

Pain Management in Trauma Surgery

INTRODUCTION

Trauma patients range from healthy children and adults to frail elderly ones. Pain management in the elderly can be challenging as these patients often present with other co-morbidities. Polytrauma patients, delayed admissions, substance abuse and psychological issues may also result in complication of care.

Appropriate pain management is a patient's right. It also helps early healing, reduces chronic pain and can lead to a shorter hospital stay.¹

Pain relief is based on the WHO analgesic ladder (Figure 1). This helps to prescribe analgesia in a stepwise fashion and in doing so prevents unwanted adverse effects from using strong opioids.

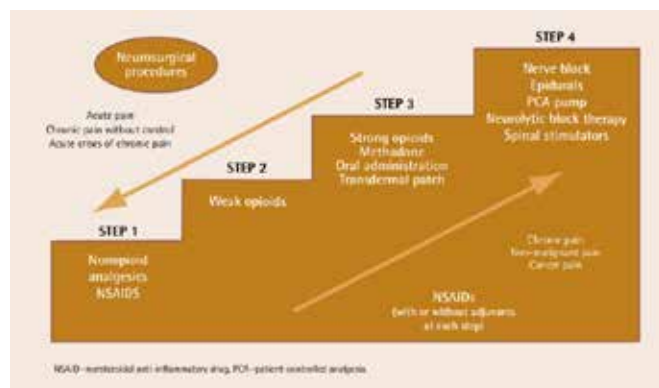


Figure 1. World Health Organization Analgesic Ladder.²

BACKGROUND AND AIM

A multitude of patients are admitted to Mater Dei Hospital (MDH) each day in view of fractures and soft tissue trauma. For each trauma admission, the doctor on call should complete a clerking sheet. A section of this clerking sheet includes analgesia prescribed at the time of admission; both for regular and as needed (PRN) analgesia. If analgesia is not prescribed adequately, on call doctors would tend to be contacted at a later stage, in view of patients complaining of pain and without a direct pain control plan. Apart from analgesia, other medications are prescribed, as appropriate, to help mitigate the side-effects of certain analgesics such as laxatives and anti-emetics.

This prospective audit is aimed to study current analgesia prescribing trends in trauma patients admitted at MDH. This audit will therefore attempt to improve the adequacy of analgesia prescribed in new admissions at MDH. Paediatric patients have been excluded.

ETHICS

Before commencing this audit, approvals from the Chairperson of the department of Trauma and Orthopaedics, and the data protection department at MDH (Ref. no. 270A/21) were granted. An audit engagement form as well as a consent form were appropriately devised and handed over to all participants.

METHOD

Treatment charts were reviewed from all trauma admissions (64 patients) over 2 weeks between 20th September 2021 and 2nd October 2021. Table 1 lists the inclusion criteria. Patients ≥ 18 years were included from the MDH online trauma list. Patients which had been diagnosed with liver or renal impairment were excluded. Each patient's blood tests were checked and assessed if a liver profile was taken anytime in the three months preceding admission. If they were deranged according to recommended ranges, the patient has been excluded. If no LFTs were found, the patient's clinical visits were assessed on the hospital's intranet to conclude if the patient was followed up for a liver problem. Also, during data collection, admitting consultants and ward location were kept anonymous. This was important to decrease bias and make the results more reliable.

Exclusions
Patients with hepatic or renal impairment: deranged LFTs, C+U in the three months preceding admission
Pregnancy
Patients taking chronic pain control medications

Table 1. Exclusion criteria.

A proforma was prepared (Figure 2) to aid in data collection following a comprehensive literature review. This included patients' details, type and mechanism of injury and operative management – if not treated conservatively. Each patient was also asked to score the level of pain felt pre-operatively and post-operatively using a suitable numerical pain score scale (Table 2) which was adopted from MDH's Anaesthesia department. It was decided that day 1 post op was to be taken for each patient to minimise the differences between patients as some may have been discharged after day 1. Apart from this score, the participants were asked if the analgesia prescribed was enough to control the pain. These 2 questions were asked to each patient every day until day of discharge. All analgesia prescribed pre-operatively and post-operatively along with any updates throughout their admission were recorded on this same proforma. During data collection, to include further post-operative days, page 4 of the proforma was re-printed, and dates filled in accordingly.

