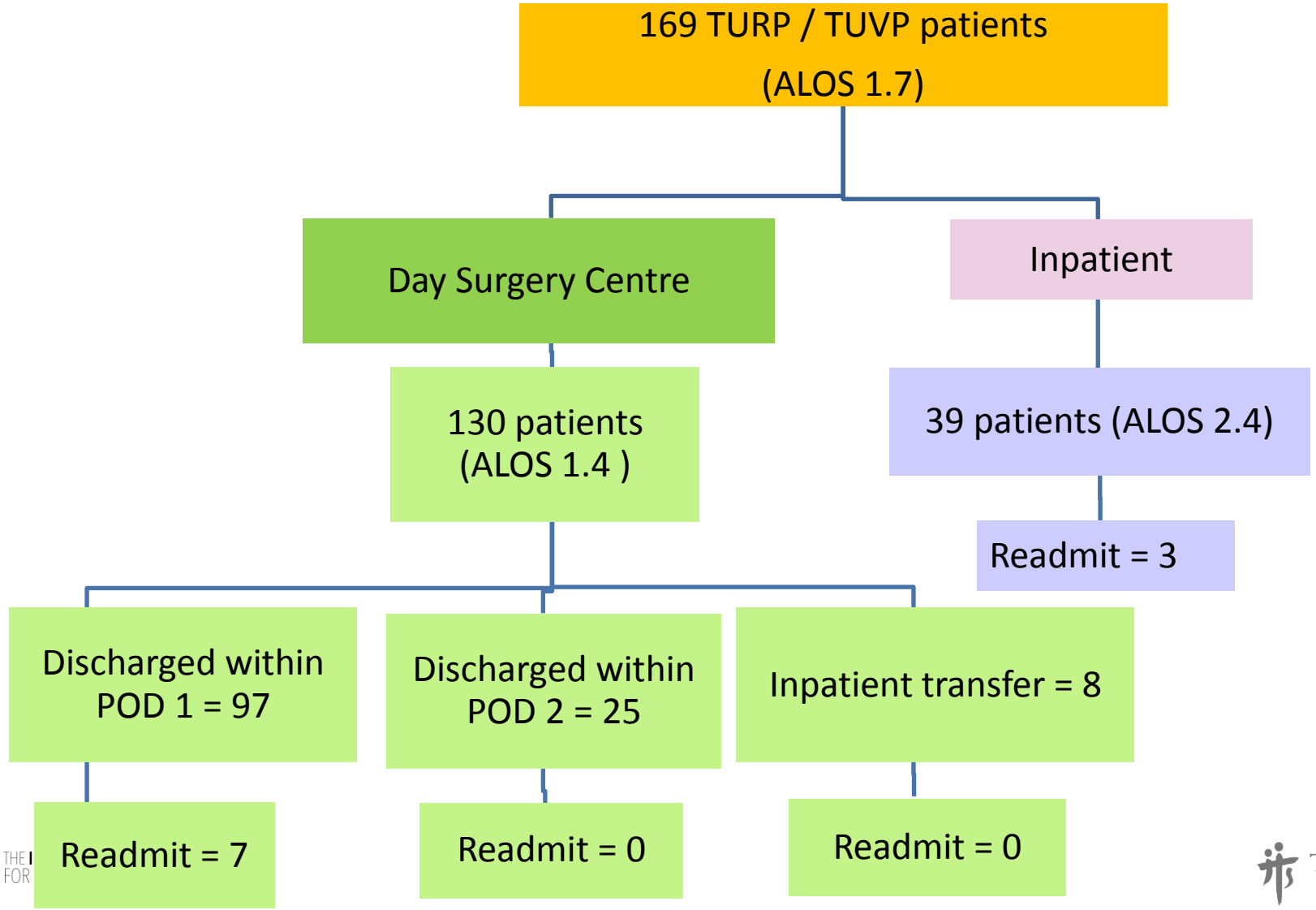
PDF (*.pdf)
Word Document (*.doc)
PowerPoint Presentation (*.ppt)
JPG Image (*.jpg)
(File Name must be 8 words or less)

