

Analysis of bedside entertainment services' effect on post cardiac surgery physical activity: a prospective, randomised clinical trial[☆]

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Abstract

Background: A rising number of acute hospitals in the UK have been providing patients with bedside entertainment services (BES) since 1995. However, their effect on postoperative patient mobility has not been explored. **Objectives:** The aim of this prospective randomised clinical trial was to compare the level of postoperative physical activity and length of in-hospital stay of patients undergoing cardiac surgery depending on whether they had access to BES or not. **Methods:** One hundred patients requiring elective cardiac surgery were randomised to receive access to BES (52 patients) or not (48 patients). Pedometers were used to quantify postoperative physical activity for 5 days. To assess the significance of the effect of intervention (TV off or on) on the pedometer counts over time a mixed effect Poisson regression model is used, with the time varying aspect as random component. The potential influence of gender difference and age on pedometer counts were assessed by incorporating these two factors as covariates in the Poisson model. **Results:** On average, patients with no access to BES walked more than those with BES access. This difference ranged between 192 and 609 steps in favour of the first group for each individual postoperative day. Patients with no access to BES were 84% more likely (risk ratio: 1.84, 95% CI: 1.29–2.63) to walk higher number of steps than patients with access to BES. On average, participants with access to BES were likely to stay longer in hospital (median of 7 days with interquartile range 6–7 days), than participants with no access to BES (median of 6 days with interquartile range 5–7 days), however the difference did not reach statistical significance. **Conclusion:** We have demonstrated that the bedside entertainment systems may have an adverse effect on post cardiac surgery patient ambulation and may contribute to an increase in hospital stay.

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Keywords: Postoperative physical activity; Immobility; Exercise; Bedside entertainment

'Your personal TV, phone & radio. Bored? Use your personal TV, phone and radio without having to leave your bed'

From BES provider advertisement

1. Introduction

Postoperative physical inactivity is considered a risk factor for pulmonary complications and venous thrombo-embolism (VTE) [1,2]. They are the leading causes

of postoperative morbidity and mortality affecting a large proportion of the surgical spectrum [1,2].

Specifically in cardiac surgery there is evidence that perioperative immobility is associated with increased incidence of pulmonary embolism (PE) [3] although it is uncommon after cardiopulmonary bypass [4].

The consultant author had noted that five patients, who underwent bypass surgery, had developed a PE (diagnosed clinically and confirmed radiologically on two occasions) over an 18-month period. This alerted our team as to a possible aetiology and we reflected on the inactivity of the post-operative patient.

Bedside entertainment services (BES) providers have been installing their systems in hospitals across the UK since 1995. The Patient Power programme was launched by the government in England in 2000 and aimed to provide a personal telephone and television for each patient in hospital. Three BES providers were granted a full licence to install and operate their systems in acute hospitals in the

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UK. Today there are just over 300 acute hospitals offering BES in the UK. BES includes telephone, television, radio, Internet, gaming and e-mail.

In the present study the authors conducted a prospective randomised clinical trial of the BES effect on postoperative mobilisation and length of hospital stay. Postoperative mobility of patients with access to BES was compared with that of patients who only had access to conventional entertainment methods located in the ward common rooms.

2. Patients and methods

Approval for the study was granted by the hospital's research ethics committee.

The initial power analysis for this study was based on achieving medium to large effect size on the basis of 80% power. A pilot study was conducted initially, consisting of 63 patients, in order to reach 80% power calculated using the commercial programme GPOWER. Consecutive patients who had undergone coronary artery bypass grafts or valve replacement surgery were recruited on the second postoperative day. After giving informed consent, patients were randomised by sealed envelope into either 'TV ON' or 'TV OFF' groups.

The results of the pilot not only showed a significant difference in the mobility of the two groups but also suggested that there probably was a difference in the number of days that patients stayed in hospital. Therefore we decided to increase our sample size to 100 in order to explore the impact of BES on length of hospital stay.