Pain score out of 10	Description of the pain
0	No pain
2-3	Mild
4-5	Moderate
6-7	Severe
7+	Extreme

Table 2. Pain Score Scale.

Pain Management for Trauma Surgery Proforma

SPTAR MATER DEI

Patient Name		
ID No.	D.O.B.	Age
Admission Date	Orthopaedic 1st Assessment Date	
Ward	Orthopaedic Consultant	

Trauma Type	
Description	
Site	

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SPTAR MATER DEI

Past Medical History			
Diabetes Mellitus ☐	Asthma ☐	Thyroid Pathology ☐	
Hypertension ☐	Chronic Kidney Disease ☐	Rheumatoid Arthritis ☐	
Ischaemic Heart Disease ☐	Epilepsy ☐	Parkinson's Disease ☐	
COPD ☐	TIA/CVA ☐	Dementia ☐	
Previous Fracture			
Other			

Past Surgical History			

Previous Anaesthesia	Y	N	Not Sure
Anaesthetic Complications			

Social History	
Smoker Y N	_____ cigarettes per day for _____ years from age _____
Alcohol Y N	Units/day _____
Home status	Alone ☐ With Someone ☐
Mobility	Independent ☐ Assisted ☐ Dependent ☐
Mobility Aids	☐

Drug History	

Drug Allergies

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SPTAR MATER DEI

Pain Pre-Operatively – Date: ____/____/____			
Pain scale score: ____/10 *for pain scale, please turn over page			
Pain description:			

Management drug	Dose	Route	Frequency
1.			
2.			
3.			
4.			
5.			

How was pain managed by this Rx?

Operation	
Procedure Description	Date
Anaesthesia General Anaesthesia ☐ Local Anaesthesia ☐ Regional Anaesthesia ☐ No Anaesthesia ☐	
Intra-Op Complications	
Early Post-Op Complications	
Post-Op Plan	

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Pain Post-Operatively – Date: ____/____/____

Pain scale score: ____/10 **for pain scale, please see below*

Pain description:

Management drug	Dose	Route	Frequency
1.			
2.			
3.			
4.			
5.			

How was pain managed by this Rx?

For scaling pain: *[From Mater Dei's Anaesthesia Dept.]*

1) Obtain a pain score (0-10) 'if 0 is no pain at all and 10 is the worst pain you can imagine, what is your pain score right now?'

2) If pain score cannot be obtained, then try with a verbal response scale

"How severe is your pain?"	"Kemna ha qawwi fuqiegħ?"	Score
A) Mild	A) Minus qawwi	2-3
B) Moderate	B) Moderat	4-5
C) Severe	C) Qawwi	6-7
D) Extreme	D) Qawwi immens	7+

3) Call anaesthetist if in doubt or if not even a verbal response scale can be used

– END –

This proforma is owned by Mr. Kurnein Saric, Dr. Christine Vella and Dr. David Borg, and its purpose is to aid in the orthopaedic audit on 'Pain Management for Trauma Surgery'.

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Figure 2. Pain Management Proforma.

RESULTS

The initial recruitment was that of 66. After considering exclusion criteria, 64 patients were considered for evaluation. These patients had been admitted to MDH in view of admissible trauma.

All information was inputted on a spreadsheet for analysis (Figure 3). Some patients were discharged after Day 1 post-operatively. In keeping with this, to decrease bias and help in the data comparison, it was decided that only day 1 post-operatively was to be taken into consideration for all patients. Pain score means were calculated and compared according to the classifications shown in tables 3 and 4. The numbers between tables 3 and 4 differ because 6 fracture patients did not require a procedure.

