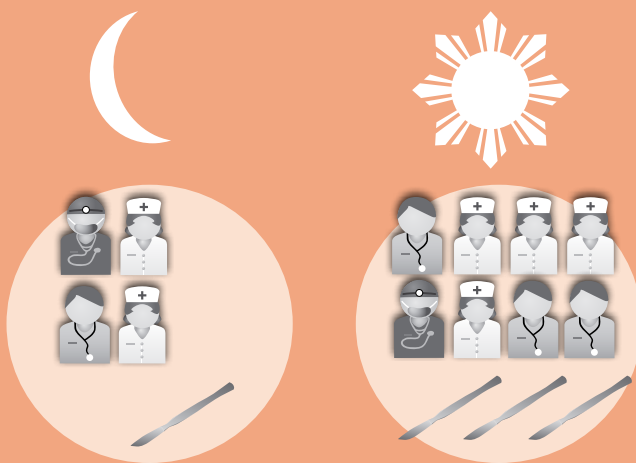
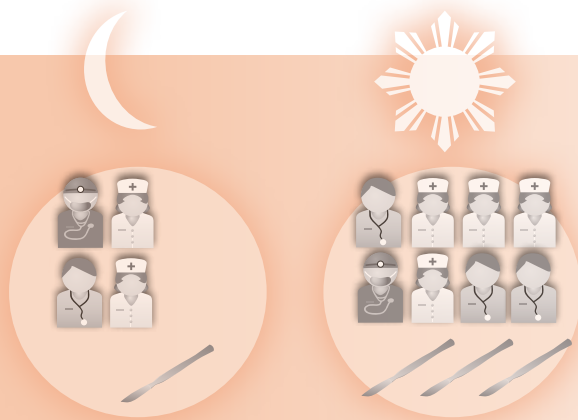


3

Re-engineering of Emergency Operating Theatre Services



Expanded theatre capacity and reshuffled operations for enhanced patient safety and optimised night activities



EXECUTIVE BRIEF

301 *Four acute public hospitals expanded their day-time emergency operating theatre (“EOT”) capacity on weekdays in order to clear their backlog emergency operations formerly performed at the night time. At certain pilot sites, EOT services were also re-engineered as to manage cases of genuine emergency at night only while semi-urgent and elective operations were reshuffled to the day time with greater manpower and facility support. Patients could then have safer operations while the workload of on-call doctors would be reduced at night. It was targeted that patients’ waiting time for emergency operations could be shortened by expanding the EOT capacity in the extended day. In the review period, more than 30% of backlog operations were cleared in the pilot hospitals while the utilization ratio of EOT time at night, relative to the total EOT time used throughout the whole day, had dropped by 10% – 50%. The outcome varied among the pilot sites and was more conspicuous in acute secondary than acute tertiary hospitals. However, patients could in general enjoy better hospital care by having earlier operations, stronger clinical supervision and other clinical support for day-time surgeries as well as fewer complications. Besides, hospitals would benefit from shorter patient stay and a higher level of patient satisfaction. The pilot programme was supported by the health carers for further rollout to other hospitals.*

302 *HA was recommended to re-engineer the EOT services in all acute hospitals with 24-hour emergency services. Different modes of operating theatre services could be introduced during out-of-hours to support emergency operations at night and additional funding, if any, should first be allocated to expand the operating theatre capacity of acute secondary hospitals in the extended day. Besides,*

HA was recommended to manage the issues of inadequate day-time operating theatre capacity and institute changes in the work practice of the surgical stream specialties in order to optimise night-time operations and improve patient safety. It would also be worthwhile to delineate the roles and service scopes of different hospitals, explore further room for service networking, formulate acute trauma and neurosurgical diversion mechanisms and develop protocol-based escort medicine in all hospital clusters. Finally, HA was recommended to explore the feasibility of providing general resident call coverage for patients who were physiologically unstable in the surgical stream specialties with reference to the global trend and local private practice.

PILOT WORK REFORM PROGRAMME

303 In the past decade, HA had echoed the global trend of embracing a risk management culture by reducing clinical risks and ensuring safer management of patients in its daily operation. As former local surveys⁸ had shown, doctors' on-call activities generally fell after midnight and genuine emergencies at night accounted to only 5% of their on-call activities. Moreover, critical conditions that required immediate surgical interventions constituted only 4% – 11% of the night operations (i.e. those performed from 22:00 hrs to 08:00 hrs the next day) while 36% – 55% of the cases operated at night could be drawn to the extended day if operating rooms were available.