2.1. Patients

All patients admitted to the cardiothoracic unit of Leeds General Infirmary for cardiac surgery (coronary artery bypass grafting or aortic/mitral valve replacement or both), either electively or as an emergency, were considered during a 6-month period. Patients with pre-operative problems significantly affecting their mobility directly (e.g. osteoarthritis, trauma, congenital) or indirectly (COPD, diabetic complications, CVA), those with a prolonged ITU or HDU stay (more than 24 h in each) and those who developed postoperative complications affecting their mobility (wound infection, arrhythmia requiring monitor attachment, pneumonia, DVT, UTI) were excluded

from the study, i.e. we focused on the 'well' (should be mobile postoperatively) cohort of patients.

Of the 100 patients who participated in the study, 52 were assigned to the 'TV ON' group and 48 to the 'TV OFF' group. Mean (SD) age for TV ON and TV OFF groups were 62.7 (11.3) and 64.7 (10.9), respectively. Male to female ratio was 35/17 (67%/33%) for TV ON and 33/15, (69%/31%) for TV OFF. From the TV ON group 31 had CABG, 20 had aortic or mitral valve replacement and 1 had combined procedure in the TV OFF group the numbers were 30, 17 and 1, respectively. There were no significant group differences in terms of age, sex distribution and type of operation.

2.2. Methods

The observation of patients began on their second postoperative day (when the CVP line was disconnected and the patient was detached from all monitoring devices). The TV OFF group had their screens covered with a sheet of paper while they were still able to use the phone attached on the device.

We used pedometers to quantify postoperative patient mobilisation, since they have been found to be a valid method for assessing physical activity [5–7]. Patients from both groups were given a standard Omron HJ-109-E pedometer to wear at all times throughout their postoperative stay. The number of steps taken was recorded twice daily in the observation chart by a member of our team and the device was reset. The position of the pedometer was over the right or left ASIS attached to the patient's garment and it was checked twice a day when the number of steps was recorded. All pedometers used were checked before and after each patient wore them to detect ± 2 steps error on the 20 Step Test [8].

We did not interfere with the physiotherapy that each patient received and physiotherapists were not actively aware of the conduction of this study.

3. Statistical analysis

The basic statistics are presented using number (percentage) or measures of central tendency and dispersion as appropriate (Table 1). The pedometer counts over days are also presented using box plots (Fig. 1) and mean (standard error) plots (Fig. 2). To assess the significance of difference in

Table 1
Basic statistics on pedometer counts by intervention

Day	TV on or off	Valid N	Minimum	Maximum	Median	First quartile	Third quartile
1	TV ON	N = 52	11.00	246.00	74.00	47.75	123.25
	TV OFF	N = 48	43.00	892.00	266.00	176.25	402.00
2	TV ON	N = 52	36.00	982.00	182.00	113.50	322.50
	TV OFF	N = 48	65.00	1612.00	482.50	371.25	698.50
3	TV ON	N = 52	23.00	1890.00	291.50	120.75	566.50
	TV OFF	N = 48	31.00	2006.00	742.00	347.50	900.50
4	TV ON	N = 46	27.00	1280.00	353.00	177.00	609.75
	TV OFF	N = 30	64.00	2090.00	801.00	584.00	1226.25
5	TV ON	N = 28	10.00	1130.00	335.50	241.75	461.50
	TV OFF	N = 18	456.00	2112.00	944.50	766.50	1278.50

