Improving Patient Care and Outcome with a Dedicated Emergency Surgery and Trauma (ESAT) Unit

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Background

- The traditional models of care for acute surgical patients face the pressures of senior staff availability, clashes with elective surgery and clinics, appropriate supervision of junior staff and timely review in the emergency department
- Khoo Teck Puat Hospital (KTPH) is the first hospital in Singapore to set up a dedicated acute surgical unit.
- Established in November 2014, the aim of this service is to provide efficient, coordinated, accessible acute care for emergency surgical and trauma patients.

Aim

- To compare the **efficiency** and **clinical outcomes** before and after implementation of ESAT in KTPH

Methodology

- A retrospective analysis of all emergency general surgical admissions in KTPH from May 2014 to April 2015
- Comparison was made for the period before (May-September 2014) and after (December 2014-April 2015) ESAT implementation
- Outcomes assessed included efficiency (number of admissions and operations, time to initial assessment, time to surgery, hospital length of stay (LOS), hospitalization costs) and clinical outcomes (re-admission and complication rates)

Results

- Table-1 and Table-2 show the distribution of emergency general surgical and trauma admissions and operations performed before and during ESAT period

Table-1. Baseline Characteristics and discharge diagnoses

Variable	Pre-ESAT (n=1148)	ESAT (n=1179)
Age	50±19	51±19
Sex (M:F)	725:423	757:422
Final diagnosis *(primary)*		
Acute appendicitis	187 (16.3)	172 (14.6)
Biliary disease/Pancreatitis	182 (15.9)	166 (14.1)
Diverticular disease	59 (5.1)	70 (5.9)
Soft tissue infection	199 (17.4)	231 (19.6)*
Trauma	95 (8.3)	73 (6.2)
Bowel obstruction	81 (7.1)	122 (10.3)*
Gastro-intestinal bleed	60 (5.2)	59 (5.0)
Gastritis/Colitis/Gastroenteritis	75 (6.5)	121 (10.3)
Gynaecology	6 (0.5)	13 (1.1)
Hernia	21 (1.8)	30 (2.5)
Non-specific abdominal pain	100 (8.7)	53 (4.5)
Other*	83 (7.2)	69 (5.9)

Data are number of patients (%)
*Other refers to small numbers of patients from a spectrum of disorders grouped together

Table-2. Emergency procedures performed

Variable	Pre-ESAT (n=484)	ESAT (n=479)
Appendicectomy	171 (35.3)	162 (33.8)
†I&D/Wound debridement	173 (35.7)	205 (42.8)*
Cholecystectomy	38 (7.9)	24 (5.0)
Hernia	16 (3.3)	15 (3.1)
Laparotomy		
Adhesiolysis	7 (1.5)	5 (1.1)
Bowel resection	30 (6.2)	26 (5.4)
Exploratory Laparotomy	17 (3.5)	9 (1.9)
Trauma	12 (2.5)	19 (4.0)
Peptic Ulcer	15 (3.1)	10 (2.1)
Gastric resection	2 (0.4)	1 (0.2)
Other	3 (0.6)	3 (0.6)

Data are number of patients (%)
†I&D; Incision and Drainage
Other refers to conditions with small numbers that have been grouped together
**P<0.05*

Table-3. Efficiency key performance indicators

KPI	Pre-ESAT	ESAT
Case time from booking to OT		
P1 *(n=51)*	43 ± 5.9	24 ± 3.5
P2 *(n=366)*	141 ± 19.1	71 ± 6.2*
P3 *(n=642)*	250 ± 18.1	84 ± 7.8*
Time from ED referral to GS review *(min)*	99 ± 4.7	80 ± 3.5*
Consultant in OT for major cases *(%)*	88	98*
Cases performed at day/night time *(%)*		
Day (07:30 – 16:00)	41	44
After hours (16:00 – 07:30)	59	56
Hospital bill size *(SGD)*	$3767 ± 209	$3189 ± 202*
ICU length of stay *(day)*	8.6 ± 2.1	5.0 ± 0.8*
Overall length of stay *(day)*	4.7 ± 0.3	3.4 ± 0.1*
Re-admission rate *(%)*	5.5	7.0
Complications *(n)*		
CD III	5	1
CD IV	4	3
CD V (death)	2	0
Overall mortality *(n)*	24	10

