Influence of ethnicity on the perception and treatment of early post-operative pain

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Abstract

Background: Previous studies indicated that patients from Black, Asian and minority ethnic (BAME) groups tend to receive less analgesics compared to Caucasian (White) patients after similar surgical procedures. Most such data originated from North America and suggested that health-care professionals may perceive the expression of excessive pain by BAME patient groups as an exaggerated response to pain, rather than sub-optimal treatment. There are limited data comparing acute pain management between South Asian and White British patients.

Objective: We aimed to investigate correlation between patients' ethnicity and disparities of early post-operative pain perception/management, in an ethnically diverse population.

Methods: We conducted a retrospective case note review of acute post-operative pain after total abdominal hysterectomy (TAH) in 60 South Asian and 60 age-matched White British females. Data for 140 variables (pre-, intra- and post-operative) for each patient were recorded. We used propensity score matching to produce 30 closely matched patients in each group minimizing effects of recorded co-variables. Data were analysed with and without propensity score matching.

Results: There were no significant differences in acute post-operative pain scores, morphine requirements, pain management, adverse effects or duration of post-operative care unit stay between South Asian and White British patients. The median duration of hospital stay of South Asian patients was longer (4.5 days versus 3.0 days, $p < 0.001$).

Conclusion: We conclude that in an institution where both patients and health-care professionals are from an ethnically diverse population, neither post-operative pain nor pain management are influenced significantly by South Asian ethnicity.

Keywords

Acute pain, ethnology, ethnic group, nociceptive pain, pain perception

Introduction

Surgical procedures cause tissue damage and inflammation resulting in acute post-operative pain. Poorly treated acute pain predisposes to chronic pain and its associated psychological burden, neuronal plasticity and delayed mobility and recovery.¹ The exploration of any factor that may cause disparities in analgesic provision between different patient groups is essential to minimise the risk of under treatment and minimise the burden of chronic pain on patients and its impact on the local health-care economy. Thermal pain sensitivity

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(and hence pain perception) can be influenced by ethnicity, gender, psychological, personality and genetic factors.² The correlation between ethnicity and pain is a difficult yet incredibly vital area to explore. Watson et al. studied hot and cold pain perception in 20 age-matched White British and South Asian healthy volunteers. They found that South Asian volunteers had significantly increased heat pain intensity scores and a significantly reduced pain threshold when compared with White British volunteers.³

Several researchers have emphasised the importance of ethnicity in pain perception, reporting management and responses to analgesic drugs. Previous work in this area has sometimes confused the terms 'race' and 'ethnicity'. The term 'race' should be reserved to describe individuals in relation to their descent, ancestry and physical characteristics while ethnicity is more related to behavioural, cultural, social and psychological background.⁴

An observational study of pain reporting involving 543 patients undergoing third molar tooth extraction suggested that patients of European descent reported less pain than patients from Black American and Hispanic origin.⁵ In a retrospective questionnaire study of 121 individuals, patients of White ethnicity reported less acute pain compared to patients of Black ethnicity after surgical correction of spinal scoliosis.⁶ A large retrospective cohort study linking the census (4.65 million people) and mortality/morbidity data for patients admitted to hospital with chest pain found that patients from Black, Asian and minority ethnic (BAME) backgrounds had higher mortality and a greater incidence of premature hospital discharge compared to White patients.⁷

Other data suggested that patients from BAME groups may receive lower quality health care, possibly due to poor representation of BAME individuals among health-care professionals.⁸ It has been suggested that inequalities in health care can be minimised by increasing the representation of people from a BAME background as health-care providers.⁸

In addition to differences in perception of pain, there may be differences in response to opioids or other analgesics in patients from different BAME backgrounds. Cepeda et al.⁹ conducted a cohort study involving 66 patients and reported that the degree of respiratory depression caused by morphine was 18% greater in native American-Indians compared to Caucasians which may lead to sub-optimal treatment of their pain.

