

## Research Article

# A comparison between use of analgesia between emergency departments in UK and China

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## Abstract

**Objective:** To compare early pain relief treatments for trauma patients between a UK and a Chinese hospital and to improve the patient experience of trauma care in Dongguan People's Hospital.

**Methods:** Review and comparison of data of trauma patients from the Emergency Departments of the Royal Sussex County Hospital and Dongguan People's Hospital from April 2016 to June 2016. We compared injury severity, mortality, use of pain medication type and proportion of use, the success of analgesic intervention as measured by the pain score. Data entry and collation used Microsoft Excel 2007, data analysis using IBM SPSS19.0, according to the data types and research purposes using t test,  $\chi^2$  test or non - parametric test analysis, with  $p=0.05$  as the test level.

**Results:** Analgesia in the UK was given to patients by pre-hospital staff in the UK but not in China. There was no significant difference in ISS score between the two groups. In the UK cohort, patients were older, male and female were equal and more injuries were sustained in body and limbs, while the Chinese Dongguan patients tended to be younger, male and have relatively more head and neck injuries. Brighton and Sussex University Hospital emergency trauma patients were given pre-hospital analgesia by ambulance staff or pre-hospital doctors. In the UK, commonly used medications were intravenous paracetamol, morphine, ketamine and fentanyl, while Dongguan People's Hospital Emergency Department trauma patients received only in-hospital analgesia, using dezocine, tramadol, Rotundine, celecoxib and Lo Finn Den. After analgesia, pain - scores decreased more significantly in UK patients (5.37 to 2.68) against the decrease in Dongguan Hospital (4.66 to 3.72). We ascertained that Dongguan People's Hospital emergency trauma patients pain did improve but to a lesser degree than for patients in the UK.

**Conclusion:** For patients with trauma, giving analgesia promptly can significantly reduce the pain score of patients, improve the patient's medical experience and lead to more humane patient care.

## Introduction

Acute pain is an early and important symptom of trauma. This aspect of the patient's experience has been given more attention as the fifth vital sign, as against focusing predominantly upon blood pressure, pulse, respiratory rate and temperature [1]. Pain can lead to further complications in patients with trauma and potentially to deterioration of the body systems and may possibly lead to life-threatening compromise of the immune system [2]. If too little analgesia is given in the process of emergency treatment, patients may not comply with medical staff for examination and treatment which may further endanger life or limb. Proper treatment of pain and prompt analgesia is therefore an important consideration in modern trauma management [3].

In the UK, analgesia for trauma is considered more important than in Dongguan and China in general. Chinese trauma doctors attach less importance to analgesia in trauma and appear to have thus less familiarity and understanding of analgesic agents than UK doctors, as shown by the lack of reports on the analgesic treatment of acute trauma in the Chinese literature [4].

We were fortunate to visit the Royal Sussex County Hospital in Brighton, UK, where we found in that pre-hospital personnel and emergency physicians attach great importance to the treatment of acute pain in trauma patients. In this article we compare the use of analgesia in our two hospitals, with the aim of encouraging Chinese doctors to provide a better service for patients and improve the treatment of traumatic injury.

## Methods

### Case collection

1.1 UK data collection: In 1989 the British established the Trauma Audit and Research Network, (TARN), which is currently the largest European trauma registration system. This data collects patients with an injury severity Score of 16 or over, and using this data can show individual hospitals if they are below or above the national average for survival in trauma. UK data collected includes injury severity, vital signs, pain scores, drugs given, where patients are sent in the hospital and their outcome [5]. Through our British colleagues from TARN we received data on patients entering the Royal Sussex County Hospital from April 1, 2016 to June 30, 2016. We looked at the use of pain medication during pre - hospital care and in the emergency department resuscitation room

### 1.2 Chinese data collection

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1.3 Guangdong province and Dongguan city have established relatively complete information for the trauma network. We collected data in Dongguan People’s Hospital from April 1, 2016 to June 30, 2016 on patients with the following conditions:

- 1) Trauma patients with unstable vital signs.
- 2) Injuries possibly leading to permanent damage to a limb;
- 3) Patients needing emergency surgery;
- 4) To ICU or specialist for treatment of patients;
- 5) Patients who needed more than 3 days hospitalization due to their medical needs.