Attachment	
Appendix 1: TURP / TUVP Results	 Appendix 1_TURP or TUVP Results.pdf
Appendix 2: Awards Won	 Appendix 2_Award Won.pdf
Appendix 3: BMJ Acceptance Letter	 Appendix 3_BMJ 2018 Acceptance Lett
Appendix 4: References	 Appendix 4_References.pdf

TURP / TUVP Clinical Pathway Annual Report 2016: AS23 Versus Inpatient



TURP/TUVP CP Annual Report 2017: AS23 Versus Inpatient

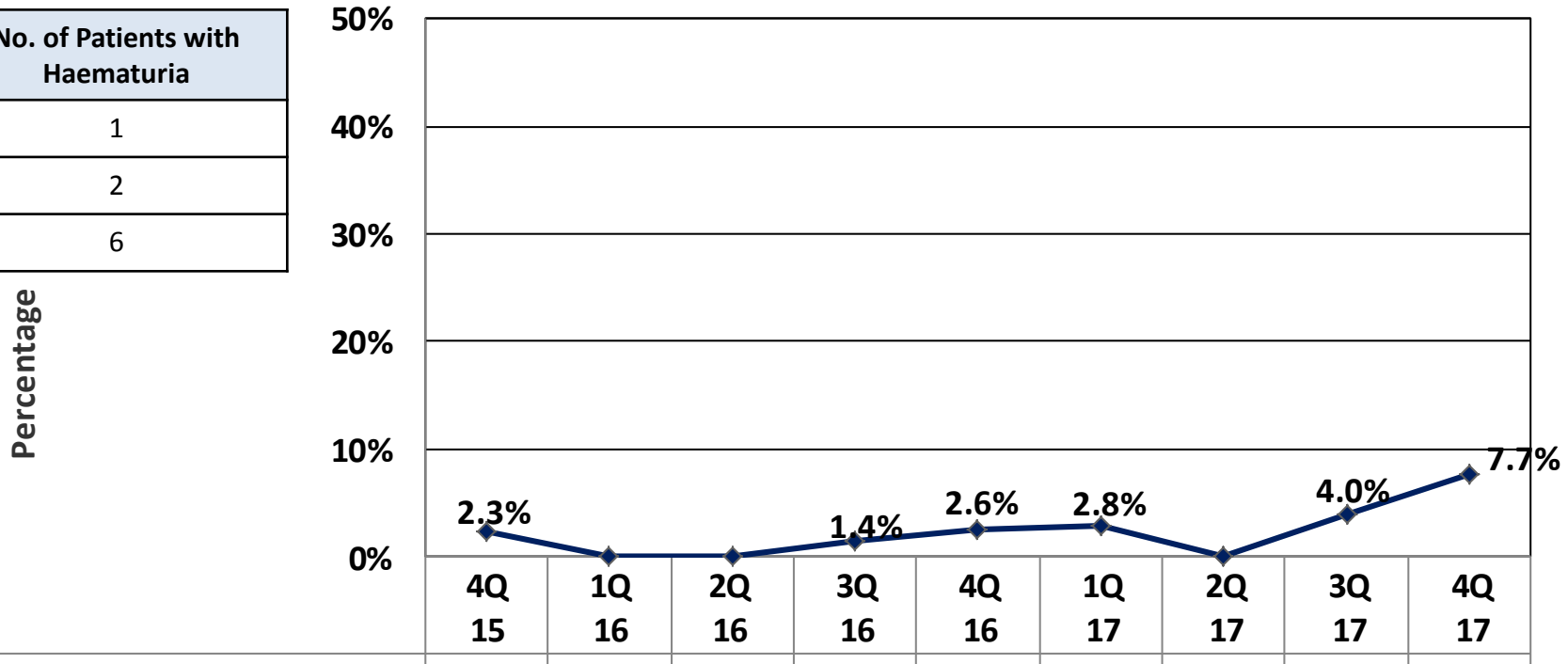


Tan Tock Seng HOSPITAL

TURP/TUVP CP Annual Report 2017:
Haematuria with Clot Retention Requiring MBWO

Total CP patients: 2015 (n=158) 2016 (n=208) 2017 (n=169)

