

# Compliance with driving instructions following anaesthesia for a day-case procedure

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## Abstract

The study explored the behaviour of patients driving within 24 hours of a day-case procedure. Although advised not to drive for 24 hours, evidence suggests some patients are non-compliant. Of the 654 questionnaires returned, 3 people drove home following General Anaesthesia, 1 after sedation and 16 following Local Anaesthesia with 30 not responding.

10 elected to drive within 24 hours of GA, 5 following sedation and 58 following LA with 6 not responding. 73 therefore drove within 24 hours. A minority thereby arrived by car suggesting pre-meditated non-compliance. Patients should be requested to sign a disclaimer regarding driving prior discharge.

**Keywords:** Anaesthesia, ambulatory surgical, automobile driving, patient compliance, patient discharge.

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## Introduction

Throughout Europe elective surgery has undergone considerable change with the increasing prominence of day surgery [1, 2]. In the United Kingdom approximately 62% of elective surgery is undertaken on a day-case basis [3] although the British Association of Day Surgery suggest this figure has the potential to rise to over 80% [4]. With the advent of modern day surgery its popularity in healthcare provision has grown, turnover has risen and patient dependence on professional care generally much diminished [5]. Further, the amount and variety of surgery that can be undertaken continues to rise due to the economic effectiveness of minimal stay surgery [6, 7].

Discharge planning for minimal stay surgery frequently commences in the pre-assessment clinic with patient information provision emphasised throughout the whole surgical experience [8, 9]. Patient and carer responsibility during the initial post-discharge days can be considerable [10], especially with the growth in surgical complexity [11, 12] hence the need for patients to be well informed. When first discharged, patients are not considered fully recovered from the effects of anaesthesia although deemed to be 'street ready' [13]. Chung, et al. [14] suggest three phases to recovery - early (emergence from anaesthesia), intermediate (co-ordination and physiological normalization allowing for discharge) and late (hours or days later when full psycho-motor functioning returns). In a review, it was found some discharge criteria were still based on older practices such as not permitting discharged until the patient was able to drink and void [15]. However, more contemporary means of ensuring patient suitability for discharge have been suggested [16] and the use of more formal measures to monitor post-discharge recovery employed [17].

One of the intrinsic values of minimal stay surgery for patients is greater choice and control over events with recovery at home being highly valued [18]. Awad and Chung [19] maintain the success and safety of ambulatory surgery is dependent, in part, on patient's adherence to the information and instructions received at discharge. Nonetheless, compliance with discharge instructions can sometimes be lacking with driving a vehicle following anaesthesia being a particularly sensitive issue [20]. Such non-compliance can be influenced by the public's possible perception 'one day surgery

equates to one day recovery' [21]. In an early study of 100 patients, 31% journeyed home unaccompanied by a responsible person, 73% of car owners drove within 24 hours of surgery and 9% drove themselves home [22]. In a large survey by Chung, et al. [23], 55 (0.2%) patients were found to have no escort home although all claimed to have a home escort on admission. Correa, et al. [24] telephoned 750 patients 24 hours post-discharge to determine compliance with instructions and revealed 1.8% had consumed alcohol, 4.1% had driven a vehicle and 4% did not have a responsible adult with them for the first 24 hours. Similarly, Cheng, et al. [25] contacted 240 patients after 24–48 hours and uncovered 4.1% had driven a car, 1.7% made important decisions, 3.3% drank alcohol, 0.8% took sedatives and 10% cooked, ironed or looked after children. Cheng, et al. [25] further states the majority of non-compliance occurred the following day suggesting patients may view medical and nursing advice as over-cautious. In a review, Ip and Chung [26] provide a flow chart for safe discharge of patients and recommended no patient be allowed to drive home after administration of an hypnotic, sedative or opioid. The availability of a carer for 24 hours post-discharge was further advocated together with transport home with an escort, easy access to a telephone and 'reasonable' home journey time [26].

In a survey of 70 anaesthetists, Cheng, et al. [27] found little agreement concerning how quickly patients should be allowed to resume normal daily activities after day surgery under general anaesthesia. Guidelines from the Driver and Vehicle Licensing Agency (DVLA) regarding post-surgery behaviour states any decision regarding driving must take into account recovery from the operation, recovery from anaesthesia, pain, impairment due to analgesia (sedation and cognitive impairment), physical restrictions due to surgery and other co-morbidities. Further, it is the responsibility of the driver to ensure he/ she is in control of the vehicle at all times and able to demonstrate this if stopped by the Police [28].

