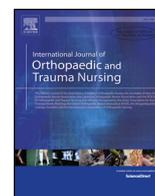




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# The impact of pre-operative telephone support and education on symptoms of anxiety, depression, pain and quality of life post total knee replacement: An exploratory case study

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## Introduction

End stage osteoarthritis is frequently the catalyst for total knee replacement (TKR) and is associated with pain and disability. Patients with pre-operative anxiety or depression have increased pain and poor quality of life (QOL) following joint replacement (Clement et al., 2013; Duivenvoorden et al., 2013). The median wait time in Australia for elective TKR in 2016–2017 was 195 days (AIHW, 2017). QOL and psychological wellbeing have been reported to deteriorate over this time (Ackerman et al., 2011). Further, the need to address pre-operative anxiety and depression is compounded by the increasing rate of TKR surgery. Comparing results over the 10 year period to 2017 showed an over 60% increase in TKR surgeries (AOANJRR, 2019).

Telehealth involves the delivery of healthcare over a distance, using telecommunication techniques to provide education and healthcare management to patients (Department of Health, 2015). Telephone support and education is the simplest form of telehealth and can easily be implemented to provide education and support to patients waiting for TKR. The pre-operative period is an opportunity to assess, identify and manage potential barriers to improvement in outcomes following surgical procedures. Research involving telephone support exists in the pre-operative period. These studies have involved telephone calls aimed at identifying and addressing reasons for surgical cancellations (Haufler and Harrington, 2011) or involved different cohorts using different outcome measures (Johansson et al., 2010). The study by Johansson et al. (2010) comparing written material alone to written material and telephone support preoperatively, showed the benefit of telephone support on empowerment post total hip replacement (THR). Telephone support is a quick and simple strategy with the potential to improve outcomes.

The primary aim of this study was to explore the role of pre-operative telephone support and education on symptoms of anxiety, depression, pain and quality of life following total knee replacement.

## Background

### Anxiety, depression and pain

Mental health plays a significant role in a patient's rehabilitation and should be considered and incorporated into the provision of care. Studies examining the impact of anxiety and depressive symptoms pre and post-surgery, found that patients with anxiety and depressive symptoms had worse outcomes in terms of physical function, QOL, and patient satisfaction, compared to those without, at 12 months post TKR or THR (Duivenvoorden et al., 2013; Hanusch O'Connor, Ions, Scott and Gregg, 2014). In a prospective cohort study of 100 patients undergoing TKR, pre-operative anxiety (30%) and depression (20%) were identified, and results suggested poorer outcomes functionally at 6 weeks and 12 months in those with pre-existing anxiety and depression (Hanusch et al., 2014). This is a significant finding, indicating that patients with anxiety and depression are at risk of poorer outcomes.

Many studies show a correlation between anxiety and depression, and persistent pain post-surgery (Hirschmann et al., 2013; Vissers et al., 2012). Vissers et al. (2012), found strong evidence to suggest that pre-operative pain catastrophizing predicts greater pain post joint replacement and that low pre-operative mental health increases pain post TKR. Similarly, two studies found that anxiety and depression predicted poorer QOL and further suggested that anxiety and depression increased pain post TKR (Qi et al., 2015; Utrillas-Compaired, De La Torea - Escuredo, Tebar - Martinez, & Asunsolo - Del Barco, 2014). A negative association between pre-operative anxiety, depression, and pain, and physical function and QOL post TKR has also been reported (Hirschmann et al., 2013).

Information sessions with healthcare professionals through scheduled Pre-Admission Clinic sessions are regularly provided before TKR. These sessions, however, can often be information intensive, or not meaningful to patients and anxiety may reduce retention of information (Goldsmith et al., 2017; Malley et al., 2015). Written material has been shown to be effective for increasing knowledge (Johansson et al., 2010)

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in the pre-operative period, but it has been reported that support should be delivered in many forms to meet patient expectations (Goldsmith et al., 2017).