304 Operating theatres used to be an expensive high-volume resource in modern hospitals so it was critically important to optimise their usage. As night-time activities in public hospitals were usually supported by slimmer supervision and scattered clinical support; and health carers were more prone to experience fatigue and increased chance of injury⁹, reshuffling non-emergency operations at night to the extended day with an augmented operating theatre capacity and better staffing support should thus render safer patient care and



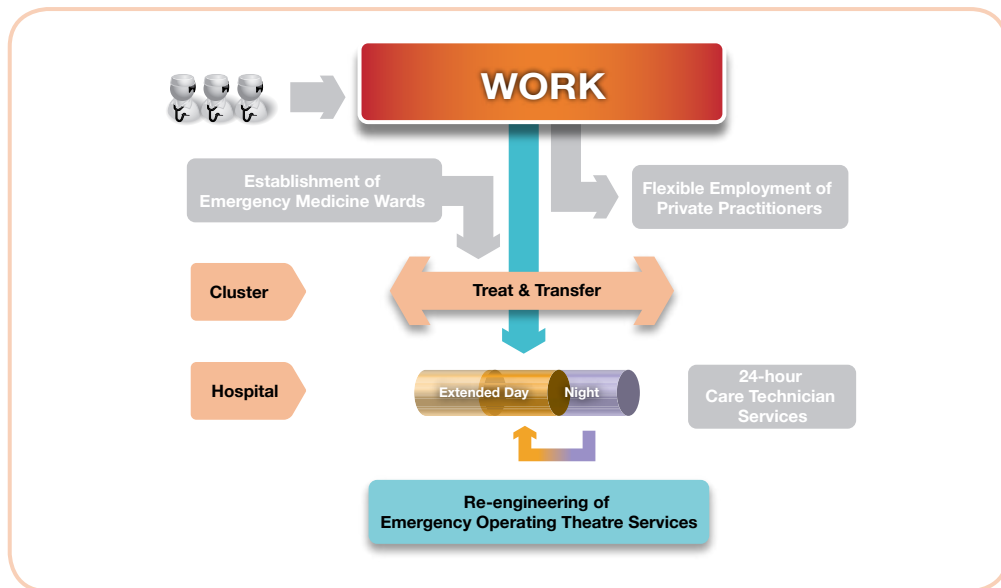
⁸ Surveys on public hospital doctors' on-call activities were conducted in September / November 2006 and February / March 2007.

⁹ Gander PH, et al. Hours of work and fatigue-related error: a survey of New Zealand anaesthetists, *Anaesth Intensive Care* 2000; 28:178-83; Uhrich ML, et al. *Surg Endosc* 2002; 16:635-g; Ava AG, et al. *Can J Anaesth* 1999; 46:665-g.

higher client satisfaction. Besides, by trimming avoidable clinical activities at night, doctors' workload would be alleviated, thus reducing their need for taking excess overnight on-site calls and improving their work-life balance as well.

305 Four acute public hospitals with 24-hour emergency services, namely, Caritas Medical Centre (“CMC”), North District Hospital (“NDH”), United Christian Hospital (“UCH”) and Yan Chai Hospital (“YCH”), took part in this pilot work reform programme. HA injected a total of \$30.6 million from 2007/08 to 2009/10¹⁰, involving 9 doctors, 16 nurses, 1 allied health professional and 12 supporting staff. The programme entailed introduction of an extended-day, optimised-night mode of operation where an extra day-time emergency operating theatre (“EOT”) session was opened on weekdays to clear the backlog operations while non-emergency operations at night were reshuffled to the extended day for enhanced patient safety. The professional workforce was re-organised and genuine cases of emergency, as per on-site doctors' clinical judgment, would continue to be operated at night. Different models were adopted by the pilot hospitals in accordance with their service scopes, operational arrangements and volume of operations at night. Figure 3.1 below contained the essence of the pilot work reform strategy and Table 3.1 gave a general overview of the re-engineering arrangements in the pilot hospitals.

Fig. 3.1 – Re-engineering of Emergency Operating Theatre Services



¹⁰ The resource injections for the EOT programme were \$3.8 million in 2007/08, \$14.7 million in 2008/09 and \$12.1 million in 2009/10.

