POP and other risk factors are associated with CPSP (ANZCA, 2010; Kehlet et al, 2006; Macrae, 2008). The effects of unrelieved postoperative pain are outlined in Table 2. Prompt identification is therefore essential and nurses must have an understanding of the nociception of pain if POP and CPSP are to be accurately identified and effectively managed.

Table 3 lists the risk factors associated with CPSP.

**NOCICEPTION**

Nociception is the term used to describe the neural processes by which a noxious substance or a tissue damaging event such as surgical incision is perceived as pain (Fig 1). Nociception involves a complex interaction between the peripheral nervous system (PNS) and the central nervous system (CNS). This goes through four stages: transduction; transmission; perception; and modulation.

The tissue damage caused by surgery results in the nociceptive system operating in a “sensitised state” to encourage behaviours that guard the wound from further damage, thus promoting wound healing (Johnson, 2009) (Table 4).

**Transduction**

Noxious stimuli associated with surgery are detected in the PNS by nociceptors of the A delta and C fibre peripheral sensory afferent nerves. These are distributed throughout the body in the skin, muscles, joints and viscera, and respond to a range of noxious stimuli that are associated with surgery. These are:● Mechanical stimuli, for example, surgical incision, pressure from swelling, inflammation and extravasation;● Thermal stimuli, for example heat from inflammation;● Chemical stimuli, for example chemicals released in response to tissue damage, inflammation, ischaemia and infection, and wound cleansing agents.

Transduction occurs when these noxious stimuli initiate the release of chemical mediators such as cyclo-oxygenase-2 (Cox-2) and substance P. These chemical mediators activate and sensitise the nociceptors to noxious stimuli, resulting in peripheral sensitisation (Table 4). This sensitised nociceptive state produces allodynia (pain due to a stimulus which does not normally provoke pain) and hyperalgesia (an increased response to a stimulus which is normally painful) (Johnson, 2009).

**Modulation**

Responses to pain

- Emotional
- Autonomic
- Movement
- Motivational
- Behavioural

**Perception**

Brain – neornatrix

- Pain impulses thalamus
- Other centres

**Ascending pathways**

- A-beta fibres (sensory cutaneous)
  - Heat and cold
  - Touch and massage
  - TENS
  - Hydrotherapy
  - Acupuncture

**Descending modulatory pain pathway**

- Preoperative information, relaxation, deep breathing
- Distraction, music
- Patient characteristics
- Culture, age, gender, genetics
- Psychological, social, environmental influences
- Patient expectations, beliefs
- Staff skills, knowledge, beliefs, attitudes

**Spinal cord:**

- Termination of A delta and C fibre nociceptors
- Pain impulse spinal cord ascending pathway
- Modulation – inhibitory and facilitatory chemical mediators

**A delta fibres (myelinated):**

- First pain – superficial, localised, sharp, stinging

**C fibres (unmyelinated):**

- Second pain – deep, poorly localised, ache, dull

**Release of chemical mediators including:**

- Prostaglandins, serotonin (5HT), substance P, histamine

These sensitise the A delta and C nociceptors and an action potential is generated.

**TABLE 2. EFFECTS OF UNRELIEVED POSTOPERATIVE PAIN**

<table>
<thead>
<tr>
<th>Category</th>
<th>Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiovascular and respiratory</td>
<td>Hypertension; tachycardia; coronary ischaemia; myocardial infarction; increased respiratory rate; reduced deep breathing and coughing; secretion and sputum; retention; chest infection; pneumonia, hypoxia</td>
</tr>
<tr>
<td>Gastrointestinal and genitourinary</td>
<td>Delayed recovery of gastric and bowel function</td>
</tr>
<tr>
<td>Musculoskeletal and metabolic</td>
<td>Reduced mobility; deep vein thrombosis; pulmonary embolism; metabolic stress response following surgery; muscle spasm; impaired muscle function</td>
</tr>
<tr>
<td>Immune and endocrine</td>
<td>Poor wound healing and surgical wound infection; depression of immune system; increased metabolism; changes in endocrine function</td>
</tr>
<tr>
<td>Psychological and cognitive</td>
<td>Insomnia; anxiety; fear; disorientation; reduction in cognitive function; mental confusion</td>
</tr>
<tr>
<td>Additional considerations</td>
<td>Longer lengths of stay; readmissions; patient dissatisfaction; reduced quality of life indicators</td>
</tr>
</tbody>
</table>