#### Telephone support

Qualitative data from two randomised controlled trials comparing telephone intervention to standard care has shown positive results for telephone support (Pariser, O'Hanlon and Espinoza, 2005; Szots et al., 2015). These studies looked at telephone support provided as part of an arthritis self-management program and post TKR, and showed that the telephone support intervention was valued, provided confidence, and gave support to these patients. The study by Szots et al. (2015) demonstrated that, although most queries were answered from the first telephone call, the second call answered new concerns. Furthermore, a study evaluating the effect of a 12-session perioperative support program on physical function post TKR, showed that a tailored telephone-delivered emotional support program was well accepted by all patients and was associated with improved six-month physical function post TKR (Franklin et al., 2012).

Prior to TKR, patients often experience anxiety and depression which can impact on information retention. To effectively prepare patients for surgery, information should be delivered in many forms. This paper examines telephone support as one form of informational support. To date, no published studies have examined the effect of the pre-operative use of telephone support only, in a cohort of TKR patients.

#### Methods

This study used a mixed-methods case study design to examine the role of pre-operative telephone support and education on symptoms of anxiety, depression, pain and quality of life following TKR. Case study designs enable data collection from a variety of sources, and allow the influence of individuals, interventions, and organisations to be measured (Taylor and Francis, 2013). Case-study design was appropriate here, as it enabled an emphasis on qualitative data, integrated with quantitative data to explain and compare results (Taylor and Francis, 2013). A pre-test was used to establish participants' baseline anxiety, depression, pain, and QOL. Telephone support was then provided twice before surgery (TKR), and a post-test was used to again record participants' anxiety, depression, pain, and QOL.

#### Ethical considerations

This study was low risk. Ethical approval was obtained from the health service's Human Research Ethics and Governance committee and Monash University.

#### Setting and sample

The Pre-Admission Clinic (PAC) within a major Victorian metropolitan health service with over 700 beds was the setting for this study. The PAC ensures patients are fit for surgery. The study sample was recruited from patients presenting to the PAC prior to TKR surgery. Participants were eligible if they were; over the age of 18 years; waiting for TKR surgery; and surgery was scheduled at least four weeks, but no more than six weeks, after PAC attendance. This ensured that the study intervention (two telephone support calls) could be achieved. Patients were excluded if they were undergoing bilateral TKR, surgery was due to infection, malignancy, revision or other complications, and they did not speak English, or had cognitive or hearing impairment.

#### Recruitment

This study was conducted over a six-month period. Using a case-study design, cases should be added until theoretical saturation is

reached, and no new data are collected. Typically, case study designs have a sample of up to 15 participants (Fletcher and Plakoyiannaki (2010). Eighteen participants were identified and recruited when they attended the PAC (all eligible patients). This was slightly more patients than was anticipated to be needed, but allowed for attrition during the study. While awaiting their pre-admission appointment, potential participants were provided with a brief letter introducing the study. Enrolment into the study was confirmed once all inclusion criteria, and no exclusion criteria, were met and an informed consent had been obtained.

#### Intervention

Telephone support and education involved two telephone calls that followed a semi structured script, with flexibility to adapt and change questions, and provide information as required. The questions were designed around core information that participants needed to know. The telephone script was a blend of open and closed questions and similar questions were asked of all patients at the PAC in preparation for surgery.

Two telephone calls were provided to participants, one week after enrolment, and one week before surgery. The same person provided all the scripted support/education, to encourage a rapport with the participant and to improve consistency.

#### Data collection

Baseline data consisted of; demographic information (age, gender, living, and working arrangements); co-morbidities; and Patient Reported Outcome Measures (PROMS). The PROMS used in this study were; the EuroQol (EQ5D-5L); the Kessler Psychological Distress Scale (K10); and the Numerical Rating Scale (NRS)-Pain (Bijur et al., 2003; Reenen and Janssen, 2015; Wooden, 2009). These PROMS were repeated with all participants at six weeks post TKR. The PROMS chosen for this study are validated tools and have been used in TKR populations (Ackerman et al., 2006; Dahl and Robertsson, 2016; Van Egmond, Verburg and Mathijssen, 2015). They were in use at the health service where the study took place, could be administered either face to face or by telephone, and were easily adapted to the study protocol.

