The impact of patient controlled analgesia in the Emergency Department on the prevalence of chronic pain following trauma and non-traumatic abdominal pain

(The CHronIc Pain Study (CHIPS). An opportunistic chronic pain prevalence study of participants enrolled in the PAin SoluTions In the Emergency Setting (PASTIES) study).

M Rockett[1], J E Smith, R Squire, C Hayward, S Creanor, P Ewings, A Barton, C Pritchard, J Benger, on behalf of the PASTIES and CHIPS research team.

1 Department of anaesthetics, Derriford Hospital, Plymouth, UK. Corresponding author (mark.rockett@nhs.net).

Introduction

It is accepted that chronic pain is a common consequence of trauma caused by surgery or following an accident. The incidence of post-surgical chronic pain has been shown to be higher than was previously thought (15% following hernia repair and 30-50% following breast surgery). There are a number of risk factors for the progression of acute pain to chronic pain. These include the type of injury (in particular the presence of nerve injury) and a number of patient-specific factors including sex, age and genetics, anxiety, depression and abnormal coping responses. The evidence for each of these factors varies between studies but the presence of severe acute post-operative pain consistently correlates with the development of chronic pain. Therefore, it would seem possible that improved pain relief in the acute phase following a traumatic injury or during an episode of non-traumatic abdominal pain may reduce the frequency of chronic pain 6 months later. The CHIPS study is an opportunistic, hypothesis-generating chronic pain study, utilizing participants in the PASTIES study populations.

The PASTIES study consisted of two contemporaneous, multicentre, open label randomised controlled trials in patients presenting to the ED and requiring intravenous opioids. One trial included patients with pain from traumatic injuries, the other trial included patients with non-traumatic abdominal pain. Patients with chronic pain were excluded. Patients recorded their pain scores (VAS) every hour for 12 hours. The primary outcome was total pain over 12 hours . These composite pain scores were used in the CHIPS study as a measure of acute pain. It is accepted that poorly managed acute pain is a risk factor for the development of chronic pain.

The CHIPS study was designed (although not powered) to determine whether patient controlled intravenous morphine analgesia (PCA) in the first 12 hours of hospital stay reduced the incidence of chronic pain at 6 months for each of the PASTIES study sub-groups

Method

Questionnaires were sent to PASTIES study participants recruited in the three South West centres (Plymouth, Exeter and Bristol). Questionnaires were sent approximately 6 months following recruitment. Participants were asked to complete the questionnaires and return them within 2 weeks. Further questionnaires were sent if an initial response was not received.

Statistical analysis

The proportion of participants with chronic pain at 6 months was calculated and compared between randomised groups (PCA or treat as usual (TAU)), separately for each pain population (abdominal pain or trauma), using tests of proportions and corresponding confidence intervals. The potential effect of overall pain score over the PASTIES 12 hour trial period (calculated as for the PASTIES trial as the area under the pain score / time curve) and gender on the risk of chronic pain were also considered. The secondary outcomes (BPI, HADS and Quality of Life) were appropriately summarised and compared between those reporting chronic pain and those not reporting continued pain, again separately for each pain population.

Hypothesis

The use of a PCA device to manage an episode of acute non-traumatic abdominal pain or pain from traumatic injury results in a reduction in the risk of chronic pain 6 months later.

Secondary aims

- To assess the impact of composite pain scores in the first 12 hours following enrolment into the PASTIES study on the prevalence of chronic pain at 6 months.
- To assess the impact of chronic pain on quality of life measures.
- To compare the levels of anxiety and depression in patients with and without chronic pain following an acute pain episode.

Primary outcome measure

The presence of chronic pain at 6 months post index event (PASTIES study recruitment). This was defined as a positive reply to the question: Do you continue to experience pain, which you attribute to the injury or episode of abdominal pain you experienced approximately 6 months ago when you attended the Emergency Department?

Secondary outcome measures

- Brief pain inventory (BPI) scores for patients with pain at 6 months.
  Participants with "average pain" scores of 4 or above or "worst pain" scores of 8-10 were defined as experiencing significant chronic pain.
- Quality of life scores for all patients (EQ5D).
- Anxiety and depression (HADS) scores for all patients.