Table 3.1 – Profile and EOT Arrangements in the Pilot Hospitals

	UCH	NDH	YCH	CMC
Nature	Acute tertiary	Acute secondary		
Programme commencement	October 2007		August 2007	March 2008
Extra weekday EOT session	Evening		Day time	
OT staffing at night	On-site		Off-site after midnight	
Remarks	Obstetric service provided at night	Neurosurgical operation provided at night	Relatively stable volume of operations at night	

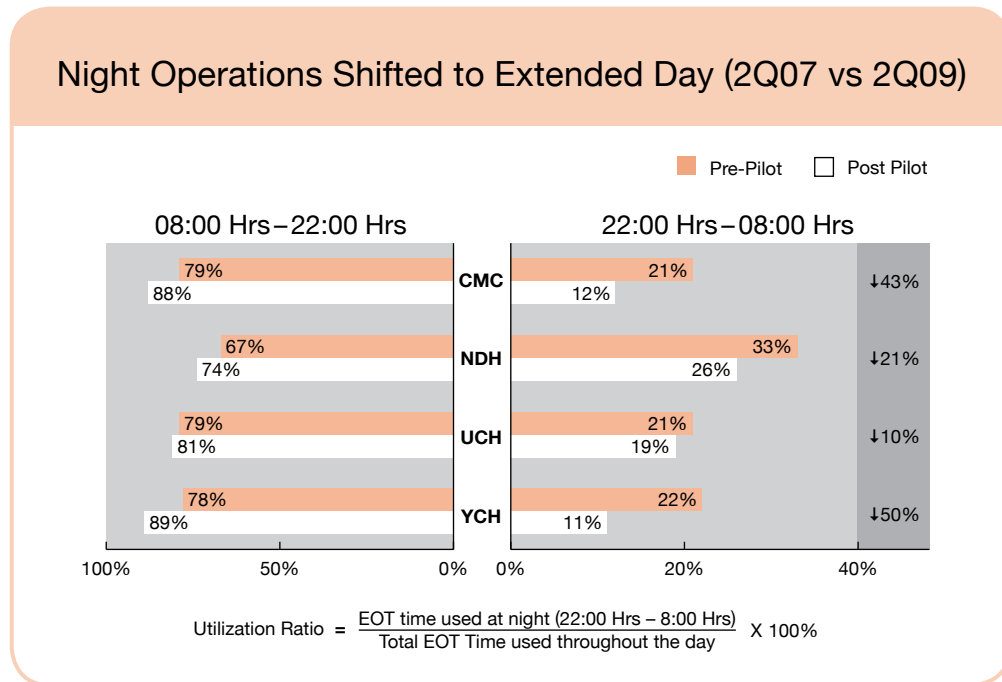
PILOT OUTCOME AND OBSERVATIONS

306 An EOT Task Group, with representations from the four acute pilot hospitals, was formed under the Steering Committee to monitor the pilot work reform outcome, identify the success and confounding factors and recommend the strategy for rollout to other acute public hospitals. The effectiveness of the pilot programme was measured in three perspectives, namely, changes in the utilization ratio of EOT time, queuing pattern of EOTs and impacts on staff composition of the on-site EOT teams at night.

A. Changes in Utilization Ratio of EOT Time at Night

307 Figure 3.2 below displayed the changes in the proportion of EOT time used at both day (i.e. from 08:00 hrs to 22:00 hrs) and night time (i.e. from 22:00 hrs to 08:00 hrs) whereas Table 3.2 showed the reduction in the utilization ratio of EOT time at night, relative to the total EOT time used throughout the day, after commencement of the programme in the pilot hospitals. Data for the second quarter of 2007 and 2009 in the pilot hospitals were compared in order to evaluate the effectiveness of the pilot work reform strategy in reducing avoidable night-time activities through addition of an extra operating theatre session at the daytime.

Fig. 3.2 – Changes in Proportion of Day and Night EOT Time



308 The above data showed that, with an additional weekday EOT session in the extended day and non-emergency operations restricted at night, the utilization ratio of EOT time at night, relative to the total EOT time utilised throughout the day, had been trimmed by 10% – 50% in the pilot hospitals. A gradual change in the work practice of surgeons was thus taking place where non-emergency operations at night were shifted to the day time. Patients could benefit from safer operations with greater manpower and facility support while on-site surgeons could work less intensely at night.

