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Influence of patient's dressing on spontaneous physical activity and length of hospital stay in surgical patients

Summary

Wearing hospital gown (HG) as opposed to plain-clothes (PC) may contribute to the general state of inactivity of hospitalised patients. We designed a randomized study to determine the influence of clothing on the level of spontaneous physical activity (SPA) and to assess the length of hospital stay. Using triaxial accelerometry we measured the SPA in two groups of surgical patients, before and after an elective operation. Twenty eight patients received instructions to wear plain-clothes (group PC) during their stay in the hospital as soon as possible from a surgical point of view. Twenty-nine patients, serving as a control group, did not receive any specific instructions and as a result, were mostly wearing hospital gowns (group HG).
Following the admission to the hospital, both groups showed a 50% decrease in SPA when compared to the recordings obtained during the last 24 hours spent at home. During the postoperative period, the SPA increased progressively in both groups. Although patients in group PC tended to be more active than those in the control group, the SPA was not significantly different (P = 0.4). Similarly, patients in group PC left the hospital 10 hours earlier than patients in group HG (P = 0.4). The power of our study was nevertheless low and a sample size of 700 patients might show statistically significant results. We conclude that wearing plain-clothes when hospitalized for elective surgery is not associated with complications and could be included in postoperative rehabilitation program.

Physical activity or mobility are usually associated with good health and are a good reflection of the quality of life[1]. In geriatrics and rehabilitation wards, the functional evaluation of patients relies frequently on the Score of Activities of Daily Living (ADL). When calculated at admission, this score seems to have a good prognostic value on the length of stay and on the patient's overall prognosis[2]. The improvement of the ADL, consecutive to an intensive rehabilitation seems to shorten the length of stay[3,4]. In surgery, the recovery of function is of primary importance. Many studies, particularly in cardiovascular and orthopaedic surgery, suggest that an early and intensive rehabilitation is associated with decreased morbidity and shortening of the length of hospital stay[5,6]. On the other hand, prolonged immobilisation might have deleterious effects on pulmonary, metabolic, musculo-squelettal and cardiovascular systems[7]. Furthermore, there is no indication that immobilisation reduces the preoperative stress; it may, however, increase the risk of psychological disorders and the dependency on the nursing staff[8,9]. The improvement of the mobility after an operation depends on many factors including the type of surgery, surgical technique, anaesthesia technique, quality of post-operative pain management and prevention of complications[10]. Few studies have addressed the issue of how a patient can contribute by himself to improve the general outcome of a procedure[11,12]. The influence of patient's dressing has only been investigated in geriatrics[13]. We propose that wearing hospital clothes (pyjamas, shirts and dressing-gowns) will contribute to inactivity, while wearing plain-clothes will encourage patients to be more active. This might accelerate rehabilitation and functional recovery and as a result, decrease the length

of hospital stay. We present a prospective randomised study to test this hypothesis.

Physical activity can be measured by different ways: subjective autoevaluation is very imprecise and unreliable, while objective methods based on observation (video, ADL), recording of metabolic variables (calorimetry), or monitoring of body movements (accelerometry) are much more accurate[14]. The development of miniaturized accelerometers allowed the quantitative measurement of movement and its application has been validated in human research[15]. The correlation between energy expenditure and physical activity is still unsatisfactory, but several studies showed that tridimentional accelerometry is reliable and useful to quantify spontaneous physical activity (SPA)[16, 17].

Patients and Methods

After approval by the local ethics committee, 91 patients with no significant health problem (ASA class 1 and 2)[18] were included in this study over a period of 6 months. In order to join the protocol, patients had 1) to be aged over 18, 2) to be scheduled for one of six pre-determined elective procedures, 3) to spend at least 16 hours in the hospital before the operation (same day admission and outpatient excluded), and 4) to give informed consent.

A few days before admission all 91 patients were visited at home by one of the authors (O.D.), and detailed information about the study as well as the accelerometer (see below) was provided. All patients were asked to keep a diary in order to distinguish accelerometry recording of sleep and awake periods as well as episodes of invalid data corresponding to episodes during which the device was not worn (i.e. showers, washing, etc.). Patients were randomly allocated in to two clothing groups. In the first group, patients were requested to wear their own plain-clothes (group PC), as they would have under normal condition at home throughout the entire hospital stay, in as much as there was no other specific indication from the staff (related to drains and wounds). In the comparison group, patients did not get any special clothing instruction and wore hospital gowns (group HG). In all patients spontaneous physical activity (SPA) was recorded continuously from the day before admission until the day following the discharge from the hospital.