Year	No. of Patients with Haematuria
2015	1
2016	2
2017	6



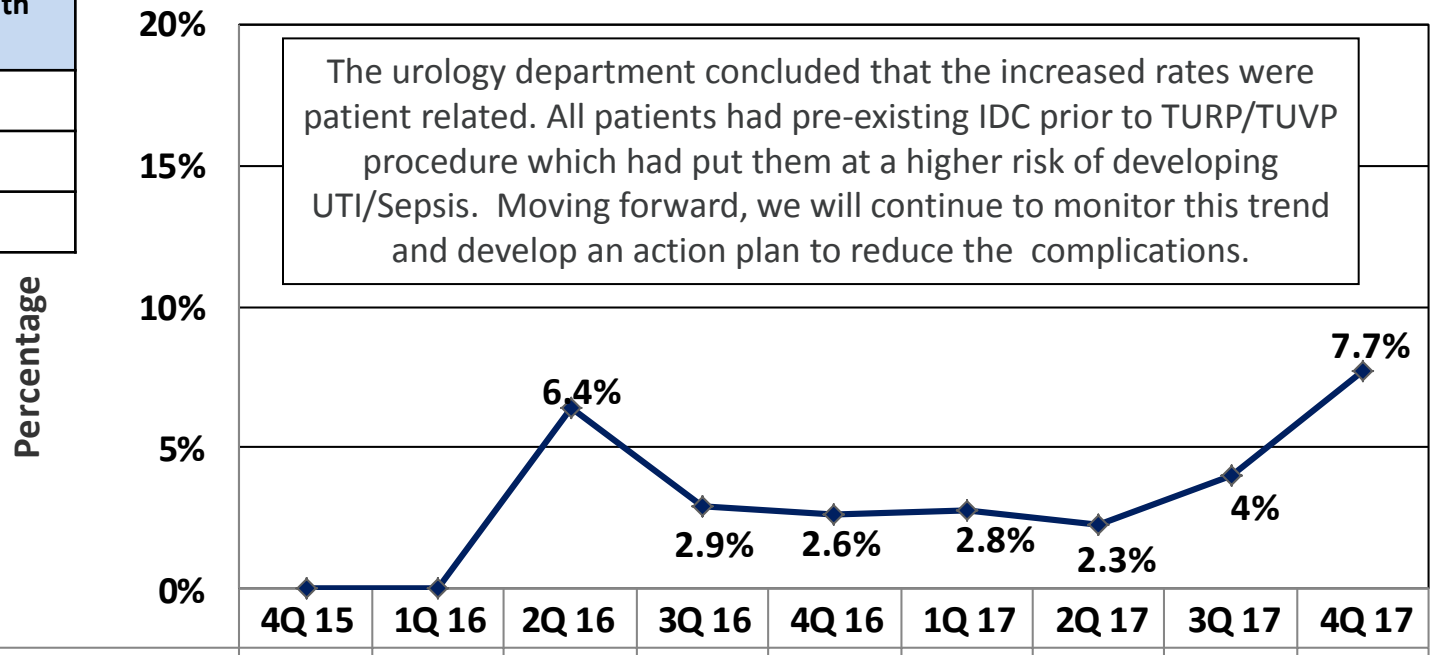
	4Q 15	1Q 16	2Q 16	3Q 16	4Q 16	1Q 17	2Q 17	3Q 17	4Q 17
Percentage	2.3%	0.0%	0.0%	1.4%	2.6%	2.8%	0%	4.0%	7.7%
CP Patients with Prolonged Haematuria /clot retention	1	0	0	1	1	1	0	2	3
CP Patients	44	53	47	69	39	36	44	50	39