Few studies in the United Kingdom have recently examined patient compliance with instructions regarding driving following day surgery. With the continued growth in minimal stay surgery, greater patient choice and the public's possible notion 'day surgery equates to day recovery', ensuring compliance with driving restrictions may be

a wider challenge. An investigation into the recovery behaviour of patients following a day-case procedure and compliance with discharge instructions regarding driving was therefore undertaken.

## Methods

### Aim

To explore the behaviour of patients driving within 24 hours of undergoing anaesthesia for a day surgery.

### Participants

A convenience sample of patients scheduled for elective surgery in one public Day Surgery Unit (DSU) were invited to take part on the day of admission. Potential participants were those undergoing general and local anaesthesia, having non-life-threatening, intermediate surgery; English or Polish speaking; and aged 18 years or more. Due to a recent rise in the number of Polish speaking people in the local study population, the questionnaire was translated into Polish (by Hospital Trust translators) for distribution to potential Polish participants. A small fee was paid for this service although translation back into English by a separate translator was included.

### Data Collection

Data were collected over a 12 month period (Sept 2010 - Oct 2011). Clinical staff in the DSU distributed the questionnaire on the day of surgery. Potential participants were given a letter of invitation and an information sheet concerning the study. The letter of invitation and patient information sheet explaining the study was available in English and Polish as was the questionnaire. Questionnaires were to be completed at home 24–48 hours after surgery and returned in the 'freepost' self-addressed envelope provided. The questionnaire had 53 items with the vast majority utilising a Likert Scale format. Patient experience of the pre-assessment visit (n=11 items), day of surgery (n=6 items), journey home (n=6 items), home information provision (n=7 items), physical/ social recovery once home (n=12 items) and demographic details (n=7 items) were the main themes. However, this paper will focus solely on the data gained in association with driving a vehicle within 24 hours with further findings published elsewhere [29].

## Results

The questionnaire was distributed to 2,401 adult patients for completion at home 24–48 hours post-discharge. Questionnaires were returned in the 'freepost' self-addressed envelope provided with 684 returned (29% response rate). Participants' ages ranged from 18 years to 108 years (mean 55.4 years). The majority spoke English (99%) with 1% Polish speaking. Participants underwent a variety of procedures, the majority under general anaesthesia (GA 49%, LA 45%, RA 5% and 0.1% sedation) (6 missing) (Table 1 & 2).

The most common method of transport home was by car (85.5%), taxi (9.6%) and public transport/ other (3.9%). Three (0.4%) participants drove home following general anaesthesia (GA), 1 (0.2%) after regional anaesthesia (RA) and 16 (2.3%) following local anaesthesia (LA) (Table 1). A total of 20 patients (3%) (5 females, 15

males) therefore drove home following an anaesthetic with a further 30 (4.5%) opting not to answer the question. Of the 30 who opted not to answer, 9 had undergone GA, 2 RA and 18 LA (1 missing) (possible total of 12 driving home following GA, 3 after RA and 34 after LA equalling a total of 7.1%). Of the patients who drove home, 6 (0.9%) had experienced orthopaedic surgery, 6 (0.9%) local anaesthetic injection for chronic back pain, 4 (0.5%) general surgery, 2 (0.3%) ENT surgery and 2 (0.3%) urological surgery (Table 1 & 2). Two males and 1 female drove following GA, 1 male after RA and 12 males and 4 females following LA. Furthermore, 90% (18) of the participants who drove home also drove within 24 hours (GA = 2 [males], RA = 1 [male] and LA = 15 [12 males, 3 females]). The average age of participants who drove home was 55.3 years (40 - 71yrs).

Of the 20 participants who decided to drive home, the majority viewed their length of hospital stay as 'about the right', which for the majority was ½ a day and 80% were 'very satisfied' with their day surgery experience. Eight of the participants who drove home lived with their spouse, 3 a partner, 2 with family although 7 lived alone. Of the patients who opted not to answer this item, 10 lived with their spouse, 3 a partner, 7 their family and 9 lived alone. No other aspect such as post-operative pain, surgery type, post-operative nausea and vomiting (PONV), experience of travelling home or number of dependence had an influence on the choice to drive home (Table 2).