Measurement

The SPA was recorded using a triaxial accelerometer (Gaehwiler z 80–32 k, V1, Zürich), worn as a wrist watch on the non-dominant side. The monitor (weighting 68 g and measuring 5,1 × 3,65 × 2,1 cm) looks like a big watch. It is composed of a piezo-electrical crystal and a microcomputer capable of storing information. Acceleration is measured every 125 millisecond. For each measure, the computer records 0 if the detected acceleration is below 0.1 G (1 G = 9,81 m/s^2), and 1 if it is equal or superior to 0.1 G. To facilitate the reading of the results, the accelerometer can be programmed in order to give average values (score) of mobility for a pre-determined period (time window), set at one minute in this study. For each time window, a value of 0 is stored if all measurements performed during that time are 0, i.e. below 0.1 G, and therefore, indicates total immobility. Conversely, if all accelerations recorded during a time window are equal or greater than 0.1 G, a value of 253 (arbitrary units) is stored and indicates heavy activity. For every patient, we obtained a complete recording of the activity, measured by minutes after minute, from 8 a.m. on the day before admission to 24 hours after hospital discharge. The data were transferred on a computer for analysis. Elimination of invalid recordings (i.e. when the accelerometer was not worn) and determination of day and night time could be achieved with the help of the diaries.

Statistical analysis

Randomisation was evaluated with a chi-square test (Pearson) for categorial variables (sex, method of anaesthesia, type of surgery) and with a T-test for the continuous variable (age). With a T-test, the mobility of every period (days and nights) and the length of stay were analysed by comparing both groups. A variance analysis was done in order to see if the mobility was different day by day, depending on the type of surgery, independent of the groups. A similar analysis was done for the length of stay, depending on the type of surgery.

Results

Secondary patient's exclusion occurred in 34 cases because of surgery postponement (n = 3) or complication (n = 1), secondary refusal to participate (n = 2), unavailability of accelerometer (n = 25), malfunction of the accelerometer (n = 2) and inaccurate ASA classification (ASA >2) (n = 1). Eventually, results from 57 patients were available for analysis, 28 in group PC and 29 in group HG. Both groups are similar in regard to mean age (51 and 50.3 respectively), sex, anaesthesia technique and type of surgery (Table 1). The instructions about how to dress have been well followed. During the day before surgery, 27 of 28 patients in group PC kept their own plain-clothes. Conversely, 27 of the 29 patients of group HG spontaneously wore pyjamas or hospital gowns. After the operation, patients in group PC wore

plain-cloths more often than those in group HG. On the day of surgery, one patient in PC was wearing his own clothes, 14 on the first, 20 on the second, 23 on the third, 24 on the fourth, 27 on the fifth and 28 on the sixth postoperative day. On the other hand, 26 out of 29 patients in group HG wore a hospital dress until the day of discharge.
Following admission to the hospital, SPA decreased in the order of 50% in both groups (55.7% in group PC and 50% in group HG). In the post-operative period, activity increased progressively and in most cases, reached the pre-operative level only at the time of discharge. There is no significant difference between groups, although the patients of group PC are slightly more active than those of group HG on the third and forth post-operative day (Fig. 1). The length of convalescence (arbitrarily defined as time from the end of the anaesthesia to discharge) and the length of stay in the hospital are not significantly different, but patients in group PC leave the hospital in average 9 to 10 hours earlier than those in group HG (Table 2). Finally, the length of convalescence is related to the type of surgery ($p = 0.0001$) (Table 3).