#### EuroQol

The EQ5D-5L is a generic health related quality of life (HRQOL) questionnaire, consisting of a descriptive health system and the EQ visual analogue scale (EQVAS). The descriptive system comprises of five health status dimensions (mobility, self-care, usual activities, pain/discomfort, and anxiety/depression). Each dimension is assigned a five-level reporting system: no problems, slight problems, moderate problems, severe problems, and extreme problems. These health states may be reported individually to record change in a particular dimension and health states may also be converted to an index score founded on population based value sets, and this score is used to calculate quality-adjusted life years (Reenen and Janssen, 2015). The EQVAS is a self-reported rating scale where individuals rate their overall health today on a 0–100 scale. Higher scores indicate better outcomes.

#### K10

The Kessler K10 (K10) is a 10-item questionnaire that measures psychological distress; anxiety and depression. It has a five-scale weighting applied based on the frequency of symptoms reported which range from; none of the time, a little of the time, some of the time, most of the time, to all of the time. The results of the 10-item questionnaire are accumulated, with the minimum result recorded as 10 and the maximum 50 (Wooden, 2009). The scoring system for this study aligned with that used in the Victorian Population Health Survey, 2010 with

four levels of psychological distress determined, based on their score: low (< 16), moderate (16–21), high (22–29) and very high (30–50) (Department of Health, 2012).

This scoring system provided guidance if referrals to other services were needed. If participants' results indicated greater than moderate psychological distress, participants were referred to their GP for further assessment as per usual care. If more urgent care was required (i.e. the score was very high), participants could be referred to mental health through the health service.

#### Numerical Rating Scale (NRS)–Pain

The NRS-Pain is a tool producing a numeric rating score which assigns a number on a scale 0–10 for pain. Zero represents no pain and ten indicates extreme pain.

#### Data analysis

Qualitative data were collected during the telephone support interviews. This was an opportunity for participants to ask questions or express concerns and all information was documented during the interviews. The interviews consisted of questions exploring patient readiness for theatre, for example “How are you feeling about your surgery”, and “Do you have any concerns or worries at this time?”. The interviewer was an experienced Orthopaedic/PAC nurse, so was able to provide information and support via telephone in response to patient concerns, as well as explore the issues that were raised by participants. Some specific questions relating to patient care planning were also asked (for example, questions about current pain management and support available). The telephone script had been pre-tested with two persons unrelated to the study to assess the flow of the questions and to determine the ability of the questions to produce appropriate responses. Each interview was conducted by the same person and the questions were usually asked from the script in succession. Content analysis was used to analyse these qualitative data. Notes from each telephone interview were checked and recorded on an excel spreadsheet, and were then compared and contrasted to identify participant knowledge gaps and repeated themes, including areas of expressed concerns.

Quantitative data were analysed using SPSS version 23. Descriptive statistics were used to describe the study sample. Results have been described using mean and SD. Paired t-tests were used in this study to compare participant mean values on the EQ5D, K10 and NRS-Pain tools before, and six weeks after, surgery. Data were then integrated to contextualise and give meaning to the qualitative data (Creswell, 2009).

#### Results

Eighteen people were approached to participate in this study and all agreed to participate (Fig. 1). Twelve participants received two telephone support calls, and five participants received one support call only. One person was uncontactable and received no telephone support calls, so was removed from the sample. Those participants who received one telephone call only, did so because they had their theatre time moved forward and had already been admitted to hospital before the scheduled second phone call. One participant received both telephone support calls, but was later removed from the sample as surgery was cancelled indefinitely due to health issues. All participants who received either one or two telephone support calls, and completed the pre and post questionnaires, were included in the study (n = 16).

The mean age of participants was 64.3 years (SD ± 10.97). Just over two-thirds of participants were women (n = 11, 69%), and the remainder were men (n = 5, 31%). Fewer than one-fifth of participants lived alone (n = 3, 19%). All participants had one comorbidity in common; osteoarthritis. Anxiety and depression were recorded in 31% of participants pre-operatively (n = 5), and most participants had ≥ 3

comorbidities (n = 11, 69%) (Table 1). Just over half the sample were of working age (n = 9, 56%), which was defined as being under 65 years of age. Most participants were not working (n = 11, 69%), mainly retired (n = 7), and just under a third of participants, (n = 5, 31%), were employed in paid work.