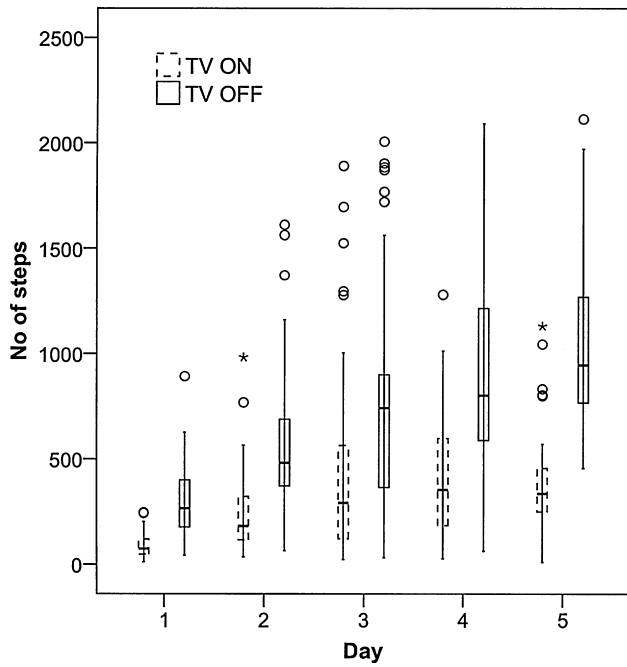


Fig. 1. Boxes show median with interquartile range; whiskers give the range. Circles denote outliers, asterisks denote extremes.

two groups on the pedometer counts over time a mixed effect Poisson regression model is used, with the time varying aspect as random component. The incidence rate ratios (RR) along with the 95% confidence intervals (CI) are presented (Table 2). We have used the likelihood ratio tests to assess the suitability of fitting the mixed effect model in this context.

The potential influence of gender difference and increasing age on pedometer counts were assessed by incorporating these two factors as covariates in the Poisson model. Though

Table 2
Mixed effect Poisson regression results

	RR	95% CI of RR	p
TV OFF	1.84	1.29–2.63	0.001
Gender (male)	1.57	1.08–2.28	0.019

the gender difference was statistically significant, age of patients did not show any significant association with pedometer counts.

4. Results

On average, patients with no access to BES walked more than those with BES access. This difference ranged between 192 and 609 steps in favour of the first group for each individual postoperative day.

The dynamics of the two groups were different: it is clear from the mean (standard error) plots that the TV OFF group increased the number of steps walked almost exponentially as the days went by, whereas the TV ON group reached a plateau of number of steps after the third day.

From the mixed effects Poisson regression model we infer that patients with no access to BES were 84% more likely (RR 1.84) to walk a higher number of steps than the patients with access to BES.

On average, participants with access to BES stayed longer in hospital (median of 7 days, interquartile range 6–7 days), than participants with no access to BES (median of 6 days, interquartile range 5–7 days), however this did not represent a statistically significant difference.

5. Discussion

We cannot prove that the observed five cases of PE were due to inactivity, we have however observed a disturbing decrease in physical activity in this cohort of patients.

5.1. VTE and physical activity

In coronary artery bypass surgery the incidence of DVT, with prophylaxis, is comparable to other specialties and ranges from 15% to 23% [4,9,10]. PE however is an uncommon complication and ranges between 0.4% and 3.4% with prophylaxis [4,11,12].

Decreased physical activity has been identified as one of the most significant independent risk factors for deep vein thrombosis (DVT) and PE in multiple studies [1,4,9,10]. Furthermore, in the cardiac surgical patient, PE has been shown to be related not only to postoperative but also to preoperative prolonged bed rest [4].

5.2. Pulmonary complications and physical activity

Early ambulation in cardiac surgery has been shown to reduce morbidity from pulmonary complications [13,14]. Ambulation stimulates ventilation, increases perfusion, promotes secretion clearance and oxygenation [15]. Reduced mobility has been shown to be not only one of the major risk