Safety and quality concerns were raised after a meta-analysis and systematic review of 20 years' worth of data highlighted significant disparities of analgesic treatment in subgroups and minorities concluding that Black/African-American patients are most at risk of

such disparities.¹⁰ The need for further research and education was suggested in another systematic review of pain and ethnicity in the United States to minimise racial and ethnic disparities in access to effective analgesic treatment for patients from ethnic minorities.¹¹

The majority of studies linking ethnicity or race and acute pain management originated from the United States. There is limited published work on differences in post-operative pain perception and treatment between White British and South Asian patients. A total of 86% of the overall population of England and Wales are of White ethnicity, and 5.25% describe their ethnicity as South Asian (Indian, Pakistani and Bangladeshi) with significant regional variations.¹² The city of Leicester has a higher proportion of people of BAME ethnicity when compared to the rest of England and Wales, where approximately 28% of the population of inner city of Leicester are of Indian ethnicity¹³ which makes it ideal for this study. The aim of this study was to establish whether there are disparities in early acute post-operative pain management between our South Asian and White British patients after total abdominal hysterectomy (TAH).

Methods

This work was classified as clinical audit therefore not requiring approval from our Clinical Ethics Committee. After approval from our Clinical Audit Department, we conducted a retrospective review of case notes between September 2008 and November 2010. Data were handled in accordance with the UK Data Protection Act and the University Hospitals of Leicester (UHL) National Health Service (NHS) Trust Data Protection Policy (UHL SOP CLIN/120). Our Trust Caldecott guardian's approval was attained before data publication. Data were collected by our research nurses by filling data collecting form for each patient and cross checked by another research nurse for accuracy; data were then entered in a Statistical Package for the Social Sciences (SPSS) database. The first author (M.A.H.) took over data handling after completion of the database for further analysis and publication. Relevant missing data points were re-recorded from original data collection forms and by revisiting patients' medical notes. Collected data included patient characteristics, chronic health status, pre-operative and intra-operative analgesics of 60 age-matched South Asian and White British patients undergoing TAH at the Leicester Royal Infirmary (Table 1). The research team did not dictate or influence patients' clinical care or analgesic provision.

All patients included in the study underwent TAH under general anaesthesia. Anaesthesia was induced with intravenous and maintained with inhalational

Table 1. List of some key variables included in propensity score calculation and matching.

Age	Stress	Tuberculosis
BMI	Diabetes	Previous surgery
Smoking	Thyroid disease	Incision
Hypertension	Endometriosis	Intra-operative opiates
Osteoarthritis	Back pain	Local anaesthetics
Migraine	Epilepsy	Skin clips
Depression	Pelvic pain	Surgical drain
Anxiety	Cancer	Post-op urinary catheter
Asthma	Regular simple analgesia	Intra-operative analgesia
Rheumatoid arthritis	Regular weak opiates	Intra-operative NSAIDs
Chronic pain	Regular NSAIDs	Surgical duration

BMI: body mass index; NSAIDs: non-steroidal anti-inflammatory drugs.

anaesthetic agents. Analgesics comprised short- and long-acting opioids (commonly fentanyl and morphine), and preventative anti-emetics (ondansetron, cyclizine, dexamethasone) according to local policies and at the discretion of the anaesthetist. All patients also received local anaesthesia, variably as wound infiltration at surgery, transverse abdominal plane block, or via local anaesthetic wound infusion catheter.

All patients received post-operative analgesics consisting of standardised patient-controlled analgesia (PCA) with intravenous morphine (1 mg bolus, 5-minute lockout time). Additional analgesics included a combination of regular paracetamol, non-steroidal anti-inflammatory drugs (NSAIDs) and weak opiates (codeine, tramadol). Intravenous morphine (up to 20 mg) was administered in the post anaesthetic care unit (PACU) for break-through pain according to local practice, at the discretion of the recovery room nurse and the anaesthetist.