Classification		Total	Mean Pre-operatively
Total		64	5.73
Trauma type	Soft tissue	19	4.68
	Fractures	45	6.18
Gender	Male	33	5.45
	Female	31	6.03

Table 3. Mean Pain Score Pre-operatively.

Patient Number	Diagnosis	Pain Scale Score out of 10		Pain Treatment				Other	Surgical Procedure Performed
		Pre-Operative	Post-Operative	Paracetamol	Codewine	Diclofenac sodium	[POST-OP CHANGES IN RED] Oromorph		
1	Right proximal tibial comminuted fracture w/ displacement	8	4	1g QDS PO	30mg TDS PO		10mg/5ml PRN TDS		ORIF
2	Right intertrochanteric fracture	8	4	1g QDS IV	30mg TDS PO				DHS
3	Right humerus mid-shaft comminuted fracture w/ displacement	5	6	1g QDS PO	30mg TDS PO				IM nail
4	LCW left tibia	8	4	1g QDS PO					Washout and closure
5	LCW left foot	2	2	1g QDS PO					Washout and closure
6	LCW left forearm	6	2	1g QDS IV					Washout and closure
7	Right intertrochanteric fracture	9	6	1g QDS PO	30mg TDS PO				DHS
8	LCW right forearm	4	3	1g QDS PO					Washout and closure
9	Right elbow fracture w/ dislocation	5	4	1g QDS PO					ORIF
10	Right leg wound sore after traumatic fall	10	3	1g QDS PO -> IV	30mg TDS PO				Debridement of wound
11	Cellulitis right forearm	0	0	1g QDS PO					nil
12	Infected sebaceous cyst right forearm	2	0	1g QDS PO					Incision and drainage
13	Cellulitis right lower limb	3	1	1g QDS PO					nil
14	Left intertrochanteric fracture	8	4	1g QDS PO	30mg TDS PO				PFN
15	Right intertrochanteric fracture	4	2	1g QDS PO	30mg TDS PO				DHS
16	Right trimalleolar fracture	5	2	1g QDS PO	30mg TDS PO				ORIF
17	RA painful episode right knee	8	4	1g QDS PO	30mg TDS PO	50mg TDS PO	10mg PRN/TDS PO		THR
18	Right intertrochanteric fracture	9	4	1g QDS IV	30mg TDS PO		10mg PRN/TDS PO		DHS
19	Pelvic crush injury	8	1	1g QDS IV					nil
20	Right intertrochanteric fracture	6	4	1g QDS PO	30mg TDS PO				DHS
21	Right patellar fracture	7	1	1g QDS PO	30mg TDS PO	50mg TDS PO			Tension band wiring
22	Left intertrochanteric fracture	8	4	1g QDS PO	30mg TDS PO				DHS
23	Left mid clavicle fracture	5	1	1g QDS PO	30mg TDS PO				nil
24	Wound dehiscence post quadriceps repair	8	7	1g QDS PO					Revision of sutures
25	Right trimalleolar fracture + patellar dislocation	4	3	1g QDS PO	30mg TDS PO			Entonox PRN PO	ORIF
26	Painful prominent retrograde IM femoral nail	10	4	1g QDS PO		50mg TDS PO	10mg PRN/TDS PO	Morphine PCA pump IV	Re-do nail
27	Left patellar fracture	7	5	1g QDS PO	30mg TDS PO				Tension band wiring
28	Left subcapital fracture	8	5	1g QDS PO	30mg TDS PO				THR

Figure 3. Google spreadsheet used for data collection. Key: Red rows - Fractures; Blue rows: Soft tissue trauma; Orange cells - no procedure done.

Classification		Total	Mean Day 1 Post-operatively
Total		53	3.68
Trauma type	Soft tissue	14	2.86
	Fractures	39	3.97
Gender	Males	26	2.67
	Females	27	3.45

Table 4. Pain Score Mean Day 1 Post-operatively.