Data entry and statistical analysis comparing these two groups of patients were performed using the Microsoft Excel 2007, with statistical software IBM SPSS19.0, according to the respective data [6]. We carried out t tests, Chi squared 2 test and non - parametric test analysis to test the level of p = 0.05.

**Results**

We received data for 172 Emergency Department patients from April to June 2016 from the Royal Sussex County Hospital and 220 cases of patients presenting to the Emergency Department of Dongguan People’s Hospital during this same period. UK patients’ mean age was 57 +/- 24 years, Dongguan People’s Hospital emergency department patients aged 41.1 +/- 18.9 years. Male to female ratio in UK patients was 53 : 47, whereas in Dongguan male to female ratio was 75.:25.

ISS scores were similar for both groups (Table 1).

Patients from Dongguan Hospital tended to be younger, with more head and neck injuries as opposed to UK patients, who were more often elderly and who suffered more limb and torso injuries. (see Table 2). UK patients pre-hospitally received analgesia in the form of intravenous paracetamol and intravenous morphine, occasionally using ketamine for severe cases. Once at hospital, hospital patients in the UK received paracetamol, morphine, ketamine or occasionally fentanyl. Patients in Dongguan did not receive analgesia before reaching hospital. In hospital they commonly received codeine, oral celecoxib, local injection of ropivacaine, intramuscular injection of tramadol, dezocine and Luo Tongding (Table 3 and table 4).

Pain scores the Royal Sussex County Hospital improved after analgesia more significantly than in Dongguan People’s Hospital, indicating a better use of analgesia and better relief of pain (Table 5).

In both groups of patients, collecting this data was occasionally difficult due to the inadequate use of a pre and post –analgesia pain score.

The mortality of the patient groups was similar (Royal Sussex County Hospital 3.5%, Dongguan People’s Hospital 3.6%) (Table 6).

**Discussion**

A comparison of the two groups shows that pre-hospital patients in Dongguan did not receive early analgesia as frequently or to the same degree. Reasons for this appear to be:

**Table 1.** Comparison of the two groups and the GCS and ISS scores between two hospitals

| Variable          | Brighton and Sussex University Hospital | Dongguan People's Hospital | Check value | P value |
|-------------------|---|----------------------------|-------------|---------|
| Age               | 57.0 ± 24.0                             | 41.1 ± 18.9                | -6.609a     | 0.000   |
| Gender            |   |                            | 20.795b     | 0.000   |
| Female            | 81(47.1%)                               | 55(25.0%)                  |             |         |
| Male              | 91(52.9%)                               | 165(75.0%)                 |             |         |
| Cause of injury   |   |                            | 38.718b     | 0.000   |
| stab              | 4(2.3%)                                 | 7(3.2%)                    |             |         |
| Traffic Accident  | 45(26.2%)                               | 109(49.5%)                 |             |         |
| Fall from height  | 32(18.6%)                               | 43(19.5%)                  |             |         |
|                   | 76(44.2%)                               | 38(17.3%)                  |             |         |
| assault           | 5(2.9%)                                 | 9(4.1%)                    |             |         |
| Industrial injury | 10(5.8%)                                | 14(6.4%)                   |             |         |
| GCS score         | 13.25 ± 2.984                           | 11.69 ± 4.520              | -2.401a     | 0.016   |
| 13-15             | 139(80.8%), 14.55 ± 0.704               | 142(64.5%), 14.73 ± 0.533  |             |         |
| 9-12              | 14(8.1%), 10.43 ± 1.089                 | 19(8.6%), 11.00 ± 0.667    |             |         |
| 3-8               | 19(11.0%), 5.79 ± 1.357                 | 59(26.8%), 4.59 ± 1.533    |             |         |
| ISS score         | 14.45 ± 9.331                           | 15.84 ± 13.174             | -0.010      | 0.992   |
| >40               | 4(2.3%), 44.00 ± 3.162                  | 12(5.5%), 56.58 ± 14.450   |             |         |
| 26-40             | 17(9.9%), 1.06 ± 1.733                  | 17(7.7%), 31.06 ± 2.633    |             |         |
| 16-25             | 43(25.0%), 0.00 ± 3.170                 | 65(29.5%), 19.97 ± 3.849   |             |         |
| <16               | 108(62.8%), .54 ± 2.949                 | 126(57.3%), 7.77 ± 3.444   |             |         |