Pain scores were recorded using a Verbal Numerical Rating Scale (VNRS) (0–10, where 0 represents no pain and 10 represents maximal imaginable pain) at several time intervals post-operatively (0, 15, 30, 45 minutes and at 1, 4, 12, 24, 36 and 48 hours), according to our hospital protocol for patients receiving PCA. We analysed data up to 4 hours following surgery as this provided the most complete and accurate data set regarding the early post-operative period. Analgesics consumption (dose of PCA morphine (mg)), serial VNRS, respiratory rate, and sedation scores were documented at set intervals (as above) in the recovery room and post-operatively. Total PCA morphine consumption was recorded from the PCA devices for each patient. Nausea and anti-emetic drugs administration was also recorded by the recovery staff.

The research team recorded ethnicity as described by patients from their medical records. We categorised ethnicity into White British or South Asian (including

Indian, Pakistani, Bangladeshi and other Asian). The ethnicity of PACU nurses was recorded retrospectively after obtaining their consent according to their self-reported ethnicity (South Asian, White British or other). Ethnicities of the anaesthetic team were not recorded.

Power calculation

We anticipated considerable differences in pain perception and management between South Asian and White British patients, based on published data and the self-reported clinical observations of our recovery room nursing staff. A sample size calculation revealed that in order to detect a 20% difference in VNRS between White British and South Asian patients we needed to include 60 patients from each ethnic group (confidence interval (CI) 95%, power 81%).

Statistical analysis

Data were analysed (Mann Whitney *U* test) to identify associations for categorical and continuous data (Predictive Analytics SoftWare (PASW) version 20; SPSS Inc., Chicago, Illinois, USA). We then performed a propensity score matched analysis (R statistics software with the Matchit package¹⁴) using all collected covariates. To minimise the influence of the covariates of sex, surgery and age, we compared age-matched females undergoing the same surgeries in the same hospital. To produce good-quality matches, we used nearest neighbour 1:1 propensity score matching with a maximum calliper of 0.1 (difference in propensity score). Our analysis included all recorded covariates leading to the assumption that any differences found in pain perception or management between the two matched groups would be attributable to ethnicity alone. The propensity score matching process resulted in 30 closely matched patient data sets (30 South Asian

Table 2. Patient characteristics, intra-operative and post-operative management in South Asian and White British patients, presented as median (interquartile range) ($n=60$ each group). The duration of post-operative stay was significantly longer in South Asian patients.

Variable	South Asian	White British	<i>p</i> value
Body mass index	29 [25–33]	28 [25–31]	0.89
Age (years)	48 [41.5–54.5]	48 [41.5–54.5]	0.94
Surgical duration in minutes	100 [78–122]	91 [66–116]	0.61
Duration of recovery stay in minutes	60 [42.5–77.5]	60 [45.0–80.0]	0.50
Intra-operative morphine used (mg)	10.0 [8.0–12.0]	10.0 [8.5–11.5]	0.45
Total PCA morphine used (mg)	47 [26.5–67.5]	49 [28–70]	0.43
Morphine PCA duration in hours	24 [20–28]	26 [20.5–31.5]	0.36
Post-operative length of stay (days)	4.5 [4–5]	3 [2.5–3.5]	<0.01

PCA: Patient controlled analgesia.

and 30 White British). Data are presented as frequency and median (interquartile range) or (range) where applicable.

Results

There were no statistically significant differences between patient characteristics, background medical history, intra-operative and post-operative management between the two ethnic groups (South Asian and White British patients) (Table 2). A total of 29 (48%) South Asian patients stated English to be their first language, compared with 60 (100%) of White British patients. Nine (15%) South Asian patients required a translator to assist communication with staff during their care. Only 2 (3%) patients in the South Asian group stated their birthplace as England; hence the majority of South Asian patients included in the study were first generation immigrants.