Inclusion Criteria	All TURP/TUVP clinical pathway patients reported with prolonged Haematuria/clot retention post-surgery
Exclusion Criteria	Patients who underwent TURBT only

TURP/TUVP CP Annual Report 2017: UTI/Sepsis

Total CP patients: 2015 (n=158) 2016 (n=208) 2017 (n=169)

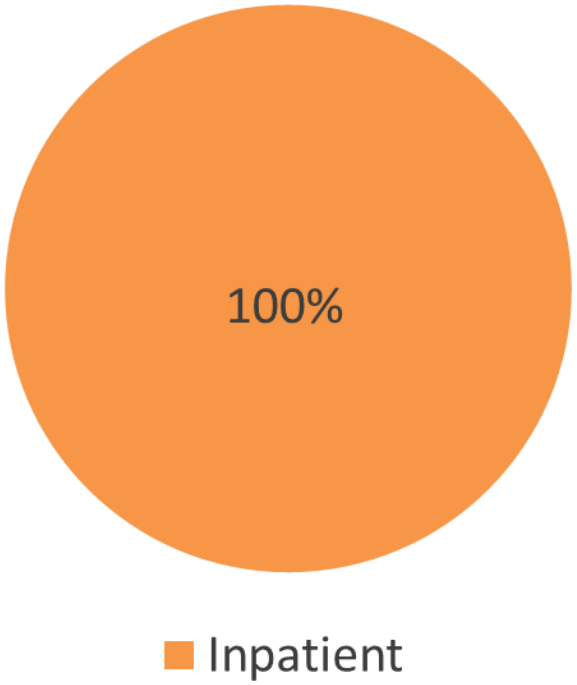
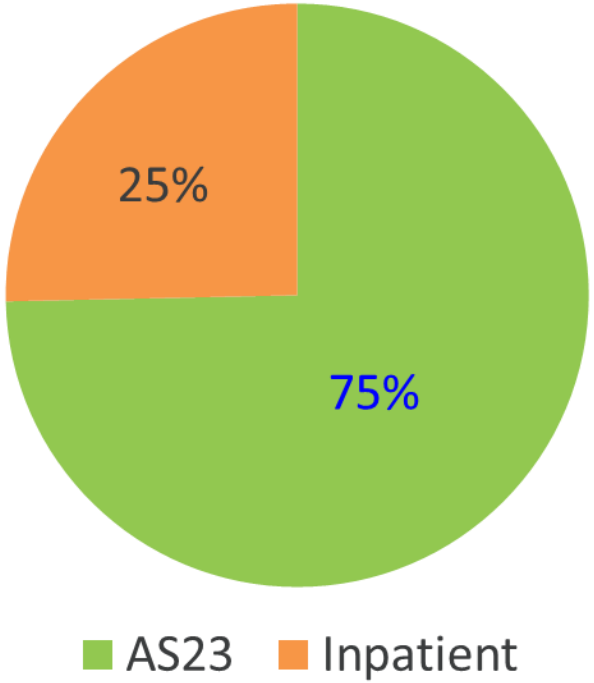
Year	No. of Patients with UTI/Sepsis
2015	1
2016	6
2017	7