Data are number (%); mean ± SE
KPI; Key performance indicator, P1; Priority 1 to be done within 1 hour, P2; Priority 2 to be done within 4 hours, P3; Priority 3 to be done within 24 hours, ED; Emergency department, GS; General Surgery, OT; operating theatre, SGD; Singapore dollars, ICU; Intensive care unit, CD; Clavien-Dindo classification
**P<0.05*

Figure 1. Mean time from ED referral to GS review (min) before and during ESAT (±SE)

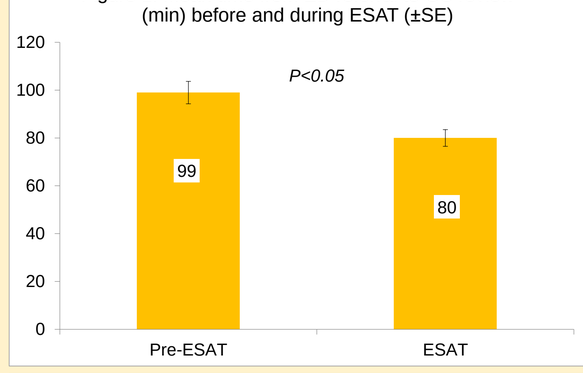


Figure 2. Mean case time from booking to OT (min) before and during ESAT (±SE)

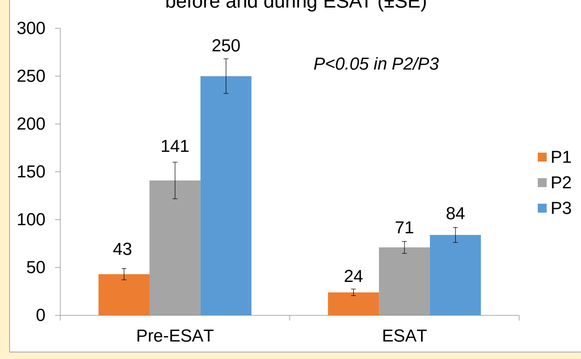


Figure 3. Consultant in OT for major cases (%)

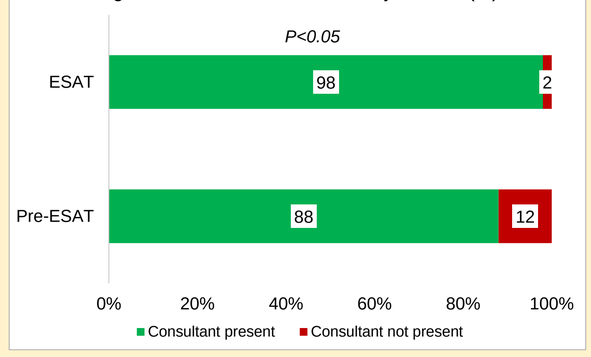


Figure 4. Average length of ICU stay (day) before and during ESAT (±SE)

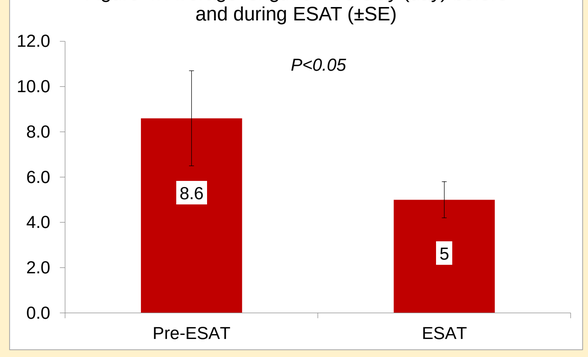


Figure 5. Average length of hospital stay (day) before and during ESAT (±SE)