309 The programme outcome was more conspicuous in acute secondary hospitals (i.e. CMC, NDH and YCH) than acute tertiary hospital (i.e. UCH). This was attributable to the peculiar role designated to different hospitals and the clinicians' determination to change their operating practice. In particular, UCH and NDH had to shoulder obstetric and neurosurgical services respectively within their own cluster. Emergency operations in these specialties were more difficult to be reshuffled to the extended day, hence less room and smaller improvement in reducing surgeons' workload at night. By contrast, both CMC and YCH could divert their acute trauma cases to the acute tertiary hospital in the same cluster at night. Their volume of night activities was thus more stable, thus rendering more flexibility and greater improvement in reducing avoidable activities at night.

B. Reduction in Backlog Emergency Operations

310 Table 3.2. below showed the extent of reducing backlog operations (i.e. bookings placed at day time but performed after 22:00 hrs due to unavailability of operating slots) by adding an EOT session in the extended day in the pilot hospitals. In overall terms, the backlog operations saw a drop of around 30% in volume and 39% in hours, with varied performance in the pilot hospitals. NDH and CMC recorded the greatest reductions in their backlog EOT hours at night by around 44% and 43% respectively, while the apparent lesser reduction in YCH was due to its already lower volume of backlog operations in the review period. These data gave evident proof that opening of extra weekday EOT sessions could effectively reduce the backlog operations at night in the pilot hospitals.

Table 3.2 – Reduction in Backlog EOTs at Night (1Q06 – 2Q07 vs 1Q08 – 2Q09)

Nature	Change in	UCH	NDH	CMC *	YCH	Overall
Backlog operations	Case No.	- 20.10%	- 35.80%	- 57.02%	- 23.81%	- 30.34%
	Hours	- 33.07%	- 44.43%	- 42.64%	- 14.86%	- 38.79%

* CMC review period (3Q06–2Q07 vs 3Q08–2Q09)

C. Changes in On-site EOT Team Composition at Night

311 With reductions in the volume of emergency operations at night and clearance of backlog cases after launching the work reform strategy, the pilot hospitals had made more room for changing the overnight on-site on-call systems of doctors in the surgical stream specialties. For example, the Anaesthetist team in CMC and YCH were put on off-site call to support emergency operations after 22:00 hrs. In addition, the overnight on-site on-call roster was also trimmed in UCH and NDH's Orthopaedics specialty as well as NDH's Surgery specialty, thereby reducing the concerned doctors' continuous work hours by 5 – 18 hours on the weekday. Besides, the nursing support for EOTs at night was also trimmed in YCH subsequent to launching the pilot EOT programme. The pilot hospitals would review the staffing arrangement when the number of emergency operations at night was reduced to a steadily optimal level.

ISSUES OF CONCERN

- 312 The above analyses had shown that by expanding the EOT capacity in the extended day and re-engineering the EOT services, a substantial volume of backlog operations could be cleared while also minimising avoidable night-time activities in the surgical stream specialties. Better hospital care could be delivered with earlier operations, stronger clinical supervision as well as fewer patient complications. The hospital would also benefit from shorter patient stay and a higher level of patient satisfaction. All these denoted a big stride taken by HA in the delivery of inpatient care and had actually created a tripartite winning situation among the health carers, patients and the entire organization. The frontline doctor representatives supported rolling out this pilot work reform strategy in other acute public hospitals as well in order to improve their workload at night.
- 313 Yet, the impacts of work reform were confounded, as atop-mentioned, by the designated roles of different acute hospitals and were closely associated with the organization of acute trauma care, neurosurgical operations and obstetric services among the cluster hospitals, as well as the clinicians' determination to change their work practice and overnight on-site on-call system. To attain further success in the work reform strategy, the concerted efforts and collaboration of all were pivotal.
- 314 Given the huge complexity of patient conditions in acute tertiary hospitals, a large on-site on-call team would be required to cater for any genuine emergencies. Re-engineering of EOT services at night would less likely trim the size of the on-site on-call teams in the general specialties of acute tertiary hospitals. Hence, although the pilot work reform strategy could apparently improve service access and reduce on-call doctors' workload, the Steering Committee would recommend HA prioritising its resource allocation for acute secondary hospitals.
- 315 Although acute secondary hospitals displayed greater room and flexibility for re-engineering their EOT services at night, greater success of the pilot programme and further reduction in doctor work hour could barely be attained without an enhanced treat-and-transfer mechanism and development of protocol-based escort medicine for transfer of patients with high risks of deterioration among the cluster hospitals. The latest pattern of Anaesthetists being called back once every 4 to 5 days in YCH could therefore be the lowest limit in support of EOTs at night in an acute secondary hospital. The Steering Committee noted the frontline concerns over patient safety

in the course of transfer and their suggestion of providing cross-hospital coverage by an on-site anaesthetic team in order to minimise the need for inter-hospital patient transfer. HA might see to the operational practicability and plan for back-up arrangements for conducting EOTs at night in different acute public hospitals.