Note: a is Mann-Whitney U check value, b is X2 check value, α=0.05 is inspection level.

**Table 2.** Injury area

| Group  | Injury parts (ISS classification) |               |           |           |           |                 |
|--|-----------------------------------|---------------|-----------|-----------|-----------|-----------------|
|  | Body surface                      | Head and neck | face      | chest     | abdomen   | Limb and pelvic |
| Brighton and Sussex University Hospital(n=172) | 41(23.8%)                         | 53(30.8%)     | 21(12.2%) | 73(42.4%) | 27(27.9%) | 91(53.0%)       |
| Dongguan People's Hospital(n=220)              | 56(25.5%)                         | 151(68.6%)    | 29(13.2%) | 56(25.5%) | 52(23.6%) | 76(35.0%)       |

The above results show limb and pelvic injuries to be major injury areas in Brighton and Sussex University Hospital Accident and Emergency department, while head and neck injuries predominate in Dongguan People’s Hospital Accident and Emergency department.

**Table 3.** Brighton and Sussex University hospital pre-hospital and in-hospital analgesic use

| Type        | Pre-hospital(n=172) | In hospital(n=145) |
|-------------|---------------------|--------------------|
| opioid      | 109(63.4%)          | 100(71.4%)         |
| Paracetamol | 140(81.4%)          | 127(90.7)          |
| others      | 8(4.7%)*            | 36(25.7)*          |

note: \*ketamine 7cases, Entonox 1 case,† fentanyl 36 cases

**Table 4.** Dongguan People's Hospital pre-hospital and in-hospital analgesic use

| Type        | Pre-hospital (n=220) | In hospital (n=160) |
|-------------|----------------------|---------------------|
| ropivacaine | -                    | 20(12.5%)           |
| Lo Finn Den | -                    | 22(13.8%)           |
| Celecoxib   | -                    | 17(10.6%)           |
| Tramadol    | -                    | 11(6.9%)            |
| Dezocine    | -                    | 5(3.1%)             |
| Hyndarin    | -                    | 3(1.9%)             |

**Table 5.** Comparison of pain score of patients

| Group                                   | Pre-hospital pain score |                 |         |       | In hospital pain score |                 |         |       |
|---|-------------------------|-----------------|---------|-------|------------------------|-----------------|---------|-------|
|   | Before analgesia        | After analgesia | z       | p     | Before analgesia       | After analgesia | z       | p     |
| Brighton and Sussex University hospital | 5.64 ± 1.184            | 2.41 ± 1.144    | -14.175 | 0.000 | 5.37 ± 1.124           | 2.68 ± 1.122    | -13.240 | 0.000 |
| Dongguan People's Hospital              | 4.56 ± 1.680            | -               | -       | -     | 4.66 ± 1.691           | 3.72 ± 1.637    | -4.878  | 0.000 |

note: z value is Mann-Whitney U check value, α=0.05 is inspection value.