#### Concerns raised by the participants

There were a number of concerns raised by participants during the provision of pre-operative telephone support. These were analysed, summarised and organised into themes to provide structure and to give meaning to the data and they were; admission preparation, anxiety about surgery and post-surgery concerns (Table 2).

#### Admission preparation

There were many concerns raised relating to the admission and discharge process. Participants frequently responded with “unsure” or “cannot recall admission procedure” when asked if they knew where they were going and which medications to take before surgery. There were benefits noted after the telephone support calls regarding retention of admission information. At completion of the second phone call, many suggestions appeared to have been implemented.

#### Anxiety about surgery

Many participants expressed “feeling anxious” before surgery. One participant expressed “feeling anxious as my surgery is getting closer” during both telephone calls. Another participant expressed her fear about the hospital stay itself. Fear of the surgery being postponed was also expressed and several participants were anxious about the type of anaesthetic to be administered. One participant expressed concerns “about having a spinal anaesthetic and being awake during the surgery”. Health issues were raised frequently during the telephone support calls, with recent health issues, or fear of a health issue developing, high amongst participants' concerns. One participant stated “I have a UTI [urinary tract infection] and I don't want this to affect my surgery” and another reported “I have aches and pains” and previously complained of pain issues.

#### Post-surgery concerns

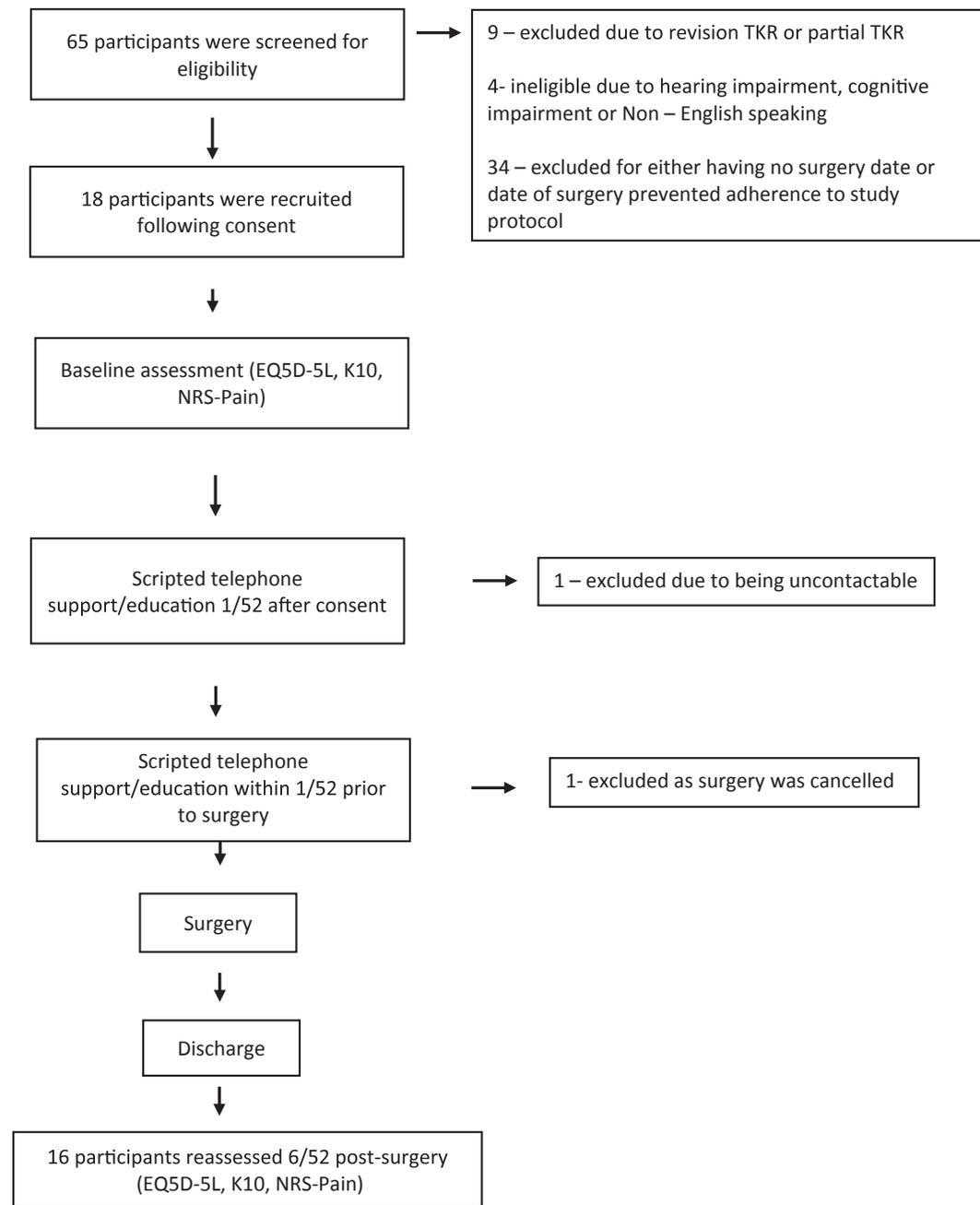
The burden the surgery may have on their significant other/s was often voiced, with one participant stating “I'm worried about my husband as he's been unwell”. Some participants were carers and were worried about the impact their surgery would have on their loved one and the extra pressure this presented before surgery “I need to organise my mum's medication before surgery”.

