The Relationship between Non Surgical Pain and Activity in Patients undergoing Total Knee Arthroplasty

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Total knee arthroplasty (TKA) is a common and effective treatment for severe pain and osteoarthritis.

About 700,000 TKA are performed annually.

By 2030 TKA are estimated to increase to nearly 3.5 million a year.

American Academy of Orthopaedic Surgeons, 2011
Successful rehabilitation depends on the patients’ ability to participate in physical therapy and recovery efforts.

Pain may impede recovery (Dubois, Gallagher, & Lippe, 2009).
Background

- In one study of patients’ experience of pain in the first 48 hours after TKA, patients who experienced non surgical pain (NSP) after a TKA reported different patterns of pain interference than those without NSP.

- Patients that reported NSP experienced more interference with the following:
  - Mood
  - Relationships
  - Sleep
  - Walking

(Wittig–Wells, Shapiro, Higgins, 2013)
The purpose of this study was to explore and describe the relationship between the patients’ non surgical pain (NSP) and activities in the total knee arthroplasty (TKA) population at 48 hours and 6–7 weeks postoperatively.
Objectives

1. Describe NSP severity/intensity of TKA patients in the first 48 hours and at 6–7 weeks

2. Explore the relationship between NSP and activity interference in the TKA patient in the first 48 hours and at 6–7 weeks

3. Describe differences in NSP by patients’ race, age, level of education, and gender

4. Compare patterns of interference of surgical vs. NSP
Procedure

- 48 hrs post op (T1) – BPI was administered at bedside (2 surveys, one for surgical pain, the second BPI for NSP)

- 6–7 weeks post op (T2) – BPI by phone (2 surveys, one for surgical pain, the second BPI for NSP)
Methods

- Descriptive statistics for all measures
- Univariate and multivariate analysis

- Continuous outcomes – Pearson correlations and t-tests
- Associations between categorical variables – Chi-square tests
- Non-parametric Mann Whitney t-tests – for ordinal measures or skewed
- Multivariate analysis of co-variance (MANCOVA) – compare pain interference components of the BPI
- Cronbach’s alpha and factor analysis were used to check the reliability statistics for the two BPI scales.
Prospective, Exploratory Study with Convenience Sample of Subjects (N=95)

- Gender – 66% female 32% male
- Race – 64% White 26% African American
- Education –
  38% had some college
  48% college education or higher
- Age – mean age was 64 years
Multidimensional – addressing severity of pain and the extent to which the pain interferes with activities and mood (interference)

Measurement tool has demonstrated validity and reliability
- Pain Intensity Cronbach’s alpha = 0.826
- Pain Interference Cronbach’s alpha = 0.914

The two-factor structure of the BPI (intensity and interference) has also been demonstrated and supported in multiple studies (over 400)

Cleeland & Ryan (1994)
- Akyol, Karayurt, & Salmond (2009)
- Wittig–Wells, Shapiro, Higgins (2013)
BPI – Pain Intensity Items

◦ worst pain in the past 24 hours
◦ least pain in the last 24 hours
◦ pain on average last 24 hours
◦ pain you have right now

(Cleeland & Ryan, 1994)
BPI – Pain Interference Items in last 24 Hours

- General activity
- Mood
- Walking Ability
- Interference with home exercises prescribed by physical therapy
- Relations with other people
- Sleep
- Enjoyment of life
- Ability to concentrate
- Appetite

(Cleeland & Ryan, 1994)
Pain Scores for All Reported Results

From a clinical perspective, pain severity scores were collapsed to describe the pain as follows:

Absence of pain (0)
Mild pain (1–4)
Moderate pain (5–6)
Severe (7–10)

(Li, Harris, Hadi, & Chow, 2007)
Objective 1. Describe the range of NSP severity of TKA patients in the first 48 hours and at 6 weeks

NOTE: ALL OF THESE ARE RATED AS MILD

Worst pain [0.73 points decrease (p=.043)]
48 Hr mean score was 2.49
6–7 Wk mean score was 1.69

Least pain [0.26 points decrease (p=.350)]
48 Hr mean score was 1.14
6–7 WK mean score was .86

Average [0.61 points decrease (p=.040)]
48 Hr mean score was 1.79
6–7 WK mean score was 1.14

Right Now[0.74 points decrease (p=.015)]
48 Hr mean score was 1.69
6–7 WK the mean score was 0.91

(1–4 = mild pain)
Did you follow that?
NSP Severity at 48 hrs (T1) & 6–7 weeks (T2)
Objective 2: NSP and Interference Items

- Patients reported the most NSP interference with “activity,” “sleep,” and “enjoyment of life” at 48 hrs after surgery.

- The highest NSP pain interference reported by patients 6–7 weeks after the surgery were for “activity,” “sleep,” and “walking.”
Score for interference with activities

48 Hrs mean was 1.60 = mild interference
6–7 Wks it was .85 = mild interference
NSP Interference 48 hrs (T1) & 6–7 weeks (T2)

All significantly lower at 6 weeks (p<.05) except Mood and Walking
All subjects showed statistically significant reductions in both pain intensity \( (p=.033) \) and pain interference \( (p=.006) \) from 48 hours (T1) post–op to 6 weeks (T2) after surgery.
Objective 3: Differences by and Associations with Gender, Education, Age & Race

There were no statistically significant associations between age, race, gender, level of education, and patients' experience of pain at either 48 hours or 6–7 weeks.
Objective 4: Compare NSP and SP

- Surgical Pain is significantly higher than NSP at both time points for both Pain Intensity (T1 (p<.001), T2 (p<.001)) and Pain Interference (T1 (p<.001), T2 (p<.001))

- Surgical Pain Intensity at 48 hours is significantly higher than at 6 weeks (p<.001)

- Surgical Pain Interference at 48 hours is significantly higher than at 6 weeks (p<.001)
SP Higher than NSP at Both Times

Pain Intensity

Pain Interference

95% CI

T1 T2 T1 T2 T1 T2 T1 T2
Positive correlation between the surgical pain interference and intensity scores and NSP interference and intensity scores at 48 hours post operatively.

At 6–7 weeks the correlation no longer exists.

At 6–7 weeks the majority of the surgical pain is relieved and only persistent, NSP remains.
Discussion

- NSP was identified as potential issue in previous study
- NSP was determined to be much less than surgical pain
- Yet NSP demonstrates a baseline of chronic and persistent pain that does impact patients’ mood and walking.
Conclusion

- Healthcare professionals should address both surgical and NSP aspects of pain and pain interference.

- Nurses should be cognizant of the way in which NSP may interfere with important quality of life determinants such as sleep, walking and other activity.
Limitations

- This was a non-random sample
- Can’t be generalized to all TKA patients
Nursing Implications and Questions for you?

- Are we documenting and addressing NSP that our patients may experience?
- Do we manage the NSP pain?
- Does this low intensity, chronic, NSP impact rehabilitation efforts?
- Why is the NSP relatively higher in the first 48hr than the NSP at 6–7 weeks?
- Email comments and suggestions to: deborah.wittig-wells@emoryhealthcare.org
References

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The End