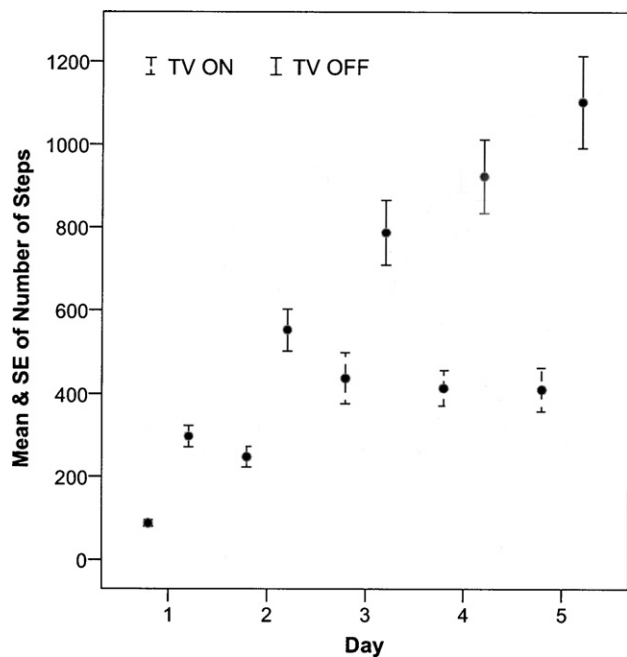


Fig. 2. Error bars show mean and standard error comparing the two groups for each postoperative day.

factors for pneumonia [16], but it also has an adverse effect on prognosis [17].

5.3. Inactivity costs

With the advent of managed care, the present era of medicine is concerned to a large extent with cost containment. For these reasons the concept of reducing hospital stays with concomitant reduction in hospital cost is very attractive. Rapid recovery protocols have been shown to be safe, cost effective and associated with accelerated and uneventful long-term recovery [18–21]. Early and active ambulation constitutes an integral part of rapid recovery protocols as it has been shown to contribute to improved functional capacity, decreased deconditioning related to bed rest, decreased emotional problems such as depression and anxiety [15] and even improve wound healing [22,23].

5.4. Airline industry and DVT

Lack of exercise and immobility are major underlying risks of travel-related DVT. Although this is a highly controversial issue and has caused extensive debate between its protagonists and antagonists, airline industries have been compelled to alert passengers to the flight-associated risk of DVT and provide specific recommendations. We propose that BES should also come with recommendations on how to improve postoperative activity whilst in bed and around the ward.

5.5. Authors' reaction to the study

We do recognise the important emotional and psychological benefits of entertainment systems and acknowledge the significant benefits that could be linked to patients having improved communication with their family, friends and business. However, we are concerned of the lack of activity that appears to be induced by BES.

We believe that increased levels of postoperative activity are beneficial to our patients and we are therefore developing standardised postoperative exercises to encourage activity.

6. Limitations

There was no attempt to link the entertainment systems to more pertinent objective issues such as actual complication rates and overall outcomes as this would require a much higher number of participants. The authors accept that it is difficult to extrapolate the importance of a longer hospital stay without more specific indications as to its aetiology.

We present data on a highly selected group of post cardiac surgical patients but this was to prevent differences in the physical mobilisation potential of the participants.

There was no attempt to stop patients on the TV OFF from walking to the beds of patients on the TV ON group and watching their TV, however this was very rare as the common room TVs were merely 20–30 steps away and had more convenient seating facilities.

The distances between patients' beds and the common rooms or toilets were variable.

Operation time and intraoperative complications were not considered.

The actual time spent by each patient watching TV was not measured.

Owing to the nature of this study, no attempt was made to blind subjects or investigators, including nursing and physiotherapy staff. The authors accept that this may have introduced observer bias, but this is unavoidable in such a study.

7. Conclusion

Our study has shown that bedside entertainment systems tend to keep patients occupied on their bed leading to increased immobility. This may predispose them to a number of complications and may contribute to an increased hospital stay.

Larger studies are required to link the use of the entertainment systems to postoperative morbidity and mortality.

Standardised postoperative clinical protocols may counteract the potential adverse effects of bedside entertainment services.

8. Recommendations

- Get them moving and they will get going.
- Alert patients on the adverse effects of immobility.

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