Participants were worried about the rehabilitation process after surgery. One stated “I want to go to in-patient rehabilitation, where I know I'll be looked after”. Another stated “I want to go to rehab to relieve pressure on my partner”. Another participant was very keen to go home, stating “I want to go home earlier” preferring not to stay in hospital for long. This comment was mirrored by another participant saying he wanted to go home “as soon as possible”.

Questions were answered and concerns discussed with several participants expressing the value of telephone support. One participant stated twice during the second phone call that she “felt better after our phone call”. Other participants stated “you've covered everything, thank you” and reported “no (concerns), I'm all packed and ready to go”.

#### Anxiety and depression

Results from the EQ5D descriptive health states tool showed that almost half of the participants (n = 7, 44%) reported feeling anxious or



Note: EQ5D-5L = EuroQOL 5 dimensions 5 level questionnaire; K10 = Kessler 10, psychological distress questionnaire; NRS-Pain = numeric rating scale

Fig. 1. Flow diagram of study recruitment.

depressed before TKR surgery with one-quarter of participants ( $n = 4$ , 25%) feeling moderately or severely anxious or depressed (Table 3). By comparison, fewer participants experienced anxiety or depression post TKR ( $n = 4$ , 25%). Only one participant (6%) reported feeling moderately anxious or depressed post-surgery and no participants reported severe anxiety or depression post-surgery.

A paired sample *t*-test was used to compare participants' EQ5D index scores at baseline (before surgery) and at six weeks post TKR (Table 4). There was a significant improvement in EQ5D index scores from baseline ( $M = 0.54$ ,  $SD = 0.21$ ) to six weeks post TKR surgery ( $M = 0.70$ ,  $SD = 0.18$ ;  $p = 0.008$ ), indicating a significant improvement in overall QOL. The mean improvement in index scores was 0.16, with a 95% confidence interval. The results represented a medium

effect size (0.37) (Barton and Peat, 2014).

A paired samples *t*-test was used to compare results from the EQVAS, from baseline (before surgery) to six weeks post TKR (Table 4). There was no statistically significant improvement in EQVAS from baseline ( $M = 68.9$ ,  $SD = 19.8$ ) to six weeks post-surgery ( $M = 75.9$ ,  $SD = 14.5$ ;  $p = 0.198$ ). The mean improvement in scores was 7.06, with a 95% confidence interval. Results indicated a small effect size (0.199) (Barton and Peat, 2014).