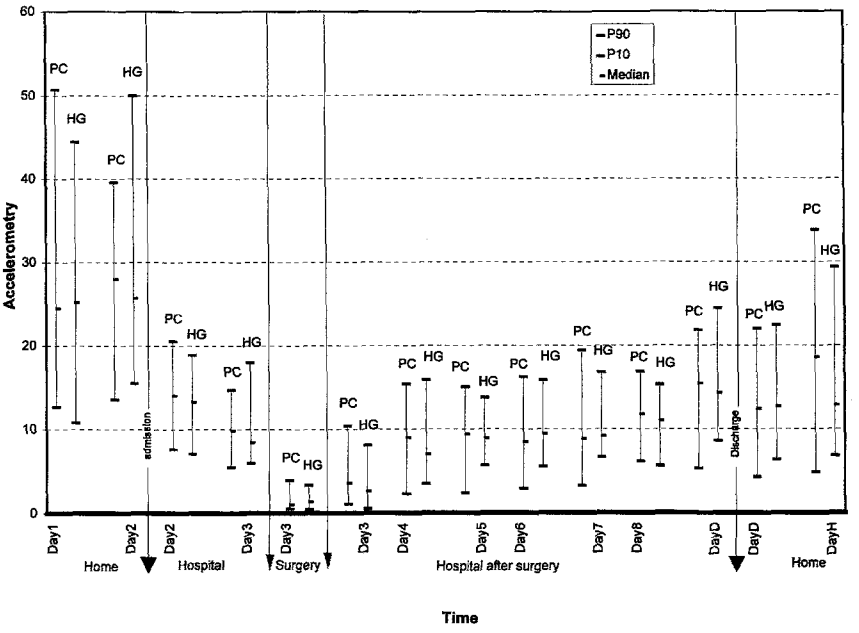

Figure 1. *Chronological recording of the mobility by accelerometry: comparison of both clothing groups PC (plain-clothes) vs HG (hospital gowns). DayD: day of discharge; DayH: first day at home after discharge.*

Variables	Group PC	Group HG
Number of patients	28	29
Men/Women	15/13	15/14
General/Spinal anaesthesia	21/7	23/6
Unilateral inguinal hernia	12	12
Bilateral inguinal hernia	2	2
Unilateral stripping	3	4
Bilateral stripping	6	4
Abdominal hysterectomy	4	3
Vaginal hysterectomy	1	4
Average age (± SD)	51.0 ± 10.6	50.3 ± 14.8

No significant difference between groups.

Table 1. *Characteristics of patients, Type of anaesthesia and surgical procedures in each group (Number or Mean and SD).*

Discussion

SPA was similar in both groups when measured at home and decreased in the order of 50% in all patients following admission. This suggests that hospitalisation in itself is responsible for a marked decrease in activity, regardless of other factors. Unusual environment, the need to be instantly available for nurses and physicians, and unsubstantiated belief that rest before an operation has beneficial effects may explain this result. During the first 24 hours after the operation, SPA was low and not significantly different between groups. Altered clinical condition, post-operative pain, general malaise, fever and residual effects of anaesthetic agents are known to affect patients up to 48 hours after surgery. Since only one patient in group PC was dressed with plain-clothes within the first 24 hours, no difference was to be expected on the first post-operative day. As time went on, the clothing differences increased between groups and so did the SPA, but the difference did not reach statistical significance. Nevertheless our study has a low power, in the 10–15% range in the best available figures, to reject the null hypothesis if there was indeed a difference (i.e.

Delay for dressing post-op.	Number of patients dressed (cumulative value)		Average duration of convalescence by patient (hours)		Sums of the hours of convalescence (hours)	
	Group PC	Group HG	Group PC	Group HG	Group PC	Group HG
24 hours	1	0	25	0	25	0
48 hours	14	0	78.6	0	1022	0
72 hours	20	2	103	52.5	618	105
96 hours	23	9	138	75.4	414	527.8
120 hours	24	15	123	100.16	123	601
144 hours	27	25	167.6	122.4	503	1224
168 hours	28	26	170	148	170	148
192 hours	–	27	–	170	–	170
216 hours	–	28	–	240	–	240
240 hours	–	29	–	218	–	218
	Total general:				**2875**	**3223.8**
	Average by patient (P = 0.4):		**102.7**	**111.5**		

Table 2. *Comparison of the length of convalescence in both vestimentary groups in relation to the delay for dressing with plain-clothes.*

Surgery	Length of convalescence (hours)		
	Average Group PC	Average Group HG	Average for all patients
Unilateral stripping	65	74.8	70.6
Bilateral stripping	69.8	87.5	76.9
Unilateral inguinal hernia	105.8	103	104.4
Bilateral inguinal hernia	122	128	125
Vaginal hysterectomy	68	146.3	130.6
Abdominal hysterectomy	169.8	169.3	169.6

Convalescence vs type of surgery: P = 0.0001.
Between group PC vs group HG: P = NS.

Table 3. *Length of convalescence in relation to the type of surgery.*

higher SPA or shorter hospital stay in dressed patients). Alternatively, a total sample size of 700–800 patients would have been necessary to allow the best observed difference to be statistically significant.

As demonstrated in other studies[19], the type of surgery was correlated with the length of hospital stay. Such a finding is related to a number of factors including post-operative fatigue, a syndrome related to the catabolic response triggered by the operation which is proportional to the extent of the surgical trauma[20]. On the other hand surgical habits can be an important factor that blurs the impact of other variables.