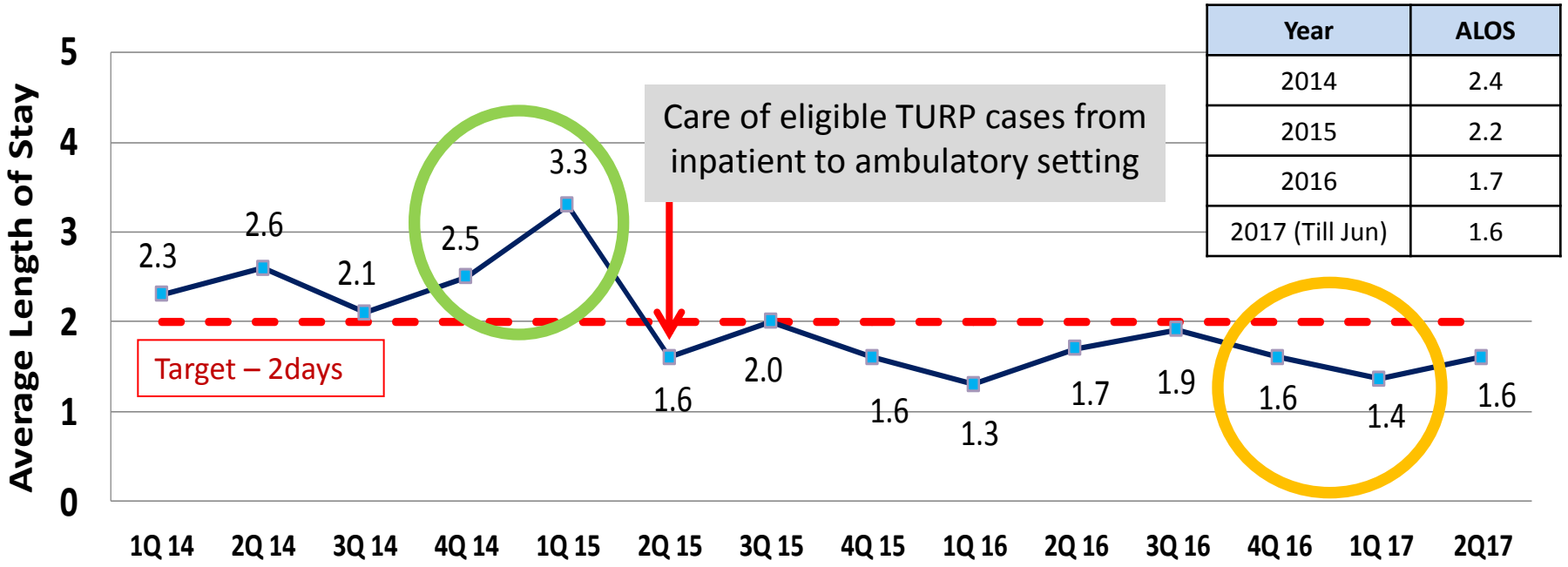
	4Q 15	1Q 16	2Q 16	3Q 16	4Q 16	1Q 17	2Q 17	3Q 17	4Q 17
Percentage	0%	0%	6.4%	2.9%	2.6%	2.8%	2.3%	4%	7.7%
CP Patients with UTI/Sepsis Post-operation	0	0	3	2	1	1	1	2	3
CP Patients	44	53	47	69	39	36	44	50	39

Inclusion Criteria	All clinical pathway patients reported with Anastomotic Leak post-operation
Exclusion Criteria	Directly admitted & stayed in ICU post-surgery (> 5 days)

Uptake of TURP / TUVP Surgical Clinical Pathway

Pre-Implementation (Oct 2014 to Mar 2015)	Post-Implementation (Oct 2016 to Mar 2017)
	
Total No. of TURP / TUVP Patients = 74	**Total No. of TURP / TUVP Patients = 75**

Improved Average Length of Stay (1Q 14 to 2Q 17)