Study variables

- Presence of chronic pain at 6 months following PASTIES trial recruitment.
- Severity and impact of ongoing pain:
  - Brief pain inventory – completed by patients in pain at 6 months as defined above.
  - EQ5D – quality of life measure completed by all patients.
- Hospital anxiety and depression scale (HADS) – completed by all patients.

Results

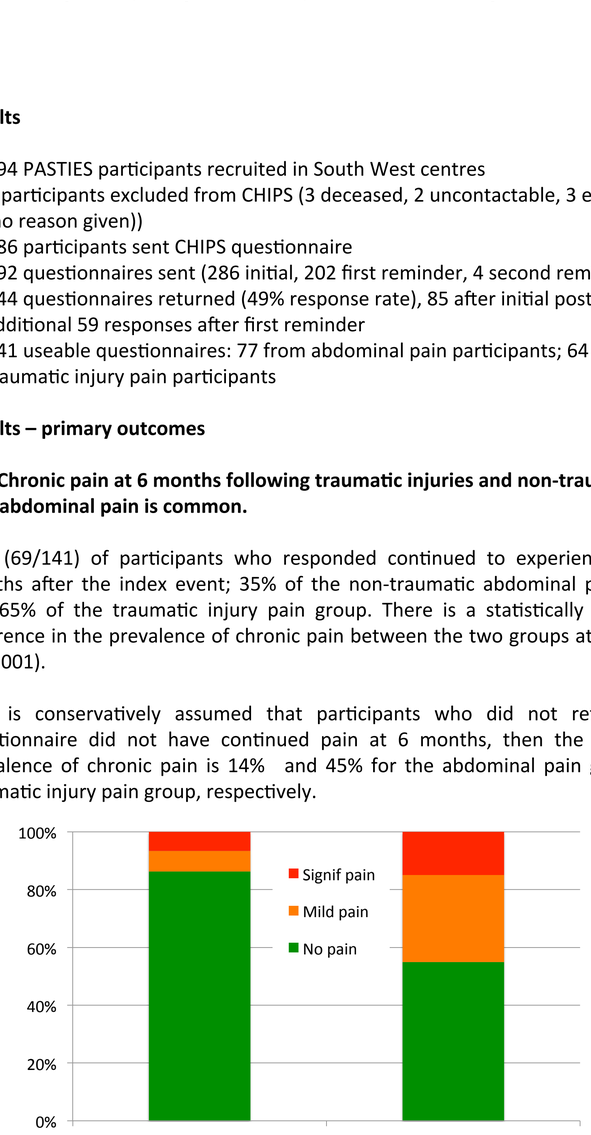
- 294 PASTIES participants recruited in South West centres
- 8 participants excluded from CHIPS (3 deceased, 2 uncontactable, 3 excluded (no reason given))
- 286 participants sent CHIPS questionnaire
- 492 questionnaires sent (286 initial, 202 first reminder, 4 second reminder)
- 144 questionnaires returned (49% response rate), 85 after initial post (30%), additional 59 responses after first reminder
- 141 useable questionnaires: 77 from abdominal pain participants; 64 from traumatic injury pain participants

Results – primary outcomes

(i) Chronic pain at 6 months following traumatic injuries and non-traumatic abdominal pain is common.

49% (69/141) of participants who responded continued to experience pain 6 months after the index event; 35% of the non-traumatic abdominal pain group and 65% of the traumatic injury pain group. There is a statistically significant difference in the prevalence of chronic pain between the two groups at 6 months ($p<0.001$).

If it is conservatively assumed that participants who did not return their questionnaire did not have continued pain at 6 months, then the estimated prevalence of chronic pain is 14% and 45% for the abdominal pain group and traumatic injury pain group, respectively.



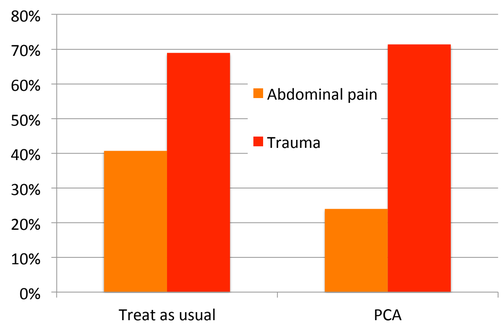
(Significant pain is defined as BPI average pain ≥4 or BPI worst pain ≥8. Abdominal pain group N= 182, trauma group N=104).

