

Appendix 1. Acupuncture treatments provided to the patients

1. Acupuncture rationale

1a) Style of acupuncture: Classical meridian theory and Western Medical Acupuncture

1b) Reasoning for treatment provided: The acupuncture prescription mainly intended to relieve acute pain after trauma or surgery, enhance gastric motility, prevent nausea and vomiting induced by opioid medication, ameliorate anxiety after traumatic events and foster physical recovery as well as manage pain after discharge. These intended effects have been suggested by several clinical and preclinical studies. In Traditional East Asian Medicine, these effects has been expressed as the results of the treatment principle of “harmonising qi and treat shen (調氣治神)” and “Invigorating blood and dissolving stasis (活血祛瘀)”. Treatment regimen was flexible and was at the discretion of the study Korean Medicine Doctor (KMD).

2. Details of needling

2a) Number of needle insertions per subject per session: flexible based on the condition of the patient (up to 30, approximately)

2b) Names (or location if no standard name) of points used: points included, but not limited,

- upper extremity: ST36, ST37, ST34, SP10, SP6, GB39, LR3 and GB41

- lower extremity: LI11, TE5, PC6 and LI4

- abdomen: CV12, ST25, CV4 and CV6

- ear and head: ear Shenmen, ear Lung and EX-HN3 (Yin-tang)

- local A-shi points (shoulder and peri-incisional area)

- Acupuncture needles were located bilaterally when available, except on ear points and those on CV meridian.

2c) Depth of insertion: around 1 to 2 mm (e.g., on ear and head points) to around 30 mm (on points located on the extremity such as ST36)

2d) Response sought: De-qi response such as numbness and dull sensation on and around the needled points were sought for some of manually stimulated points. This response was not mandatory for all points. For electroacupuncture stimulation, visible muscle twitch or sensation of mild-level electricity by the patient was required.

2e) Needle stimulation: For manual stimulation, clockwise and anti-clockwise rotational technique was applied just after the penetration. Alternating frequency (i.e., 2 to 100 Hz) of electrical stimulation within comfortable intensity (model no. ES-160, ITO, Tokyo, Japan) was applied.

2f) Needle retention time: around 20 to 30 minutes per each session

2g) Needle type: 0.25 mm x 40 mm (or 0.30 mm x 60 mm), sterilized, disposable needles (Dongbang Inc., South Korea) were used for points on abdomen or extremity. For ear and head points, 0.20 mm x 30 mm needles were used.

3. Treatment regimen

3a) Number of treatment sessions: The number of treatments varied between 2 and 49 during admission. The number of treatments after discharge varied between 1 to 16.

3b) Frequency and duration of treatment sessions: twice weekly during admission and 1 to 3 after discharge

4. Other components of treatments

4a) Details of other interventions administered to the acupuncture group: A PC6 wristband (Model WB-DL150 Hour Device, Neurowave Medical Technologies LLC, Chicago, Illinois, USA) which provides transcutaneous electrical stimulation was added for prevention or controlling nausea and vomiting due to opioid medication. Other acupuncture-related interventions such as cupping or moxibustion were not administered. An educational leaflet written in plain Korean language was provided to patients and caregivers to inform them on the nature and the expected prognosis of traumatic multiple rib fractures, components of multidisciplinary care, explanation on the acupuncture treatments and instructions to the self-exercise of respiratory rehabilitation.

4b) Setting and context of treatment: an inpatient trauma ward and the outpatient clinic in the regional tertiary hospital. Explanation on the general expected prognosis of the recovery and advice on pain-coping self-strategy such as applying local heat therapy at home was provided during clinical encounter; however, neutral attitudes on the benefits of acupuncture was strictly adhered.

5. Practitioner background: a study KMD with 15 years of clinical experience

6. Control or comparator interventions: no control group

Appendix 2. Use of opioid and other healthcare resources after discharge

	3 months (n=19)	6 months (n=17)
Use of opioid	8 (42%)	3 (18%)
MME per prescription among opioid user (mg/day)	37.5 [37.5, 47.5]	37.5 [18.8, 46.9]
Gabapentinoid	6 (31%)	3 (18%)
Regional anaesthesia (nerve block)	0	0
Non-pharmaceutical intervention	9 (47%)	5 (29%)
Non-medical resources	4 (21%)	4 (24%)

MME; morphine milligram equivalents

Non-opioid medication refers to paracetamol, muscle relaxants, and gabapentinoids.

Non-pharmaceutical intervention refers to acupuncture by Korean medicine doctors and physical therapy.

Non-medical resources refer to massage, dietary supplements, and other non-medical type interventions.