The Impact of Introducing Handovers on After-hours Patient Transfers in an Elective Surgery Centre

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Abstract

Background There has been increasing use of satellite facilities for elective surgery to allow more efficient use of major hospital resources. Manukau Surgical Centre (MSC) is a stand-alone elective surgical centre which operates in conjunction with Middlemore Hospital (MMH). MSC has limited services, particularly after-hours and clinically unstable patients are required to be transferred to MMH for further management.

Purpose This study evaluated whether the introduction of a formal handover process – "the huddle" - had an effect on reducing the proportion of such after-hours transfers.

Methods Patient transfers between MSC and MMH over the periods of August to November 2014 (pre-huddle) and March to June 2015 (post-huddle) were included in the study. Primary outcomes included proportion of after-hours transfers (as a function of total transfers). Secondary outcomes included monthly transfer rate.

Results There were no significant differences in the proportion of after-hours transfers between pre- and post-huddle months with an odds ratio of 0.898 ($p = 0.76$). Monthly transfers overall were also not statistically different. There was a significant increase (22.5%) in the number of patients being transferred for further radiological investigations ($p = 0.033$). In addition, there was a significant increase in the proportion of transfers under the presumed diagnosis of venous thromboembolism (VTE) of 23.4% ($p = 0.0023$).

Conclusions The "huddle" did not demonstrate significant differences in reducing the proportion of after-hour transfers from MSC to MMH. However, there were significantly more transfers that required radiological investigations as well as transfers under the presumptive diagnosis of VTE.

Keywords (MeSH): Quality Improvement, Patient Transfer, Communication, Patient Safety, Elective Surgical Procedures

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Introduction

Manukau Surgery Centre (MSC) is a stand-alone elective surgical centre that provides a range of elective surgical procedures in South Auckland, New Zealand, as Counties Manukau Health. The main hospital is Middlemore Hospital (MMH) that operates as a major acute general hospital. Since its opening of in-patient capacity in 2001, elective services at MSC have steadily grown to keep up with the demand of the growing CMH population and meet national targets for improving access to elective surgery [1]. While overseen by surgical consultants and registrars based at MMH, the day-to-day running of the surgical unit is staffed by house officers (postgraduate year 2 or above junior doctors), clinical nurse managers and nursing staff. House officers manage post-operative recovery in consultation with surgical registrars and consultants with input from clinical nursing staff. In addition, high dependency patients are admitted to a four-bed peri-operative care unit, managed by a consultant anaesthetist and anaesthetic registrar.

A large variety of surgical procedures are carried out at MSC. These include total joint replacements, major colorectal surgery (both laparoscopic and open), total abdominal hysterectomies in addition to minor procedures and day stay surgery, Acute services at MSC are limited in terms of medical expertise and resources such as radiological imaging or laboratory testing, particularly after-hours. When patients are recognised as clinically unstable or requiring management beyond the resources available at MSC they are transferred by ambulance to MMH in consultation with specialist advice at MMH.

Concerns about whether delayed care contributed to over the clinical status of some patients requiring transfer led to the introduction of a formal handover process – the "huddle" –in December 2014 with the intention of identifying and anticipating clinical issues and the need for patient transfer to MMH. Effective handover processes have long been recognised as vital components of safe clinical practice in order for patients to receive timely and effective care [2]. Formal handovers allow appropriate management to be implemented earlier in the patient's clinical course and possibly preventing patient transfers and pre-empting clinical deterioration. These "huddles" occur at 1500 and 2200, marking the change-over between day and evening staff (1500) and evening and night staff (2200). The evening huddle consists of the evening house officer, anaesthetic consultant, anaesthetic registrar and clinical charge nurse managers for the wards at 1500. At the night huddle, there is the evening house officer, night house officer, night clinical nurse advisor and night anaesthetic registrar.

This study was conducted to review our experience with transfers before and after the introduction of the 'huddle'. Specifically, we sought to evaluate the effect of the "huddle" on after-hours patient transfers between MSC and MMH by comparing transfers over a four month period prior to (August 2014-November 2014) and after (March 2015-June 2015) the introduction of the formal handover.

We hypothesised that the "huddle" would reduce the proportion of after-hours transfers by identifying clinically unwell or deteriorating patients at an earlier stage and instituting appropriate management earlier in their post-operative course and potentially avoiding transfer to to MMH. It was anticipated that the information from this study may be utilised to manage resources in the future, as well as to examine the effectiveness of our huddle in limiting exposure to clinical risk.