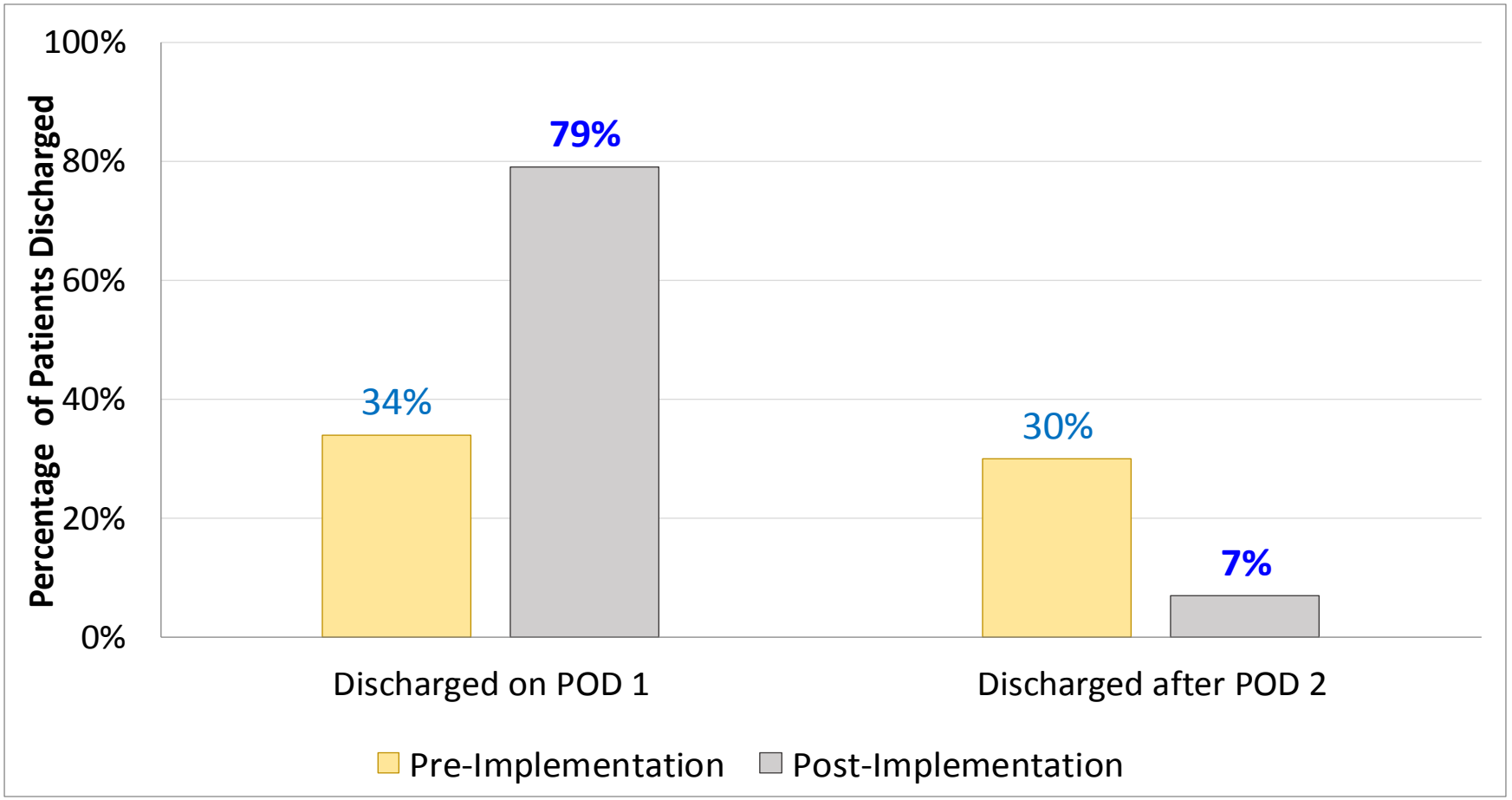
Year	ALOS
2014	2.4
2015	2.2
2016	1.7
2017 (Till Jun)	1.6

Quarter	1Q 14	2Q 14	3Q 14	4Q 14	1Q 15	2Q 15	3Q 15	4Q 15	1Q 16	2Q 16	3Q 16	4Q 16	1Q 17	2Q 17
Total CP days	92	114	84	81	137	52	80	71	70	78	132	64	49	72
CP patients	40	44	40	33	41	33	40	44	53	47	69	39	36	44

Note: The 30-day readmission rates are similar for both periods being studied.