Results were recorded from the K10 questionnaire which measures psychological distress; anxiety and depression, at two time points (pre-surgery and at six weeks post TKR). Results were compared using a paired *t*-test. Results showed a small, non-significant, improvement (reduction) in K10 scores from baseline ( $M = 18.47$ ,  $SD = 7.90$ ) to six

**Table 1**  
Comorbidities.

	Participants (n = 16)	%	Frequency
Cardiovascular	7	44	10
Respiratory	5	31	6
Endocrine	3	19	6
Musculoskeletal	16	100	19
Gastrointestinal	8	50	9
Cancer	2	13	3
CNC/Neurological	2	13	2
Anxiety and/or Depression	5	31	7
Total			62*

Note: \*Each reported illness was counted once and some participants had more than one complaint.

weeks post-surgery ( $M = 18.0$ ,  $SD = 4.51$ ;  $p = 0.75$ ). The mean improvement in scores was  $-0.47$ , with a 95% confidence interval. The results indicated a small effect size (0.036) (Barton and Peat, 2014). One-third of participants ( $n = 5$ , 31%) recorded high to very high psychological distress at baseline but this figure had reduced to 18.75% ( $n = 3$ ) six weeks post-surgery and no participants recorded very high psychological distress.

### Pain

Two tools were used to examine pain; EQ5D and NRS-Pain. Results from the EQ5D-5L showed that all participants ( $n = 16$ ) reported pain pre-operatively, ranging from slight to extreme pain (Table 5). Moderate to extreme pain was reported pre-operatively by more than half of the participants ( $n = 10$ , 62%). Post-operatively, only one-third of participants ( $n = 5$ , 31%) reported moderate pain, and most participants ( $n = 11$ , 69%) reported no, or only slight pain.

A paired sample *t*-test was used to compare total self-reported pain at baseline (pre-surgery) and six weeks post TKR, using the NRS-Pain tool. Results showed that there was a statistically significant improvement in pain scores from baseline ( $M = 4.91$ ,  $SD = 2.25$ ) to six weeks post-surgery ( $M = 2.25$ ,  $SD = 1.72$ ;  $p < 0.001$ ). The mean improvement in pain scores was 2.66, with a 95% confidence interval. The results indicated a medium to large effect size (0.553) (Barton and Peat, 2014).

**Table 2**  
Themes identified from responses during telephone support.

Themes	Sample responses
Admission preparation	<p>“unsure, will check my documents”</p> <p>“My GP has given me a script for antibiotics before I have surgery. Is this OK?”</p> <p>Patient reported “I have cold packs now”</p> <p>Expressed benefit of telephone calls twice “felt better after our phone call”</p> <p>Reported “being all organised”, “all packed”, all sorted” for OT</p> <p>“you covered everything, thank you”</p> <p>“feeling nervous”</p>
Anxiety about surgery	<p>“how long someone should stay with me post-surgery”</p> <p>“worried should I have surgery because I’ve got no pain”</p> <p>Concerned “I want to organise scripts for husband and mother before surgery” “feeling a bit nervous as my surgery is getting closer”</p> <p>“worried I will be awake during surgery”</p> <p>“want to be knocked out (during surgery)”</p> <p>“Surgery postponed for further tests”</p> <p>Concerned family member “works long hours and aren’t much help”</p>
Post-surgery concerns	<p>“worried about my husband as he’s been unwell”</p> <p>“worried my husband is unwell with cancer”</p> <p>Requested rehabilitation to “reduce stress on my partner and to be well enough to look after my daughter”.</p> <p>“wants to get home asap”</p> <p>“can I go home earlier”</p>

## Discussion

The results of this study showed significant improvement in QOL and pain following TKR. Anxiety and depression also showed improvement. The five key findings that arose from this study were: i) telephone support addressed participant concerns, and education was provided when gaps in participant knowledge were identified; ii) participants valued telephone support, iii) participants had significantly less pain post-operatively, iv) participants had significantly improved QOL post-operatively; v) participants had less anxiety and depression post-operatively.