Ten (1.5%) participants drove within 24 hours of GA, 5 (0.7%) 24 hours after RA and 58 (8.5%) after LA. A total of 73 (10.7%) therefore drove within 24 hours of a day-case procedure (Table 3). The patients who had experienced a GA had undergone gynaecological surgery (3), urological surgery (3), general surgery (2), ENT surgery (1) and cardio-version (1) (Table 3). A further 6 (0.9%) opted not to answer the question and of these 3 had undergone GA (ENT surgery 2, orthopaedic surgery 1) and 3 LA (orthopaedic surgery 2, local anaesthetic injection for chronic back pain 1). Again, if such patients were to be included a possible 13 (1.9%) drove within 24 hours of a GA. Of the 5 patients who had experienced RA, 4 had undergone orthopaedic surgery and 1 an injection for chronic back pain. Six males and 4 females drove within 24 hours following GA, 5 males following RA and 43 males and 15 females following LA. The average age of participants who drove within 24 hours was 59 years (34–77yrs).

Of the participants opting to drive within 24 hours, 37 lived with their spouse, 12 a partner, 6 with family and 15 lived alone (3 missing). Of these patients, 81% (n=59) rested at home for 1 day or less with 74% (n=54) stating they were happy with this length of time to rest. The majority (73% n=53) experienced no, slight or mild pain with 88% (n=61) stating they were recovered after 3 days. Fourteen patients experienced nausea once home but still drove with one patient experiencing a very large amount yet still drove. Four patients experienced a small amount of vomiting once home and one a very large amount although still drove within 24 hours of surgery. Four participants found recovery difficult or very difficult but again still drove within 24 hours.

**Table 1** Driving Home, Anaesthesia Type and Day-Case Procedure (n=684) (Total n=20)..

Anaesthesia Type	Orthopaedic Surgery	Injection Chronic pain	General Surgery	ENT Surgery	Urological Surgery	
GA	1	0	1	0	1	3
RA	1	0	0	0	0	1
LA	4	6	3	2	1	16
					<b>Total</b>	<b>20</b>

**Table 2** Driving Home, Day-Case Procedure, Post-Operative Symptoms and Demographics (n=684) (Total n=20).

Anaesth	Surgery	Pain	PONV	Exp. travel	Age	Depend	Gender	Living Arrang
GA	General	Very small amount	Very small amount	Very satisfied	40	1 or 2	M	Partner
LA	Ortho	Small amount	Very small amount	Very satisfied	41	1 or 2	M	Family
LA	Ortho	Medium amount	None	Mildly satisfied	45	None	M	Alone
LA	Ortho	Very small amount	Very small amount	Very satisfied	45	1 or 2	F	Spouse
LA	ENT	Very small amount	None	Mildly satisfied	45	None	F	Alone
GA	Ortho	Small amount	Very small amount	Very satisfied	47	1 or 2	F	Spouse
LA	General	Small amount	None	Very satisfied	48	None	F	Family
LA	ENT	Very small amount	None	Very dissatisfied	52	1 or 2	M	Alone
LA	Ortho	Very small amount	None	Very satisfied	56	1 or 2	M	Spouse
LA	Injection for chronic pain	Very small amount	Very small amount	Mildly satisfied	57	1 or 2	M	Spouse
LA	Injection for chronic pain	Very small amount	None	Very satisfied	59	None	M	Alone
LA	General	Medium amount	None	Very satisfied	60	None	F	Partner
LA	General	Very small amount	None	Very satisfied	60	1 or 2	M	Partner
LA	Injection for chronic pain	None	None	Very satisfied	60	None	M	Alone
LA	Urological	None	None	Very satisfied	61	None	M	Spouse
RA	Ortho	Very small amount	Very small amount	Very satisfied	62	None	M	Alone
LA	Injection for chronic pain	Very small amount	None	Very satisfied	63	None	M	Spouse
GA	Urological	Very small amount	None	Very satisfied	66	None	M	Alone
LA	Injection for chronic pain	Very small amount	None	Very satisfied	68	1 or 2	M	Spouse
LA	Injection for chronic pain	None	None	Very satisfied	71	1 or 2	M	Spouse

**Table 3** Driving Within 24 Hours, Anaesthesia Type and Day-Case Procedure (n=684). (Total n=73)

Anaesthesia Type	Orthopaedic Surgery	Injection for Chronic pain	General Surgery	ENT Surgery	Gynae Surgery	Urological Surgery	Knee Aspiration	Neuro-implant	Cardio-version	
GA	0	0	2	1	3	3	0	0	1	10
RA	4	1	0	0	0	0	0	0	0	5
LA	15	29	3	5	1	3	1	1	0	58
									<b>Total</b>	<b>73</b>