There were no statistically significant differences in pain scores and analgesic consumption during the early post-operative period (4 hours) for propensity score matched and non-matched patients (Table 3). Median respiratory rates between South Asian and White British patients were statistically significantly different at 30, 45 and 60 minutes ($p=0.03$, 0.05 and 0.02 respectively); however, we identified no significant differences in median respiratory rates after propensity score matching ($p=0.30$, 0.31 and 0.15 respectively). There were no statistically significant differences in sedation scores between both groups (Table 3), and no significant differences between groups in the incidence and management of post-operative nausea and vomiting (data not shown). The duration of hospital stay after surgery was significantly longer in South Asian compared with White British patients ($p<0.01$) (Table 2). However, the majority of patients left hospital within the usual timeframe: 78 (65%) within 4 days and a further 23 (19%) patients within 5 days of surgery.

Discussion

This is one of very few studies performed in the United Kingdom comparing early post-operative pain management between South Asian and White British patients; in contrast with the majority of data from the United States comparing patients of Black or White ethnicities, we found no significant differences in acute post-operative pain management between South Asian and White British patients following TAH. In this study we compared pain scores and analgesic provision/consumption in two groups of patients using PCA which is directly comparable to other similar studies using the same analgesic provision. Due to the nature of PCA and the matching process that aims to eliminate patient factors influencing analgesia, we believe that differences (if any) would be attributed to ethnicity rather than covariates or health-care professional administration bias.

In this retrospective case review, we compared acute post-operative pain scores and management (as recorded in the medical notes) for age-matched female patients from different ethnicities. One of the key limitations of observational studies is selection bias and the difficulty in differentiating causality from association. The use of propensity score matching minimises selection bias by using all recorded covariates to increase the confidence of results being a genuine causality link rather than coincidental association.¹⁵ In our study, we identified numerous socioeconomic and background health conditions that could have affected pain perception and management between the two groups (e.g. smoking, anxiety, depression, stress, etc.) that we included in our propensity score matching to minimise selection bias.

While we did not identify significant differences in acute post-operative pain management between patient groups, we did observe some differences in early post-operative respiratory rates. These differences in respiratory rates may explain our local health-care professionals' prior perception that South Asian patients are more

Table 3. Pain scores (Verbal Numeric Rating Score [VNRS] (0–10)), PCA analgesia consumption (intravenous morphine in mg), respiratory rates and sedation scores (0–3) in propensity score matched and non-matched South Asian and White British patients (median [range]).

Variable	Matched		Non-matched	
VNRS	South Asian (n = 30)	White British (n = 30)	South Asian (n = 60)	White British (n = 60)
0 minute	0 [0–2]	0 [0–3]	0 [0–2]	0 [0–3]
15 minute	1 [0–2]	1 [0–3]	1 [0–2]	1 [0–3]
30 minute	1 [0–2]	1 [0–2]	1 [0–2]	1 [0–3]
45 minute	1 [0–2]	1 [0–1]	1 [0–2]	1 [0–2]
1 hour	1 [0–2]	1 [0–2]	1 [0–2]	1 [0–2]
4 hours	1 [0–2]	1 [0–1]	1 [0–10]	1 [0–2]
Morphine (mg)	Matched		Non-matched	
	South Asian (n = 30)	White British (n = 30)	South Asian (n = 60)	White British (n = 60)
0 minute	0 [0–4]	0 [0–1]	0 [0–4]	0 [0–5]
15 minute	1 [0–6]	1 [0–6]	1 [0–6]	1 [0–8]
30 minute	3 [0–9]	3 [0–9]	3 [0–9]	3 [0–11]
45 minute	6 [0–11]	5 [0–14]	6 [0–11]	4.5 [0–14]
1 hour	7 [0–14]	7.5 [0–16]	7.5 [0–14]	7 [0–17]
4 hours	20.5 [0–48]	18 [0–37]	21 [0–48]	21 [0–42]
Respiratory rate	Matched		Non-matched	
	South Asian (n = 30)	White British (n = 30)	South Asian (n = 60)	White British (n = 60)
0 minute	16 [10–26]	16 [12–24]	16 [10–26]	16 [12–24]
15 minute	16 [10–28]	16 [12–22]	16 [10–26]	16 [12–22]
30 minute	16 [10–24]	16 [12–20]	16 [10–24]	16 [12–22]
45 minute	16 [8–22]	16 [12–18]	16 [8–24]	16 [12–20]
1 hour	16 [8–20]	14 [12–18]	16 [8–24]	14 [12–20]
4 hours	14 [9–18]	14 [12–20]	14 [9–22]	14 [8–20]
Sedation score	Non-matched			
	South Asian (n = 60)		White British (n = 60)	
0 minute	0 [0–3]		0 [0–3]	
15 minute	1 [0–3]		1 [0–2]	
30 minute	1 [0–2]		1 [0–2]	
45 minute	1 [0–2]		1 [0–2]	
1 hour	1 [0–2]		1 [0–2]	
4 hours	1 [0–2]		1 [0–2]	