### The role of telephone support

The key benefits of the telephone support calls were; the opportunity for participants to express concerns, the ability to identify knowledge gaps and provide education when required, and that participants felt valued. The number of concerns raised during the telephone interviews indicated that information delivered at the PAC did not meet participant needs, or was not meaningful to them at that time. The PAC can often involve a lengthy, information intensive experience, and retention of information can be an issue, as patients may feel overwhelmed or anxious during the pre-admission appointment (Malley et al., 2015), reducing their ability to retain information. As such, support should be delivered in many forms (Goldsmith et al., 2017).

Informational support was viewed as significant by participants. The first telephone call revised the pre-operative information and provided further information when knowledge gaps were identified. The second call was often quicker, as many concerns were raised and resolved during the initial call. Telephone support enables patients to make choices and express fears and concerns, which is an important opportunity (Johansson et al., 2010). This ensures the patient is fit for surgery, reducing the risk of post-operative complications, and also manages avoidable cancellations.

Studies have shown that telephone support was effective in patients post joint replacement (Hordam et al., 2009; Johansson et al., 2010). The increasing number of TKR surgeries annually, the length of time spent on the waitlist, and the poor outcomes in patients with anxiety and depression, demonstrate that there is a need to address the issues in the pre-operative period of TKR surgery. Telephone support was quick and effective, and emerges as a valid option.

**Table 3**  
EQ5D - Anxiety and Depression; Baseline and six weeks post TKR.

Level of anxiety/depression	Level of anxiety/depression	
	Baseline n (%)	Six weeks post TKR n (%)
Not anxious or depressed	9(56)	12(75)
Slightly anxious or depressed	3(19)	3(19)
Moderately anxious or depressed	3(19)	1(6)
Severely anxious or depressed	1(6)	0(0)
Extremely anxious or depressed	0(0)	0(0)
Total	16(100)	16(100)

### Anxiety and depression

The prevalence of anxiety and depression pre-operatively in this study varied depending on the tool used. The generic HRQOL tool; EQ5D-5L found that 44% of participants had pre-operative anxiety or depression. This is higher than the levels previously reported in the literature, which is around 20–30% of patients presenting for TKR (Ayers, Franklin, Trief, Ploutz - Snyder and Freund, 2004; Hanusch et al., 2014). The results from the K10 psychological distress tool showed that high to very high anxiety and depression were present in 31% of participants at baseline in this study.

At six weeks post-surgery, fewer participants experienced anxiety or depression and only one participant reported feeling moderately anxious or depressed. However, although there was a reduction in anxiety and depression post TKR, this was not statistically significant. Several explanations may account for this finding. Osteoarthritis usually affects multiple joints, therefore issues with disability may still exist post TKR. In this study only one (knee) joint was replaced. Some participants were wait listed for TKR surgery for the other knee, and some participants had ongoing issues with osteoarthritis in other joints. This may have had an influence on the way these participants answered the K10 questionnaire post TKR, and could account for the non-significant reduction in anxiety and depression post TKR. A longer follow up period may have produced different results also as at six weeks post-surgery, patients are still likely to be actively rehabilitating and may still have some pain, swelling and anxiety around the outcomes of their surgery. Furthermore, the rehabilitation process itself may have caused anxiety and or depression (Montin et al., 2007).

### Pain and quality of life

The literature indicates an association between anxiety, depression and pain (Hirschmann et al., 2013; Qi et al., 2015). This suggests that any improvement in pain outcomes would be reflected in outcomes for anxiety and depression. There was a statistically significant improvement in pain and QOL from baseline to six weeks post TKR but not in anxiety and depression. Pain was an expected outcome as improvement in pain post TKR has previously been reported in the literature (Hirschmann et al., 2013; Utrillas-Compaired et al., 2014).

Participants in this study showed greater improvement in pain and QOL than has been reported previously. In a study examining the effectiveness of a fast track protocol for TKR, pain scores improved (reduced) from pre-operative ( $M = 3.6$ ,  $SD = 1.5$ ) to six weeks post-operative ( $M = 1.9$ ,  $SD = 1.4$ ), ( $p < 0.01$ ), a mean improvement of 1.7

**Table 4**  
EQ5D Mean index scores; Baseline and six weeks post TKR.

	Baseline (SD)	Six weeks post TKR (SD)	Mean difference	p	Effect size
EQ5D*	0.54 (0.21)	0.70 (0.18)	0.16	0.008	0.37
EQVAS ** (0–100)	68.88 (19.82)	75.94 (14.52)	7.06	0.198	0.199

Note: \*EQ5D = EuroQOL 5 dimensions questionnaire; \*\*EQVAS = subjective assessment of participant's own health state in real time. Second part of EQ5D HRQOL questionnaire (office of Health Economics, 2016).