(ii) The early use of PCA did not significantly reduce chronic pain at 6 months in either the non-traumatic abdominal pain group or traumatic injuries pain group.

Amongst the abdominal pain respondents, 25% of PCA participants reported chronic pain compared to 41% of TAU participants (p=0.183).

Amongst the traumatic injury pain respondents, 71% of PCA participants reported chronic pain compared to 69% of TAU participants (p=0.830).

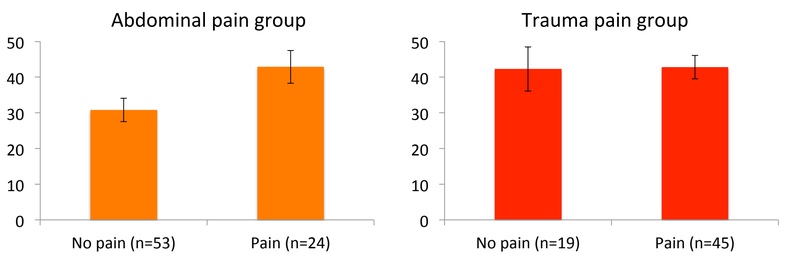
Percentage of respondents reporting chronic pain by treatment group



(iii) Chronic pain at 6 months is significantly associated with higher acute pain scores over the first 12 hours for the non-traumatic abdominal pain group, but not for the traumatic injuries pain group.

For the non-traumatic abdominal pain group, respondents reporting chronic pain had significantly higher total 12 hour pain score (PASTIES data) compared to those not reporting chronic pain (p=0.039, 95% CI for difference (continued pain minus no continued pain) of 0.7 to 23.6).

Mean 12 hour total acute pain score (+/- SEM) versus chronic pain at 6 months



(iv) No significant association between gender and incidence of chronic pain in either pain group.

For the non-traumatic abdominal pain group, 19% of males and 38% of females reported continued pain at 6 months (p=0.078). For the traumatic injury pain group, 78% of males reported continuing pain at 6 months and 59% of females (p=0.098).

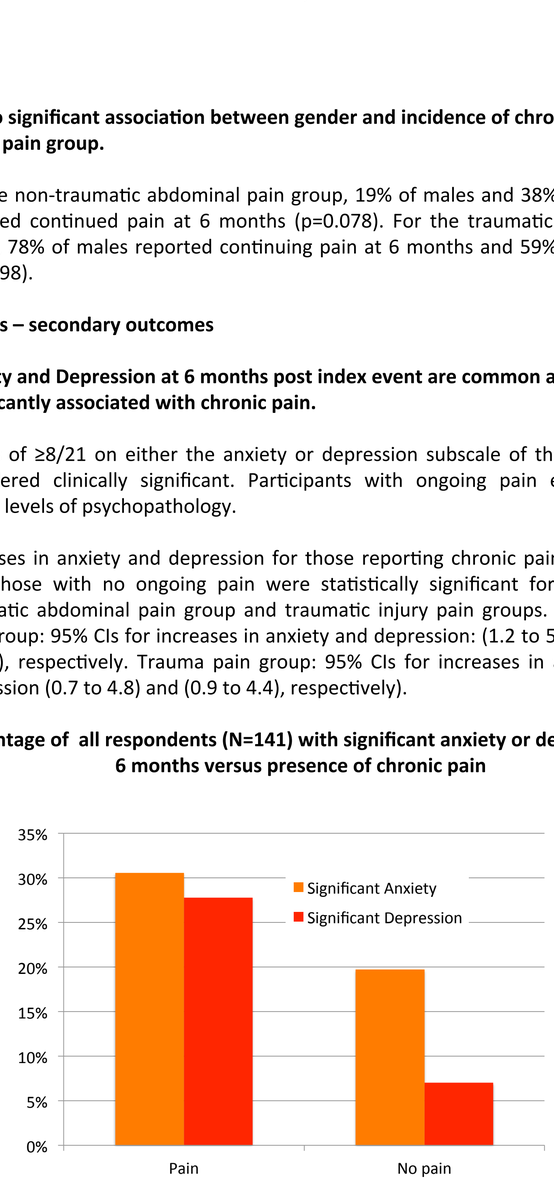
Results – secondary outcomes

Anxiety and Depression at 6 months post index event are common and significantly associated with chronic pain.