## Discussion

### Driving Home

The main findings from this survey of patients undergoing anaesthesia for a day-case procedure suggests a minority did not comply with instructions regarding driving a vehicle home or driving within 24 hours. The number of patients who drove home after an anaesthetic was 20 (3%) although this figure is very likely an under-estimate and 50 (7.3%) patients driving home may be a more accurate reflection. Of the patients who revealed they drove home, 3 drove following GA (1 female, 2 males), 1 following RA (1 male) and 16 following LA (4 females, 12 males) (Table 1). Of the 30 patients who opted not to answer, 9 had undergone GA, 2 RA and 18 LA (1 missing). If the total number who failed to answer this item were to be included, 12 (1.3%) underwent GA, 3 (0.3%) RA and 34 (2.6%) LA (1 missing). A total of 49 (7.1%) could potentially have driven home following a variety of surgeries and anaesthesia.

In an early study to examine patient compliance with driving instructions, Ogg (22) established 9% (n=9) drove themselves home following GA and 73% drove within 24 hours. Ogg (1972) recommended patients be requested to sign a disclaimer regarding driving, drinking alcohol and operating machinery. However, more recently it has been suggested lower doses of Propofol had little impact on psychomotor function and patients could drive home after 2 hours [30]. Likewise, following endoscopic procedures employing a bolus dose of Propofol 40mg for subjects <70yrs and 30mgs for >70yrs, Horiuchi, et al. [31] concluded recovery of driving ability was good after 60 minutes. Sinclair, et al. [32] also established certain driving skills returned after two hours following low doses of Fentanyl in a group of young healthy volunteers. However, in a study by Seidl, et al. [33] of Colonoscopy and Gastroscopy patients, 15 minutes of Propofol was administered (2.4mg/kg body weight) and it was concluded driving should not be permitted until an interval of 6 hours.

Of the patients who drove home following GA, 1 had undergone orthopaedic surgery, 1 general surgery and 1 urological surgery. The specific surgery undertaken was not recorded although the majority of patients underwent orthopaedic surgery (Table 2 & 3). Irrespective of anaesthesia employed, following arthroscopy it is accepted between 48 hours and 4 weeks should elapse before returning to driving [34]. However, Lewis, et al. [35] found the advice from orthopaedic surgeons regarding returning to driving to be inconsistent. Dalury, et al. [36] suggest up to 4 weeks because of the possible need for emergency braking. Employing 20 healthy volunteers and 20 arthroscopic knee surgery patients Chung, et al. [37] established patients demonstrated significantly more lapses in attention, micro-sleeps and lower reaction times and reduced road positioning ability 2 hours after general anaesthesia. It was concluded patients were only safe to drive 24 hours after GA.

As the number who acknowledged they drove home was low (n=20) no significant differences in demographic details or lack of satisfaction

with treatment could be noted. However, patients who drove home tended to be older with an average age of 55.3 years (40 - 71 years), male (15 males, 5 females), 8 living with their spouse but 7 living alone (Table 2). Living with a partner appears to be no guarantee of availability to drive the patient home. Greater weight is possibly added to this when considering patients who did not answer the question. Of the patients who opted not to answer, 10 lived with their spouse, 3 with a partner, 7 their family and 9 lived alone. Laffey, et al. [38] noted patients who failed to comply with fasting instructions prior to surgery and planned to take public transport home alone or drive home alone were also predominately older males. This is in contrast to drinking alcohol and driving a vehicle where the most common age group to be prosecuted is 17–30 year old males [39].

The majority who drove home viewed their length of hospital stay as 'about the right', which for the majority was ½ a day and 80% were 'very satisfied' with their day surgery experience. No other aspect such as post-operative pain, surgery type, PONV, experience of travelling home (feeling ill during the journey) or number of dependence appeared to have an influence on the choice to drive home (Table 2). Indeed, two patients experienced a small amount of pain and PONV while travelling home but still continued to drive.

### Driving Within 24 Hours

Seventy-three (10.7%) patients drove a vehicle the following day (within 24 hours of a day-case procedure) and 18 (2.6%) of these also drove home on the day of the procedure. Ten (1.5%) patients drove within 24 hours following GA, 5 (0.7%) after RA and 58 (8.5%) after LA. The surgery undertaken on the GA patients who opted to drive within 24 hours was gynaecological (3), urological (3), general (2), ENT (1) and cardio-version (1) (Table 3). Five patients drove within 24 hours of RA (orthopaedic surgery 4, local anaesthetic injection for chronic back pain 1). A further 6 (0.9%) opted not to answer the question and of these 3 had undergone GA (ENT surgery 2, orthopaedic surgery 1) and 3 LA (orthopaedic surgery 2, injection for chronic back pain 1). If the missing data were to be included, 13 (1.9%) may have driven within 24 hours of experiencing GA following a variety of surgery.