PCA: Patient controlled analgesia.

‘sensitive’ to the respiratory depressant effects of opioids. However, after propensity score matching, there were no significant differences in respiratory rates. This suggests that any perceived differences are likely to be attributable to factors accounted for in the propensity score matching process (such as anxiety, depression and chronic pain). Since our sample size was based on differences in pain scores, we cannot discount a smaller effect on sensitivity to respiratory depression, or the effect of other non-recorded covariates.

Our analysis runs counter to some published literature in this area. Previous studies have demonstrated

significant disparities in the management and perception of acute pain between ethnicities.⁴ It has been suggested that these disparities are a consequence of differences in ethnicity between patients and health-care professionals. Smedley argues that this results in ‘a lack of shared values and beliefs’ leading to deficiencies in treatment.⁸ Leicester is an ethnically diverse city with ethnic minorities well represented among medical and nursing staff. According to the UHL¹⁶ workforce report (published in 2013), the ethnic distribution of staff in post was 68%, 17%, 7% and 11% for White, Asian, Black and other ethnicities

respectively. We had originally hoped to be able to study the effect of the ethnicity of recovery room nursing staff on acute pain management in more detail. However, though our PACU nurses are from a variety of ethnic backgrounds, they work in teams that usually include nurses from varied ethnicities at any one time. Hence, we could only identify a handful of patients that were exclusively looked after by nurses of similar or different ethnicities to their own, and so there were insufficient data to analyse this separately. However, our data suggest that in a population with a large proportion of BAME patients, and an institution employing health-care professionals from diverse ethnic backgrounds, ethnicity does not have a major influence on pain assessment and treatment. This may represent greater experience and understanding among staff of dealing with patients from different ethnic groups. It also suggests that 'culture' has a more profound effect on opioid dosing and response than genetics.

We recognise that there are some limitations to our study. The analysis was retrospective and dependent on the accuracy of measurements by different nursing and medical staff. Furthermore, not all data sets were complete, as is common in such retrospective analyses of clinical care. However, we believe that our data show that the impact of ethnicity on analgesic management in our patients is not as great as reported elsewhere, reflecting the cultural diversity of our patient population and staff. Another finding was the difference in length of hospital stay between Asian and White British patients; we did not collect data on the factors that might influence hospital discharge (e.g. time to mobilisation, late post-operative pain or complications, social circumstances) but feel that further work in these areas is required, particularly within the United Kingdom, by a prospective study.

In conclusion, we found no differences in the reporting and management of acute post-operative pain between our South Asian and White British female patients after abdominal hysterectomy in this small, retrospective, single centre case notes review. Caution should be expressed in extrapolating these results in view of the size of this study and the multicultural nature of both our patients and health-care professionals in Leicester. Further work is required to confirm this, both in hospitals or regions where the ethnic diversity among patients and hospital staff is similar, and where it is different.

Declaration of Conflicting Interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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