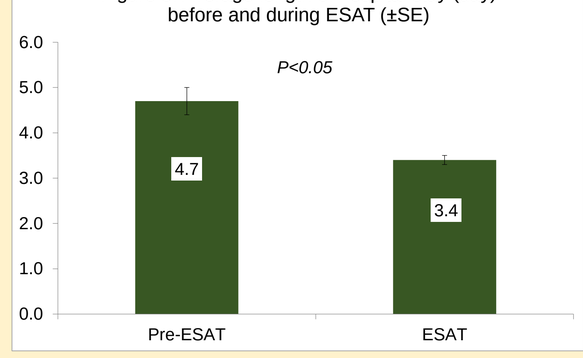
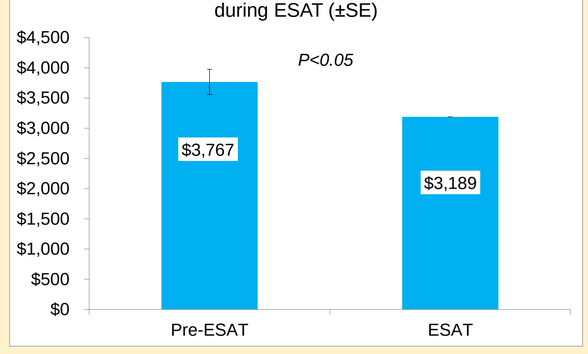


Figure 6. Mean hospital bill size (SGD$) before and during ESAT (±SE)



Conclusion

- The dedicated Emergency Surgery and Trauma (ESAT) unit in KTPH has resulted in improvement of patient outcomes such as reduction in time to surgical review, time to surgery, length of stay and hospital costs. The KTPH model has been described in the newspaper *Lianhe Zaobao* (Fig. 7) and in the Singapore Medical Journal (Fig. 8)

08 2016年12月31日 星期六 联合早报 新加坡

邱德拔医院紧急手术计划

“随传随到”医生助病患提早出院

计划推行两年来，邱德拔医院紧急部门病患住院天数从之前的4.7天减至3.4天，入住加护病房的天数从8.6天减至4.9天。此外，由紧急部门转介至普通外科的时间减少了近20分钟，手术并发症情况也明显下降。

杨漾 报道
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为紧急部门病患分配特定的外科医生小组，在病患需要开刀时第一时间“随传随到”，不但能让病患获得更及时治疗，也改善了整体护理质量。

邱德拔医院自2014年底率先改善工作流程，推出紧急手术和创伤服务计划（Emergency Surgery and Trauma Service，简称ESAT），由创伤急症外科医生专门负责需要动手术的紧急部门病患。

更有效分配医生资源

计划推行两年来，紧急部门病患住院天数从之前的4.7天减至3.4天，入住加护病房的天数从8.6天减至4.9天。此外，由紧急部门转介至普通外科的时间减少了近20分钟，手术并发症情况也明显下降。

负责推行ESAT计划的马瑟医生（Sachin Mathur，40岁）接受《联合早报》访问时介绍，这种新护理模式主要目的是要更有效分配医生资源，把紧急部门的手术病患和普通手术病患区分开来，以此简化护理流程，加强工作效率，最终改善病患的护理质量。

在计划推行前，若有紧急部门病患需动手术，得调动每日值班（on call）的外科医生。但这些轮班的医生来自胸外科和骨科等不同部门，他们在兼顾各自专科的手术病患同时，另得花额外三四成的工作时间来应对紧急部门病患的需求。

马瑟说：“每日值班的工作制度目前仍在运行，但ESAT计划让需要开刀的紧急部门病患，也能获得像其他外科手术病患那样的护理方式，由一组固定的创伤和急症医生更专注地为他们提供治疗和跟进护理，同时让其他外科医生花更多时间在各自的专科领域发展和照顾病患。”