Methods

Ethical and study approval was obtained from the CMH Research Office prior to extraction of clinical data.

Patients

Transfers between MSC and MMH over the periods of August 2014 to November 2014 (defined as pre-huddle) and March 2015 and June 2015 (defined as post-huddle) were included in the study. Cases were identified using the CMH patient transfer record of all patients transferred between MSC and MMH.. The following cases were excluded from the study:

1. Paediatric patients (no inpatient services for children are available at MSC)
2. Transfers directly from theatre or the post-anaesthetic recovery unit (i.e. not admitted to the MSC post-operative wards. These included planned transfers where a post-operative admission to MMH had been planned prior to surgery)
3. Non-acute transfers to the adult treatment and rehabilitation ward at MMH

After-hours was defined as 1600-0759 weekdays and all hours of the weekends. The morning, evening and night periods were defined as 0800-1559, 1600-2159 and 2200-0759 weekdays respectively.

Variables retrieved included age, gender, ASA score (ASA physical status classification system as adopted by the American Society of Anaesthesiologists (ASA)), surgical speciality; time of transfer; presumed diagnosis at time of transfer; reason for transfer; management following transfer and length of stay (LOS) following transfer. Two authors (SK and BB) extracted these data from the identified case records.

Outcomes and statistical analysis

Primary outcomes included proportion of after-hours transfers (as function of total transfers), and time of transfers.

Secondary outcomes included proportion of overall transfers (as function of total surgical cases) per month, length of stay, and management after transfer. Reasons for transfer was also analysed and stratified into 4 categories: further investigation/imaging, need of intensive care or high dependency unit care, request for surgical review, or request for medical review.

Statistical analysis was performed using SAS version 9.4 [SAS Institute, United States of America]. Descriptive statistics for the demographics variables were expressed as counts and proportions. Analysis of categorical variables was performed using chi-square test.

Binary logistic regression was used to compare outcomes; after-hours transfers and length of stay between the two periods whilst adjusting for the risk factors - age, gender, ASA, specialty, reason for transfer, diagnosis and management. To compare time of transfers between the two periods, logistic regression model fitted with a multinomial distribution was carried out and adjusted by the listed risk factors. The results from these models were represented as odds ratios with 95% confidence interval and p-values.

The monthly overall transfers were compared before and after the hand-over period using Poisson regression with the offset of total cases unadjusted for the risk factors. Cochran-Armitage Trend Test was used to determine if there was a significant trend in the proportions of transfers during the later ("post-huddle") 4-month hand-over period. Chi-square test was performed to see if there was there was a difference in the proportions of management between the two periods.

Results

A total of 140 patients were transferred in the two 4 month periods.

A summary of variables for the two transfer populations is shown in Table 1: proportions for gender, ASA status and surgical specialities were not significantly different for these two groups.

There were, however, significant differences in the reason for transfer in the period following the introduction of the handover process (Table 1); significantly more transfers required some form of radiological investigation (23.9% compared with 46.4%: p=0.033). There was also a significant increase in the number of transfers with a presumed diagnosis of venous thromboembolism (VTE) – (8.5% versus 31.9%: p=0.0023).

Primary outcomes

There was no significant difference in the proportion of after-hours transfers following the introduction of the huddle (Table 2: p=0.76). There was an increase in the proportion of transfers occurring during the evening period (1600-2159), but this difference (35.2% versus 44.9%) was not statistically significant (p=0.49).

Table 2 After-hours transfers and time of transfers before and after the introduction of the huddle.

	Pre-huddle (N = 71)	**Post-huddle (N = 69)**
After-hours transfers		
Working hours	23 (32.4%)	24 (34.8%)
After-hours	48 (67.6%)	45 (65.2%)
Time of transfers		
0800-1559	37 (52.1%)	30 (43.5%)
1600-2159	25 (35.2%)	31 (44.9%)
2200-0759	9 (12.7%)	8 (11.6%)

Secondary outcomes

The mean transfer rate as a function of total surgical cases over the 8 months was 1.92%. The mean pre-huddle transfer rate was 1.80% while the post-huddle transfer rate was 2.05%. There were no significant differences between monthly transfers and Poisson regression indicated that there were no significant differences in the expected rates of monthly transfers. The rate ratio for after hours transfers for Post-huddle versus Pre-huddle was 1.10 (95% CI= 0.81, 1.52) (p=0.516). During the post-huddle months there was a progressive decrease in the proportion of surgical cases requiring transfer (Figure 1) (near here) . The Cochran-Armitage Trend Test showed a significant decreasing trend with a p-value of 0.040. Following the introduction of the huddle, there was a 8.7% increase in subsequent, on-going routine management for patients transferred to MMH, and a corresponding decrease in the introduction of new,

Table 1 Summary comparison of pre-huddle and post-huddle transfers.