It was recorded that in almost all cases, post-operatively pain was controlled better than that before the procedure.

Fractures

A pre-operative pain score mean of 6.18 signifies that the average patient admitted due to a fracture had a pain level described as 'Severe' (Table 2). Despite this, 31.1% of these patients were not prescribed a second analgesic and left only on paracetamol. Figure 4 illustrates what patients were prescribed as a percentage over total fracture admissions. Codeine with paracetamol represents the most common combination of analgesia.

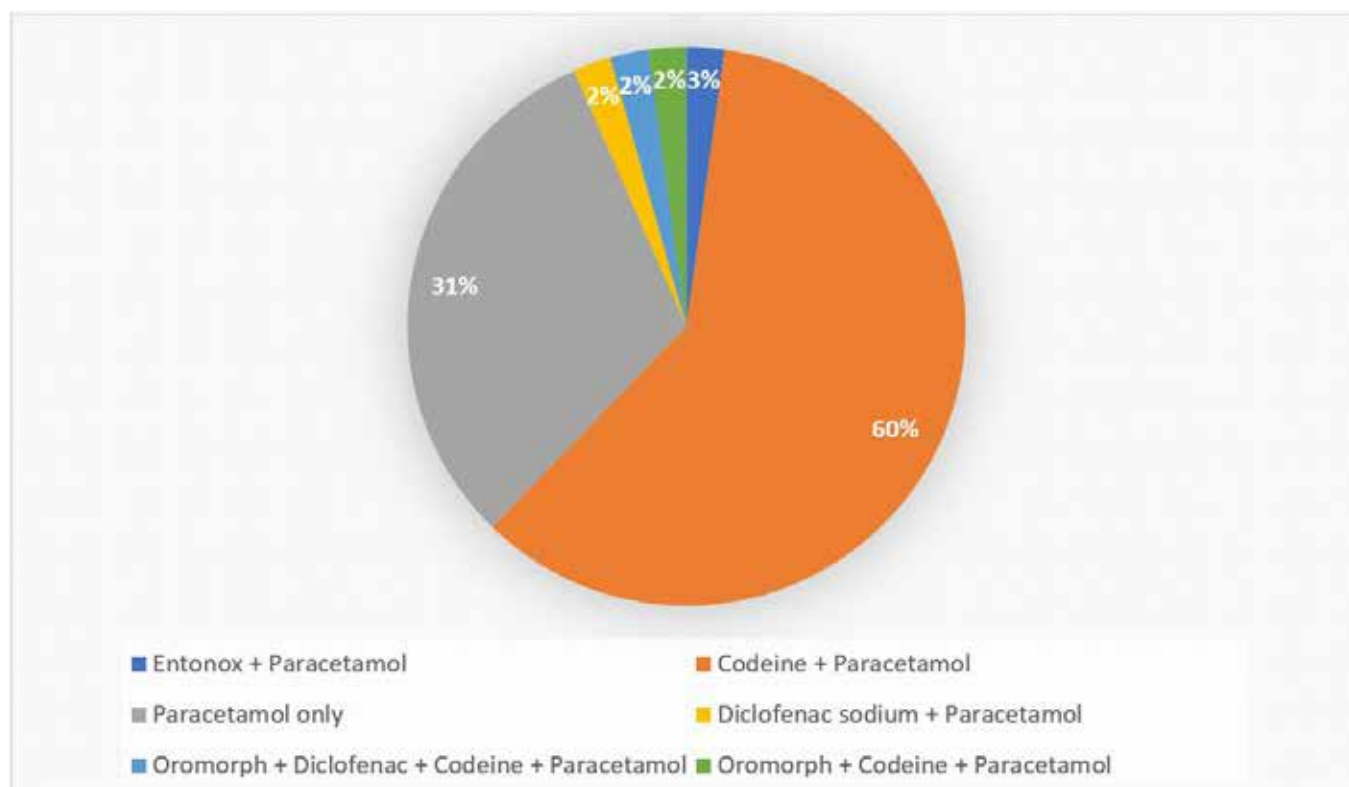


Figure 4. Pie chart demonstrating analgesia prescribed pre-operatively for fractures. [Entonox is a gas mixture composed of 50% nitrous oxide and 50% oxygen].