Some surgery types clearly have a longer recovery period than others which can considerably influence the ability to drive [16]. A number of studies have been undertaken on driving ability following upper and lower limb orthopaedic surgery. Goodwin, et al. [40] states few guidelines are available to assist orthopaedic surgeons in advising patients about returning to driving after surgery although Fleury, et al. [41] recommends 4 weeks absence following simple knee arthroscopy and 4-6 weeks after Anterior Cruciate Ligament repair (ACL). Moreover, it is recommended this period be extended for manual transmission vehicles. Conversely, Hau, et al. [42] advises a delay of 1 week after right knee arthroscopy (used for the brake) as reaction times are slower in the affected limb. In a survey of 112 patients regarding driving with an upper limb plastered, Kalamaras, et al. [43] discovered 50% never drove, 38% drove once and 22% drove

daily with males being the most common group (17–25yrs). Further, upper limb orthopaedic studies suggest poorer performance when wearing a splint/ plaster/ sling [44], especially on the left arm (used for gear shifts) in above elbow thumb spica as evasive manoeuvres when faced with hazards are diminished [45, 46]. In a review of the literature by MacLeod, et al. [47], ‘Brake Reaction Time’ and ‘Brake Pedal Force’ were deemed crucial aspects for safe driving and Von Arx, et al. [48] advise surgeons not to become involved in the decision to re-commence driving.

Of the participants driving within 24 hours, 37 lived with their spouse, 12 a partner, 6 their family and 15 lived alone (3 missing). In a large study by Correa, et al. [24], 1.8% disclosed they had consumed alcohol within 24 hours of day surgery, 4.1% had driven a vehicle and 4% did not have a responsible adult during the first 24 hours. Four females and 6 males drove within 24 hours of a GA, 5 males following RA and 15 females and 43 males following LA. The average age of participants who drove within 24 hours was 59 years (34–77yrs) with the majority again being male (74% n=54). Cheng, et al. [25] likewise found 4.1% had driven a car, 1.7% made important decisions, 3.3% drank alcohol, 0.8% took sedatives and 10% cooked, ironed or looked after children within 24 hours. In the present study, 81% (n=59) rested for 1 day or less and 74% (n=54) were happy with this length of time. The majority (73% n=53) experienced a little pain although 88% (n=61) were recovered after 3 days. In a survey of patients undergoing differing types of orthopaedic surgery (knee arthroscopy, hand/arm, foot/leg and shoulder) a similar amount of time was taken to recover although the shoulder surgery patients took approximately 2 weeks [49]. A number experienced nausea in the present study once home but still drove with one patient driving even with a very large amount of nausea. Four patients experienced a small amount of vomiting once home and one a very large amount although also still drove within 24 hours of surgery. Four participants found recovery difficult or very difficult but again drove within 24 hours.

## Conclusion

A minority of patients made a clear decision prior to arrival at the Day Surgery Unit to travel to the hospital by car, park at or nearby and drive home afterwards. Moreover, 90% who drove home also drove within 24 hours of receiving differing surgeries and differing anaesthesia types. For a minority, irrespective of anaesthesia type or surgery undertaken, pre-meditated non-compliance appears highly applicable. Also, the figures concerning driving home and driving within 24 hours are likely to be higher than stated here. Older males and people living alone appear to be more prone to such behaviour although further studies are required using a larger sample of patients as this question remained unanswered on a number of occasions.

The rise in day surgery together with the public’s possible association with minimal stay equalling minimal recovery [21], may give rise to more risky behaviour in the future. This has the potential to lead to an increase in accidents and litigation [20]. It has been recommended patients be requested to sign a disclaimer regarding driving, drinking alcohol and operating machinery prior to leaving the hospital. This will help safeguard the hospital staff and Trust against possible litigation in the event of an accident while travelling home or during the first 24 hours. Furthermore, it may be beneficial during routine post-operative telephone contact to reiterate any relevant points concerning safety. However, it has been stated telephone contact can be unwanted by some patients and that texting via mobile phones (mHealth) to remind patients of instructions/ medications may have greater impact [50]. Likewise, the future use of specific mobile phone applications (apps) for post-surgical care has much potential.

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