**Table 6.** Final destination of trauma patients

| Group  | Outcome of the patients |             |           |         |
|--|-------------------------|-------------|-----------|---------|
|  | Observation ward        | admission   | discharge | death   |
| Brighton and Sussex University hospital(n=172) | 15(8.7%)                | 144*(83.7%) | 7(4.1%)   | 6(3.5%) |
| Dongguan People's Hospital(n=220)              | 59(26.8%)               | 148*(67.3%) | 5(2.3%)   | 8(3.6%) |

note: \*coma19cases, +coma59cases

- 1) The belief that using analgesia may decrease pain and thus mask the diagnosis
- 2) Unwillingness to risk starting addiction in a patient especially in those with a possible past history of drug use
- 3) Unconcern about the legalities of using analgesia drugs in some patients
- 4) Concern about the side effects, particularly cardio-respiratory, of some of the analgesia drugs.
- 5) Concern that these medications may interact badly with some patients due to their past medical history.

There are differences in the drugs used in the UK and in Dongguan. European countries attach more importance to the treatment of pain, both pre-hospital and in hospital. The use of ketamine for analgesia relief in selected patients is commonly accepted in Brighton and Sussex University Hospital for acute traumatic pain, usually intravenous but occasionally intramuscular. Commonly used systemic analgesic drugs are paracetamol and morphine, occasionally fentanyl. Doctors in Dongguan People's Hospital are more cautious about the use of opiates in acute trauma, and most of them are used only after the diagnosis is clear. In Dongguan, commonly used intramuscular injection is Luo Tongding, tramadol or dezocine, with intravenous analgesics rarely if ever used.

We considered the commonly held belief that using analgesia will mask the diagnosis of an injured area. In the UK we observed that even after the use of intravenous analgesia such as fentanyl, there was still evidence of pain when the area was palpated.

British trauma patients receive early bedside ultrasound scanning and early CT, whereas this is used much less in Dongguan People's

Hospital. UK trained Emergency Doctors are required to have training in bedside ultrasound scanning to pick up abdominal bleeding or pneumothorax, for example.

Dongguan People's Hospital doctors are hampered in the use of analgesia by considerations of legalities and addiction. There is more bureaucracy and cumbersome paperwork and discussion in relation to Chinese patients and their families before strong analgesia can be given. This is difficult to achieve in the stressful and hurried environment of the Emergency Department.

## Conclusion

Acute traumatic pain by tissue trauma will cause a stress reaction, anxiety and stimulation of the sympathetic nervous system which may lead to hypertension. Severe pain may also cause parasympathetic stimulation leading to bradycardia and hypotension. Thoracic and abdominal trauma may cause shallow breathing and decreased respiratory function, decreased tidal volume and a subsequent decrease in effective ventilation leading to hypoxaemia, while stress reactions can lead to changes in blood viscosity.

The British doctors used emergency intravenous morphine, fentanyl and occasionally oral codeine for acute traumatic pain. For Brighton doctors there are no legal concerns about giving these drugs to patients with trauma as the primary concern is alleviating pain and distress rather than worrying about cumbersome paperwork procedures.

## Summary

Our two samples from the Royal Sussex County Hospital and Dongguan People's Hospital were similar in the ISS score, though differed in the areas most commonly injured.

Differences between the two hospitals in the treatment of acute traumatic injury with respect to analgesia are as follows:

The UK will use strong opiates both for pre-hospital and in-hospital care without concern that this will cause possible addiction.

British doctors are not concerned that the use of strong analgesia will mask the diagnosis of injury in trauma patients.

The use of analgesia in the UK is underpinned by the belief that this will be good for the patient's physiology and that not using analgesia is inhumane.

There is an early use of bedside ultrasound and early use of head to pelvis CT scanning in selected patients with an emphasis on the speed of getting a patient to the CT scanner.

Mortality rates in the two groups were similar but considering the more elderly age of the British patients, where declining body functions lead to a greater chance of dying through trauma, one could say that early and good use of adequate analgesia was one of the means through which the UK patients had a relatively low mortality rate.

As the population ages in China, this is something which doctors in China may well want to consider in the treatment of traumatic injury in the elderly.

We would be very much in favour of relaxing the restrictions upon giving morphine or other strong intravenous opiate medications to trauma patients in China. We believe that this would make our treatment of these patients more humane in more in line with other countries with advanced health care systems.

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