The postoperative recuperation of SPA over time followed a similar pattern in all patients, reaching the pre-operative level on the day of discharge. Since discharge criteria were not based only on physiological parameters, it is difficult to determine whether patients reached a given activity because of physiological recovery or because of a physician given incentive. This finding supports our experience as well as the results from other groups[21,22], which suggest that without post-operative programs or incentive to recover normal function, patients tend to spend more

time in hospital without any documented benefit.
SPA recorded at home during the first 24 hours after discharge remains significantly lower than SPA before admission. This further suggests that functional recovery is incomplete when a patient leaves the hospital.
Wearing plain-clothes was well accepted by patients and nurses and was not associated with complications or problems. The only patient who developed a wound infection was in group HG.

Conclusion

We conclude that:

1. Admission to the hospital decreases the spontaneous physical activity by 50%.
2. Wearing plain-clothes instead of hospital gowns does not significantly affect the length of hospital stay or the level of SPA.
3. There is a trend towards increased SPA and shortening of hospital stay in patients wearing plain-clothes.
4. Wearing of plain-clothes is not associated with complications and could be included in postoperative program aimed at early function recovery.

Zusammenfassung

Hat die Bekleidung chirurgischer Patienten einen Einfluss auf ihre Beweglichkeit und auf die Hospitalisationsdauer?

Die Verpflichtung Spitalkleidung zu tragen im Gegensatz zu normaler Kleidung könnte die Inaktivität der hospitalisierten Patienten verstärken. Um den Einfluss der Kleidung auf die Beweglichkeit und die Dauer des Spitalaufenthalts zu studieren, haben wir eine prospektive randomisierte Studie durchgeführt. Durch triaxiale Accelerometrie haben wir die spontane Beweglichkeit in zwei chirurgischen Patientengruppen gemessen, und zwar vor und nach einer elektiven Operation. In Gruppe 1 (PC) haben 28 Patienten den Auftrag bekommen, normale Kleider während der Hospitalisation zu tragen, sobald die chirurgische Situation es erlaubte. In Gruppe 2 (HG) trugen 29 Patienten wie üblich Spitalkleider. Nach Spitaleintritt verminderte sich in beiden Gruppen die Beweglichkeit um 50%; während der postoperativen Phase stieg die Beweglichkeit allmählich in beiden Gruppen an. Obschon die Patienten der Gruppe PC die Tendenz hatten, aktiver zu sein und das Spital früher zu verlassen als jene der Gruppe 2 (HG); wobei der Unterschied nicht signifikant (p = 0,4). Die Aussagekraft unserer Studie ist aber gering (15%), eine Gruppe von mindestens 700 Patienten wäre nötig gewesen um signifikante Aussagen machen zu können. Das Tragen von eigener Kleidung im Spital hat zu keinen Komplikationen geführt und könnte die „funktionelle Wiederherstellung" des Patienten begünstigen.

Résumé

Influence de la tenue vestimentaire du patient chirurgical sur sa mobilité et sur la durée du séjour hospitalier

Rester en pyjama, blouse d'hôpital et robe de chambre au lieu de s'habiller pourrait renforcer le degré d'inactivité de patients hospitalisés. De manière prospective et randomisée, nous avons étudie l'influence de la tenue vestimentaire sur la mobilité et la durée de séjour de patients chirurgicaux. Par accélérométrie tridimensionnelle, nous avons mesuré la mobilité de deux groupes de patients, avant et après une opération élective. Un groupe de 28 patients (groupe PC) a reçu la consigne de s'habiller à l'hôpital pour autant que la situation chirurgicale le permette. Les 29 patients du groupe témoin n'ont reçu ancune consigne vestimentaire particulière et restèrent pour la plupart en pyjama ou robe de chambre. Les résultats montrent dans les deux groupes une diminution de 50% de la mobilité dès l'admission, avec une récupération progressive mais incomplète dans la période post-opératoire. Les patients du groupe PC ont tendance à être plus actifs et à quitter l'hôpital plus tôt que ceux du groupe témoin mais ce de façon non significative (P = 0.4). La puissance de notre étude s'est néanmoins révélée faible (15%), un collectif d'au moins 700 patient étant nécessaire pour obtenir des résultats significatifs. Nous concluons que le fait de s'habiller lors d'un séjour hospitalier pour chirurgie élective n'entraîne pas de complications et pourrait favoriser la récupération fonctionnelle du patient.

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