Soft tissue trauma

A mean of 4.68 signifies that the average soft tissue trauma patient had a pain level described as 'moderate' (Table 2). Paracetamol was the analgesic of choice for soft tissue trauma patients, being prescribed in 68.4% of the total number of patients pre-operatively. 63% of the population was prescribed paracetamol only, whilst 5% were managed with paracetamol and codeine. Despite

the fact that only one analgesic was administered in the majority of patients, most of these patients' pain improved post-operatively, where the mean pain score was at 2.86 - described as 'discomforting' or 'mild'. Figure 5 shows a pie chart illustrating what patients were prescribed as a percentage over total soft tissue trauma admissions pre-operatively.

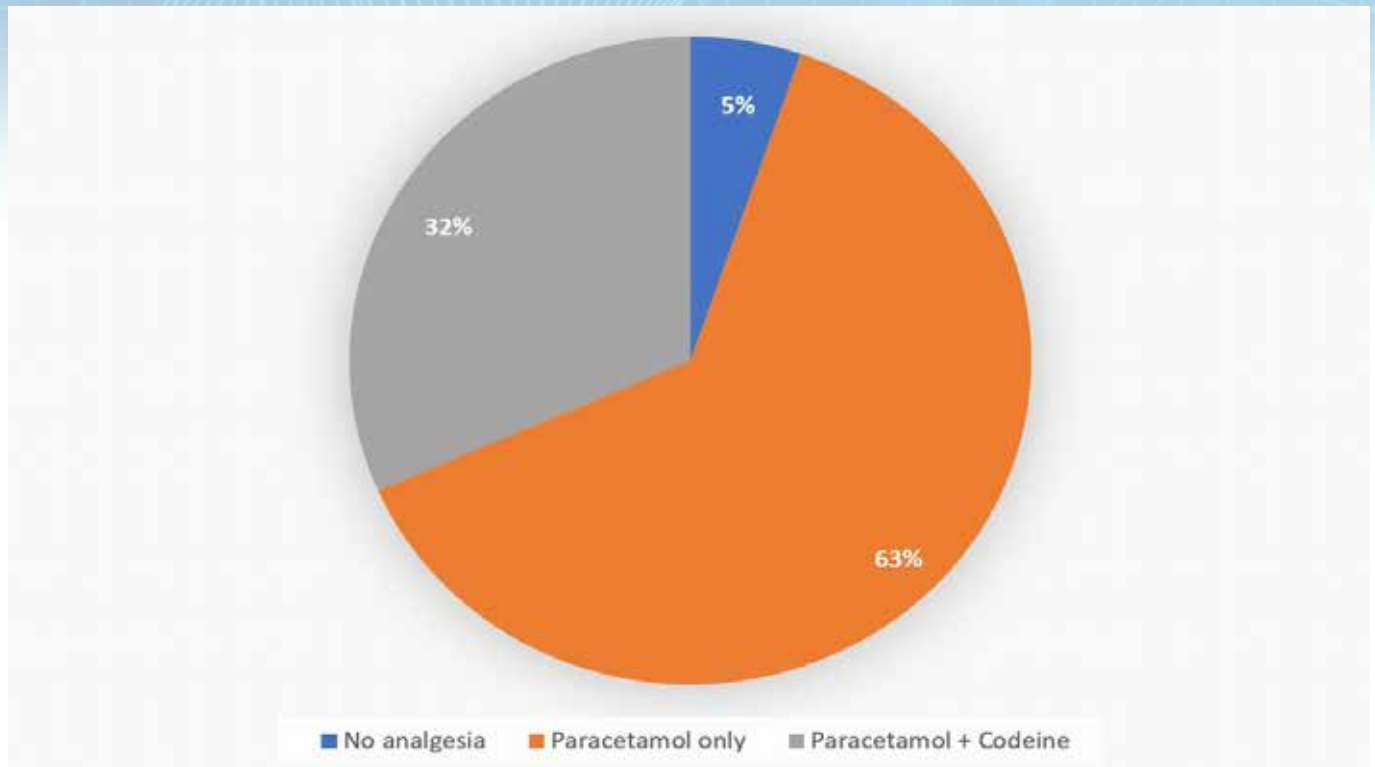


Figure 5. Pie chart demonstrating analgesia prescribed pre-operatively for soft tissue trauma patients.

Gender

In fractures, 20 males and 25 females had mean pain scores of 5.75 and 6.44 respectively. In soft tissue trauma, 13 males and 6 females had a mean pain score of 5 and 4 respectively.

Age

The patients were further categorised into age groups as shown in Figure 6. It was noted that there was no trend in pain score when comparing these age groups. Table 5 represents the number of patients per age group.

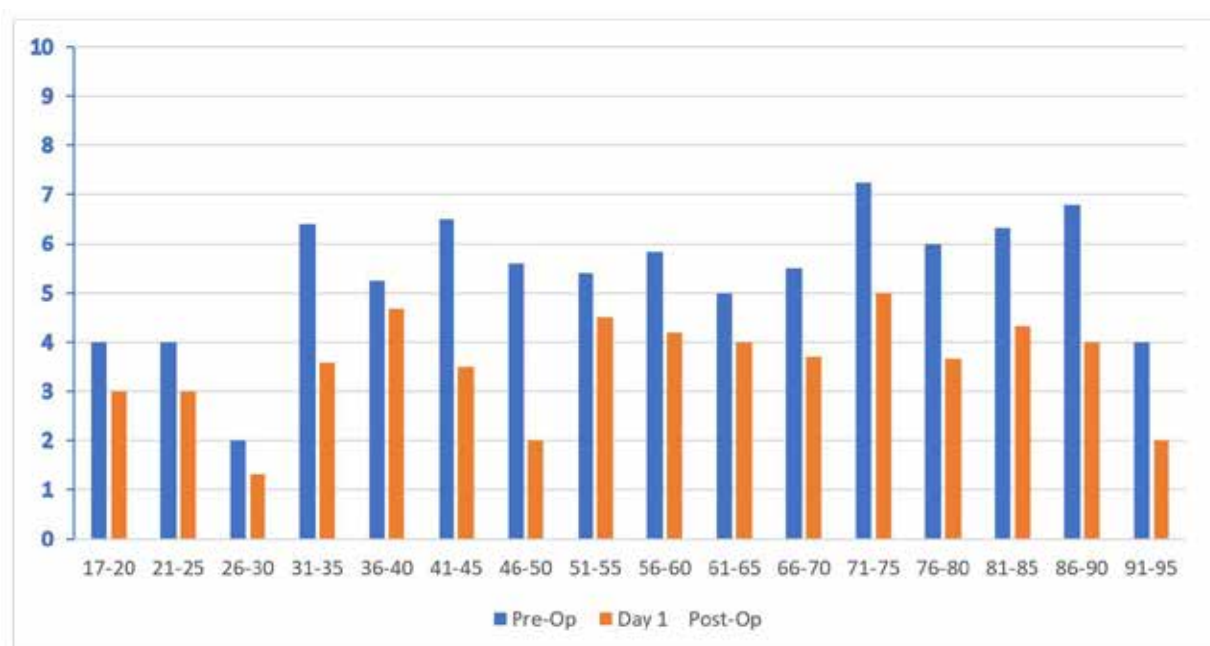


Figure 6. Illustrating pain score on y-axis against ages on x-axis.