**Table 5**  
EQ5D - Pain; Baseline and six weeks post TKR.

Level of pain/discomfort	Level of pain/discomfort	
	Baseline n (%)	Six weeks post TKR n (%)
No pain	0(0)	1(6)
Slight pain	6(38)	10(63)
Moderate pain	5(31)	5(31)
Severe pain	4(25)	0(0)
Extreme pain	1(6)	0(0)
Total	16(100)	16(100)

(Van Egmond et al., 2015). By comparison, following telephone support, participants in this study had a mean reduction in pain of 2.66.

Similarly, patients in this study had a larger improvement in QOL (EQ5D) following pre-operative telephone support and TKR. Results for EQ5D reported in the fast track study showed a mean index score of  $M = 0.63$  pre-operatively, with the score falling to  $M = 0.51$  at six weeks post TKR, suggesting QOL was worse post-operatively (Van Egmond et al., 2015). By comparison, the mean index score pre-operatively for this study (telephone support) was  $M = 0.54$  and this figure improved at six weeks post-operative to  $M = 0.70$ .

Results recorded from the EQVAS showed less improvement compared to the literature. Likewise, when comparing K-10 results to the literature, these findings showed less improvement in psychological distress; anxiety and depression. This may be in part due to the shorter follow up time in this study.

### Limitations

There were limitations associated with this study. The intervention of two telephone support calls was not provided to all participants, and this may have skewed the results. Recruitment of participants was also impacted by both a change in the PAC model of care, and the Christmas period, reducing numbers. Thus caution should be taken when interpreting these results as the small sample size may give rise to type 1 and type 2 errors. A six week follow up may have been too short a timeframe to show improvement post TKR. Other studies evaluating TKR allow at least three to twelve months for follow up and results of those studies showed greater improvement compared to this study (telephone support) (Ackerman et al., 2006; Dahl and Robertsson, 2016). Furthermore, if telephone support had an impact on anxiety and depression pre-surgery this may have contributed to the results, however, these results would have been anticipated post TKR and thus cannot be assumed attributable following the provision of telephone support. Finally, this was a single centre study and study participants may not have been representative of the general population.

### Recommendations

The population is aging and, as a result, the number of TKR surgeries is increasing. Strategies aimed at improving outcomes post-surgery should be identified and telephone support is one such strategy. Results from this study suggest that a pre-operative telephone support program should be considered in TKR patients with anxiety and

depression to improve QOL.

## Conclusion

Anxiety and depression were present in approximately one-third of patients presenting for TKR. Results showed significant improvement in QOL and pain post TKR and a small improvement in anxiety and depression. The fast pace of the PAC means high information intensity for patients and, coupled with the stress of impending surgery and navigating a hospital system, knowledge retention is a challenge for patients. Telephone support calls were implemented to address the potential knowledge deficit and provide care and support during this time. The opportunity for participants to clarify information and seek advice helped to build rapport and a sense of trust and participants' valued telephone support. Results from this case study, when compared to the literature, showed improvements in pain and QOL. A small improvement in anxiety and depression was also seen, suggesting that further consideration of the use of telephone support before TKR may be warranted.

## Conflicts of interest

This study is the original work of the listed authors and all authors have read and approved the manuscript being submitted. The authors abide by the copyright terms and conditions of Elsevier and the paper has not been submitted for consideration for publication elsewhere. There was no funding sought for this study.

## Ethical statement

This study used a mixed [HYPHEN] methods case study design which examined pre-operative telephone support on pain, anxiety, depression and QOL post total knee replacement. Ethical approval was obtained from the health service's Human Research Ethics and Governance committee and Monash University.

## Declarations of interest

None.

## Financial disclosure

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