(CP: Clinical Pathway; ALOS: Average Length of Stay)

Higher Rates of POD 1 Discharges
(4Q 14 Oct 2014 to Mar 2015 versus 1Q 17 Oct 2016 to Mar 2017)



- Improved percentage of patients discharged on POD 1 from 34% to 79%
- Reduced percentage of patients discharged after POD 2 from 30% to 7%

Cost Estimations on Bed Days

	Pre-Implementation (Oct 2014 to Mar 2015)	Post-Implementation (Oct 2016 to Mar 2017)	
		AS23	Inpatient
Total No. of TURP / TUVP Patients	74	56	19
Average Length of Stay per patient	3.0	1.5	1.6
Total No. of Bed Days (Annualised)	3.0 x 148 = **444** (Estimated No. of TURP / TUVP patients per year = 148)	1.5 x 112 = **168** (Estimated No. of TURP / TUVP patients per year = 112)	1.6 x 38 = **61** (Estimated No. of TURP / TUVP patients per year = 38)
		168 + 61 = **229**	
Difference in Bed Days (Annualised):		229 - 444 = **-215** **215** Bed Days Saved	
Difference in Bed Days in Monetary Terms (Annualised):		[(168 x $258) + (61 x $393)] - (444 x $393) = **-$107,175** **$107,175** (Savings in Monetary Terms)	

Assumptions:

Estimated cost of Inpatient Ward Charge per day is $393 [A1 Class]

Estimated cost of Day Surgery Centre (AS23) Charge per day is $258 [Private - Single]

Cost Estimations on ALOS (Annualised)

	Pre-Implementation (Oct 2014 to Mar 2015)	Post-Implementation (Oct 2016 to Mar 2017)	
		AS23	Inpatient
Total No. of TURP / TUVP Patients	74	56	19
Average Length of Stay per patient	3.0	1.5	1.6
Total Cost of Care (in 6 months)	74 Patients x 3.0 x $2,492.78 = **$553,397.16**	56 Patients x 1.5 x $2,617.47 = **$219,867.48**	19 Patients x 1.6 x $2,492.78 = **$75,780.51**
Total Cost of Care (Annualised)	($553,397.16/74) x 148 = **$1,106,794.32** **(Estimated No. of TURP / TUVP patients per year = 148)**	($219,867.48/56) x 112 = **$439,734.96** **(Estimated No. of TURP / TUVP patients per year = 112)**	($75,780.51/19) x 38 = **$151,561.02** **(Estimated No. of TURP / TUVP patients per year = 38)**
		$439,734.96 + $151,561.02 = **$591,295.98**	
Difference in Total Cost of Care (Annualised):		$591,295.98 - $1,106,794.32 = **-$515,498.34**	

$515,498

Estimated Total Cost of Care Saved Annually

Assumptions:

Estimated cost of Inpatient stay per day is $2,492.78 [A1 Class]

Estimated cost of Day Surgery Centre (AS23) stay per day is $2,617.47 [Private - Single]

Cost Estimations on ALOS Per Patient

	Pre-Implementation (Oct 2014 to Mar 2015)	Post-Implementation (Oct 2016 to Mar 2017)	
		AS23	Inpatient
Total No. of TURP / TUVP Patients	**74**	**56**	**19**
Average Length of Stay per patient	**3.0**	**1.5**	**1.6**
Total Cost of Care per patient	3.0 x $2,492.78 **= $7,478.34**	1.5 x $2,617.47 **= $3,926.21**	1.6 x $2,492.78 **= $3,988.45**
Cost Savings to Patient:		($3,926.21 - $7,478.34) **= -$3,552.13**	($3,988.45 - $7,478.34) **= -$3,489.89**

Estimated Cost Savings for 1 Patient is **$3,500**

Assumptions:
Estimated cost of Inpatient stay per day is $2,492.78 [A1 Class]
Estimated cost of Day Surgery Centre (AS23) stay per day is $2,617.47 [Private - Single]