Demographics characteristics	Pre-huddle	Post-huddle	p-value
N (%)	N = 71	N = 69	
Gender			
Male	33 (46.5)	32 (46.4)	0.99
Female	38 (53.5)	37 (53.6)	
ASA score			
ASA 1	4 (6)	7 (10.3)	0.65†
ASA 2	30 (44.8)	31 (45.6)	
ASA 3	30 (44.8)	29 (42.7)	
ASA 4	3 (4.5)	1 (1.5)	
Speciality			
Orthopaedic Surgery	30 (42.3)	34 (49.3)	0.064
General Surgery	21 (29.6)	21 (30.4)	
Plastic Surgery	12 (16.9)	4 (5.8)	
Otorhinolarygnology	3 (4.2)	0 (0)	
Gynaecology	5 (7)	10 (14.5)	
Reason for transfer			
Investigation (USS/CT/CTPA)	17 (23.9)	32 (46.4)	0.033*
ICU/HDU care	8 (11.3)	6 (8.7)	
Surgical review	26 (36.6)	21 (30.4)	
Medical review	20 (28.2)	10 (14.5)	
Presumed diagnosis			
Cardiac	18 (25.4)	7 (10.1)	0.0023*
Respiratory	12 (16.9)	4 (5.8)	
Gastrointestinal/abdominal	11 (15.5)	11 (15.9)	
Venous thromboembolism	6 (8.5)	22 (31.9)	
Planned transfer	16 (22.5)	14 (20.3)	
Failed discharge	8 (11.3)	11 (15.9)	
Management			
Theatre/operative intervention	10 (14.5)	11 (15.9)	0.61
ICU/HDU admission	7 (10.1)	4 (5.8)	
Active treatment (antibiotics, anticoagulation)	28 (40.6)	24 (34.8)	
Conservative (analgesia, fluids, rest)/no change in management	24 (34.8)	30 (43.5)	
Length of stay			
<48 hours	12 (16.9)	9 (13.2)	0.1
2-5 days	20 (28.2)	31 (45.6)	
>6 days	39 (54.9)	28 (41.2)	

ICU = intensive care unit; HDU = high dependency unit; USS = ultrasound scan; CT = computed tomography; CTPA = computed tomography pulmonary angiogram.
†Fisher exact test used. *Statistically significant at P < 0.05.

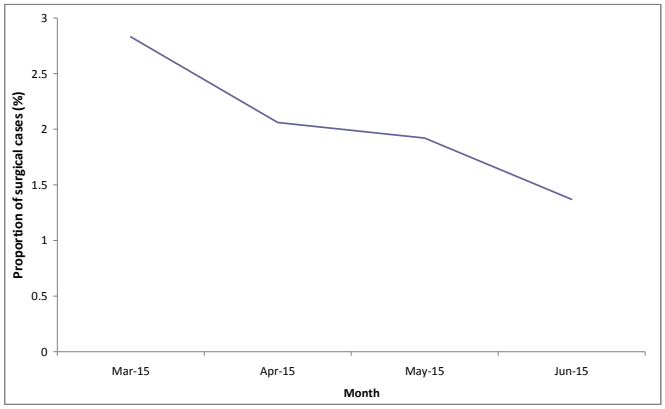

Figure 1 Proportion of total surgical cases transferred from MSC to MMH, following introduction of the huddle.

Table 3 Comparison of management streams pre- and post-huddle.

Management	Pre-huddle	Post-huddle
No change	24 (34.8%)	30 (43.5%)
Active management	45 (65.2%)	39 (56.5%)
Antibiotics/anticoagulation	*28 (40.6%)*	*24 (34.8%)*
ICU/HDU admission	*7 (10.1%)*	*4 (5.8%)*
Theatre/operative intervention	*10 (14.5%)*	*11 (15.9%)*

active management at MMH (Table 3), but these differences were not statistically significant (p = 0.29). The breakdown of different active management streams is also shown in Table 3.