Age	Total		Age	Total	
	Pre-Op	Day 1 Post-Op		Pre-Op	Day 1 Post-Op
16-20	1	1	56-60	6	5
21-25	1	1	61-65	2	2
26-30	3	3	66-70	8	7
31-35	5	5	71-75	8	6
36-40	4	3	76-80	4	3
41-45	2	2	81-85	3	3
46-50	5	5	86-90	5	4
51-55	5	2	91-95	2	1

Table 5. Total population per age category.

LIMITATIONS

- Lack of detailed categorization: The patients were not categorized in detail according to the type of fracture or soft tissue trauma, which limits the ability to compare pain scores between different types of trauma. Moreover, categorization could aid in the comparison of genders and ages and increase accuracy.
- Small cohort size which limits the ability to draw conclusions about the relationship between age and pain scores.
- The audit only considered the use of analgesics and did not evaluate other pain management techniques such as physical therapy or nerve blocks, which also play a role in managing pain in trauma patients.

RECOMMENDATIONS AND WAY FORWARD

Pain is very subjective. It is important to use a stepwise approach when prescribing analgesics depending not only on the patient's pain score but also on the type of trauma the patient experiences. The patient needs to be subsequently monitored for adverse effects to alter treatment if need be as per established guidelines.² In keeping with this it is recommended that future studies include a follow-up period after the patients have been discharged from the hospital, which would enable an assessment of the long-term effects of the analgesia, including adverse effects, prescribed for pain control.

RECOMMENDED ANALGESIA FOR ADULT TRAUMA ADMISSIONS

The authors found that analgesia was administered as recommended by the WHO analgesic ladder.²

- Mild pain: oral/IV paracetamol
- Moderate pain: Oral/IV paracetamol and codeine
- Severe pain: Oral/IV paracetamol, codeine and PO/IV morphine

Adverse reactions can be mitigated by administering the medications at appropriate time intervals, with food, and if necessary, with appropriate medication example antiemetics, antacids, and laxatives.

Fractures have a higher overall pain score average and therefore should be treated differently compared to soft tissue trauma. For this reason, it is suggested that these patients are immediately started on oral or intravenous paracetamol, with codeine administered every 8 hours as well as oral morphine as needed (PRN), and if not contraindicated. On the other hand, soft tissue trauma admissions should be started on oral/IV paracetamol with codeine prescribed as needed as the first step.

NSAIDS given to supplement pain relief should be used with caution as they have been associated with delayed bone healing. NSAIDS should not be offered to frail or elderly patients as these increase risk of gastrointestinal bleed and renal function impairment.³

CONCLUSION

Recognising and assessing pain is crucial for proper pain management. The administration of pain medication should be based on prescribing the most effective drug for the patients which has the least adverse effects when considering the patient's parameters.

In view of the above pain score means, pain management can be improved especially for patients admitted with fractures. Regular assessment of the pain score would help alter a patient's analgesic treatment as needed. Having guidelines which one can follow can help to strategically treat pain according to the patient's needs.

In 2023 posters containing the Pain Management Proforma will be handed out to orthopaedic staff at MDH including doctors and ward nurses, and distributed in all orthopaedic wards. An email containing the poster itself and accompanying instructions will be disseminated to all doctors working at MDH to make sure these changes are implemented. A re-audit will be done five months after this is implemented to ensure the required improvements are making effect.

References

1. Ahmadi A, Bazargan-Hejazi S, Heidari Zadie Z, et al. Pain management in trauma: A review study. *J Inj Violence Res* 2016;8:89-98.
2. Yang J, Bauer BA, Wahner-Roedler DL, et al. The Modified WHO Analgesic Ladder: Is It Appropriate for Chronic Non-Cancer Pain? *J Pain Res* 2020;13:411-417.
3. Pountos I, Georgouli T, Calori GM, et al. Do Nonsteroidal Anti-Inflammatory Drugs Affect Bone Healing? A Critical Analysis. *Scientific World Journal* 2012;2012:606404.