- 316 The Steering Committee was also aware of the inadequate day-time operating theatre capacity for elective procedures and the practice of certain surgeons taking the EOT sessions to perform semi-elective procedures in public hospitals. While there might be increasing backlog of cases pending operations at the day time, genuine emergency cases could be displaced due to exploitation of the EOT sessions. HA might consider augmenting the operating theatre capacity for elective procedures as well in order to rectify the situation and enhance patient safety in operation. Moreover, HA might consider scheduling semi-emergency and elective operations in other non-acute hospitals in the same cluster.
- 317 For certain surgical stream specialties, an immediate reduction in the number of overnight on-site on-call doctors might not be feasible, unless general resident call coverage was developed in the surgical stream specialties, as was currently practised in some overseas countries and local private hospitals. This would however depend on closer collaboration and service re-arrangements among the hospitals and specialties, strengthened core competency of frontline doctors in emergency care, as well as formulation of clinical management protocols in patient management. These complementary measures would take time to develop and should be implemented in phases with the support and collaboration of all involved parties.
- 318 Finally, the Steering Committee was delighted to know that, since February 2008, HA had extended the employee compensation coverage for its employees travelling for ad hoc called-back duties at any scene / site (including that outside their normal place of work) beyond their normal working hours. This would definitely give extra protection for staff performing emergency duties and improve their morale.

THE STEERING COMMITTEE'S RECOMMENDATIONS

319 The Steering Committee put forward the following recommendations in relation to re-engineering the EOT services in HA hospitals:

- a) HA was recommended to re-engineer the EOT services in all acute public hospitals with 24-hour emergency services in order to clear the backlog of emergency operations and optimise patient access to emergency services currently provided by a limited number of HA doctors – Different modes of EOT services could be introduced after 22:00 hrs to support emergency operations at night. Additional funding, if any, could first be allocated to acute secondary hospitals to expand their EOT capacity in the extended day.
 - i) For acute hospitals shouldering acute trauma, obstetric and neurosurgical services (i.e. Prince of Wales Hospital, Princess Margaret Hospital, Queen Elizabeth Hospital, Queen Mary Hospital and Tuen Mun Hospital), HA was recommended to run two concurrent EOT sessions with back-up arrangement for conducting another emergency operation at night.
 - ii) For acute hospitals shouldering obstetric and / or neurosurgical services (i.e. Kwong Wah Hospital, North District Hospital, Pamela Youde Nethersole Eastern Hospital and United Christian Hospital), HA was recommended to keep one EOT session with back-up arrangement for conducting another emergency operation at night.
 - iii) For less busy acute hospitals (i.e. Caritas Medical Centre, Tseung Kwan O Hospital and Yan Chai Hospital), HA was recommended to run on-call theatre services (i.e. Anaesthetists and theatre nurses put on-call for ad hoc emergency operations) or transferring patients with high risk of potential deterioration to another acute hospital in the cluster for emergency operations at night.
- b) HA was recommended to manage the issues of inadequate day-time operating theatre capacity in order to clear the backlog elective operations, avoid exploitation of EOT slots for non-emergency operations and reduce the night activities of surgeons and their work hours.
- c) HA was recommended to review the work practice and institute changes in the work practice in the surgical stream specialties in order to optimise the need for operation at night, improve patient safety by operating in the extended day and reduce the number of overnight on-site on-call doctors in public hospitals.

- 319
- d) HA was recommended to delineate the roles and service scopes of different hospitals, explore further room for service networking, formulate acute trauma and neurosurgical diversion mechanisms and develop protocol-based escort medicine service in all hospital clusters in order to ensure patient safety and support the treat-and-transfer arrangement.
 - e) HA was recommended to explore the feasibility of providing general resident call coverage for patients who were physiologically unstable in the surgical stream specialties with reference to the global trend and the practice in the private healthcare market.