Scores of ≥8/21 on either the anxiety or depression subscale of the HADS are considered clinically significant. Participants with ongoing pain experienced higher levels of psychopathology.

Increases in anxiety and depression for those reporting chronic pain compared with those with no ongoing pain were statistically significant for both non-traumatic abdominal pain group and traumatic injury pain groups. (Abdominal pain group: 95% CIs for increases in anxiety and depression: (1.2 to 5.2) and (1.1 to 5.5), respectively. Trauma pain group: 95% CIs for increases in anxiety and depression (0.7 to 4.8) and (0.9 to 4.4), respectively).

Percentage of all respondents (N=141) with significant anxiety or depression at 6 months versus presence of chronic pain



EQ5D Quality of life measures

The EQ5D was used to provide quality of life data. Overall health status was statistically significantly lower for participants with chronic pain for both groups (Abdominal pain group: p=0.029; Traumatic Injury pain group: p<0.001). Chronic pain also had a significant effect on mobility for both groups. For the traumatic injury pain group, mobility was impaired for 90% of participants with chronic pain versus 10 for those without ongoing pain (p=0.008). For the non-traumatic abdominal pain group, 69% of participants with chronic pain stated they had reduced mobility versus 31% without ongoing pain (p=0.002).

Discussion

The CHIPS study has revealed the significant burden of chronic pain following admission to hospital with pain from traumatic injuries or non-traumatic abdominal pain. This is the first study designed to investigate the incidence of chronic pain in an ED population without pre-existing pain problems, and to characterise that pain and its impact on well-being.

Chronic pain following acute abdominal pain was common (at least 14% with 7% significant chronic pain). The impact of gender on the prevalence of chronic pain was not statistically significant, but the proportion was higher in female participants (38% vs 19% of those who replied). Anxiety and depression were higher in patients with chronic pain, and overall health status lower. Interestingly, mobility was also impaired by chronic pain in the non-traumatic abdominal pain group. Chronic pain was significantly more common in patients who had experienced more severe acute pain. Fewer patients experienced chronic pain if treated with a PCA, although this was not statistically significant. These findings are perhaps not surprising, as severe acute pain is known to be a strong predictor of chronic pain in the surgical setting.

A different picture was seen in participants with pain from traumatic injuries. The prevalence of chronic pain in this group was significantly higher than in the non-traumatic abdominal pain group (at least 45%, 15% significant chronic pain). Acute pain scores did not differ from patients with non-traumatic abdominal pain, but it would seem that chronic pain was a much more common outcome for this group. The severity of acute pain or the use of PCA did not correlate with the presence of chronic pain for the traumatic injuries pain group. Those participants with chronic pain were significantly affected, with lower quality of life scores, higher rates of significant anxiety and depression, and significant interference with mobility.

Conclusion

Chronic pain is common following ED admission with acute pain in those with no prior history of long-term pain. Substantial numbers of individuals will be affected by significant chronic pain, resulting in a low quality of life and psychological illness. It would seem that, for the non-traumatic abdominal pain group at least, it is imperative to manage acute pain effectively to reduce the incidence of chronic pain and disability. Participants presenting with pain due to traumatic injuries frequently suffer chronic pain, but there appears to be a lack of correlation between the severity of acute pain and chronic pain prevalence in this group. This finding warrants further study.

Leading with excellence, caring with compassion

Acknowledgements:
The PASTIES study was funded by the National Institute for Health Research (NIHR)'s Research for Patient Benefit (RfPB) Programme, grant reference number PB-PG-0909-20048. The views expressed are those of the author(s) and not necessarily those of the NHS, the NIHR or the Department of Health. The CHIPS study was funded by the NIAA Wiley-Blackwell Anaesthesia Research Grant Number WKR0-2011-0073. Both studies were supported by the Peninsula Clinical Trials Unit.