目前，ESAT计划共有两名创伤急症外科医生负责，他们在每周一至五的办公时间内，为需开刀的紧急部门病患提供专业咨询和手术服务。

两名医生下班后，其他外科医生便会照例根据每日值班的做法，接手负责至隔天早上。

马瑟透露，每天一般会为约10至15名紧急部门病患进行评估，其中半数患者需手术治疗。

他说：“约三成患者因创伤动手术，另七成则是因腹部疼痛、阑尾炎或胆囊等紧急情况开刀。不过，我们也会根据不同病患的个人情况进行评估，比如同是阑尾炎，我们会为30岁的病患开刀，而不会建议90岁的病患这么做，另外心脏病和中风病患一般也会另交专科医生负责。”

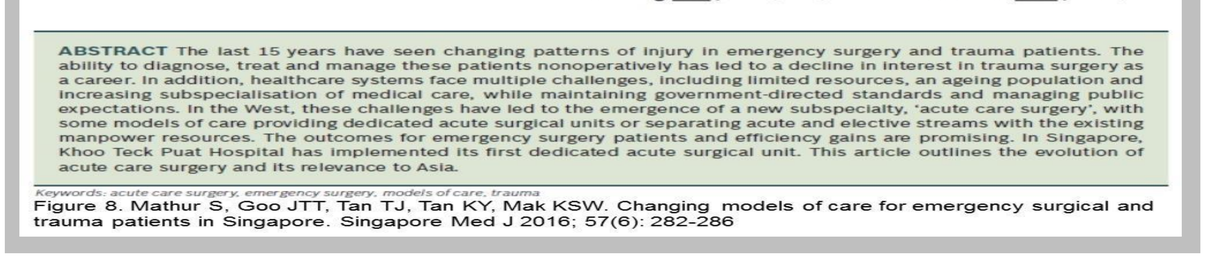
这个源自美国的紧急病患护理概念，在本地甚至亚洲国家都属“前卫”，但马瑟乐见这种做法有望成为本地未来的护理新趋势。

“我们推行计划两年多来，在病患护理和医生工作方面都看到实质的改善，最终我们希望能为紧急部门病患提供更及时地咨询和医疗服务。对病患和医生来说，它都是一种双赢局面。”

今年10月加入ESAT计划的顾问医生伍长泰（35岁），本身是一名乳癌外科医生，在坚持专科工作的同时，他目前每周也会花三四天的时间负责紧急部门病例。他说：“虽然我不会放弃乳癌外科专业，但我认为紧急部门病患同样需要更专注和及时的护理治疗。对医生来说，这不仅是一种公共服务，也能提升我们的专业水平。”

若有紧急部门病患需要开刀，邱德拔医院顾问医生马瑟（左）和伍长泰必会在第一时间赶到，为这些病患提供及时的医疗服务，减少他们的等候时间。（张毅圣摄）

Figure 7. Yang, Y. (2016, December 31, Saturday 03:30AM). Khoo Teck Puat Hospital Emergency Surgery Service facilitates early discharge of patients. *Lianhe Zaobao,* Retrieved from http://www.80sd.org/guoji/2016/12/31/154969.html



Changing models of care for emergency surgical and trauma patients in Singapore

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ABSTRACT The last 15 years have seen changing patterns of injury in emergency surgery and trauma patients. The ability to diagnose, treat and manage these patients nonoperatively has led to a decline in interest in trauma surgery as a career. In addition, healthcare systems face multiple challenges, including limited resources, an ageing population and increasing subspecialisation of medical care, while maintaining government-directed standards and managing public expectations. In the West, these challenges have led to the emergence of a new subspecialty, 'acute care surgery', with some models of care providing dedicated acute surgical units or separating acute and elective streams with the existing manpower resources. The outcomes for emergency surgery patients and efficiency gains are promising. In Singapore, Khoo Teck Puat Hospital has implemented its first dedicated acute surgical unit. This article outlines the evolution of acute care surgery and its relevance to Asia.

Keywords: acute care surgery, emergency surgery, models of care, trauma

Figure 8. Mathur S, Goo JTT, Tan TJ, Tan KY, Mak KSW. Changing models of care for emergency surgical and trauma patients in Singapore. Singapore Med J 2016; 57(6): 282-286

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