Using logistic regression, there was no significant difference in length of stay for transferred patients before and after the introduction of the huddle in both the adjusted and unadjusted models. Notably proportionately fewer transferred cases in the post-huddle group (54.9% versus 41.2%) had a LOS of 6 or more days (Table 1), but these differences were not statistically significant (p = 0.10).

The only statistically significant variable for LOS was MMH management after transfer (p = 0.0016). The odds ratio for no-change ("passive") management versus active management was 0.189 (95% CI =0.067, 0.533); the odds of more than 6 days' LOS decreased by 81% in the passive management group when compared to the active management group.

Discussion

This analysis of transfer data showed that, the introduction of the "huddle" did not result in a reduction in the proportion of after-hours patient transfers; nor did the "huddle" have any significant effect on transfers during normal working hours. However, there was an associated progressive trend towards a decreasing proportion of total surgical cases being transferred over the post-huddle months.

The principal results of this study turned out to be that the introduction of a new Model of Care, with a formal handover process (the "huddle") was associated with (1) a significant increase in transfers for further imaging such as USS/CT/CTPA at MMH; and (2) a significant increase in the formal diagnosis of VTE events.

Thus it seems that significantly more patients were identified as having possible VTE events and transferred to MMH for investigations that were not available at MSC. Certainly there were significantly more cases of VTE diagnosed in the post-huddle group. We cannot be sure whether this is a result of closer monitoring and better detection or a true increase in VTE rates. We believe that the threshold for transfer to MMH was lowered as a result of the new Model of Care, representing a more cautious approach to the management of patients. Certainly that is the clinical impression among the nursing and peri-operative medicine staff at MSC. The lack of appropriate on-site imaging resources at MSC presents a rate-limiting step in the management of patients where VTE is suspected. Transfers could be avoided if there were local site access to imaging modalities such USS or CTPA. Some may critique that a D-dimer assay may be of utility in such a resource constrained environment. However numerous studies have identified that plasma D-dimer levels are elevated following major surgery and as such is not a useful test in the post-operative setting to identify patients with VTE events [3, 4]. The introduction of the huddle also coincided with organisational changes to patient safety initiatives to reduce VTE events through formal documentation of risk stratification. This may have contributed to a higher index of suspicion of clinical deterioration events caused by VTE.

The low numbers of overall transferred cases is a limitation of this study. The actual overall proportion of cases transferred remained stable at approximately 1.92% over the two 4-month periods. Furthermore, on average 2 cases per month were transferred overnight (between 2200 and 0800) and 1 case per month required admission to ICU/HDU. Given such low numbers it is difficult to attribute any decrease (or increase) in transfers to one single factor such as the introduction of the "huddle". Larger numbers of patients would be required to discern a statistically significant effect. Another limitation of this study relates to the source of identified cases – the CMH patient transfer record. There is potential for this to have been incomplete and thus patient transfers missed and subsequently not included in the study. This is considered unlikely as a transfer involves an ambulance journey and substantial administrative documentation.

Further studies should explore the experiences of other free-standing elective surgical centres, where elective surgery is the predominant focus and acute services are limited (especially after-hours). Additionally, it would be interesting to see whether continuation of the "huddle" is associated with measurable changes in transfer rates in the future. This study looked at a small 4-month period after only 2-3 months using the "huddle" in clinical practice, so it is possible that the true effect of the "huddle" is yet to be seen. The reason for the increased number of VTE cases is speculative at this stage, and needs to be examined more explicitly with a prospective study, taking into account risk factors and VTE prophylaxis protocols – which themselves have continued to evolve since the introduction of the huddle.

While the area of handover communication has been investigated by others, there is a scarcity of research into the application of such processes in the setting of elective surgical centres. Although our study has not shown any significant change in the proportion of patient transfers, it is well established that high quality handover is critical for patient safety in theatre to ICU hand-over processes [3].

The results of this study suggest that a more cautious approach to managing patients post-operatively took place, represented by increases in transfers requiring investigation, without significant changes in active management. The "huddle" continues to be part of our new model of care, as the intention was to identify patients early and prevent clinical deterioration through timely and appropriate management.

Conclusion

The introduction of a new model of care produced no statistical significant reduction in the proportion of patients transferred from MSC to MMH, but was associated with a significant increase in transfers for further imaging such as USS/CT/CTPA at MMH; and a significant increase in the formal diagnosis of VTE events. This suggests that the huddle may have been responsible for a more cautious approach to managing patients at stand-alone short-stay elective surgical centre, where acute services are limited, especially after-hours.

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