Post-operative pain management: how can we CHANGE PAIN®?
Who is Grünenthal?

The Grünenthal Group is an independent, family-owned, international research-based pharmaceutical company headquartered in Aachen, Germany:

- investing in research and development above the industrial average
- committed to innovation in order to treat unmet medical needs
- long record of innovative pain treatments and technologies
What is the CHANGE PAIN® initiative?

The CHANGE PAIN® initiative aims to understand the needs of pain patients and to develop solutions to improve the management of pain.
What are the priorities of CHANGE PAIN®?

<table>
<thead>
<tr>
<th>Scientific support</th>
<th>Education</th>
<th>Service</th>
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</thead>
<tbody>
<tr>
<td>Support research and publications on needs in post-operative pain management (POPM)</td>
<td>Provide workshops and “Educationals” to increase knowledge on post-operative pain management</td>
<td>Offer customised services and tools to cover needs in daily practice</td>
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What will we cover in this session?

Today we will discuss the following topics:

<table>
<thead>
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Pain is complex, subjective and unpredictable

Post-operative pain is difficult to predict, with large variation in patients’ individual responses to medications and therapies used to treat post-operative pain.

The degree of pain experienced does not always correlate with the degree of surgical intervention.

<table>
<thead>
<tr>
<th>Major surgeries</th>
<th>NRS 0</th>
<th>NRS 1</th>
<th>NRS 2</th>
<th>NRS 3</th>
<th>NRS 4</th>
<th>NRS 5</th>
<th>NRS 6</th>
<th>NRS 7</th>
<th>NRS 8</th>
<th>NRS 9</th>
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<tbody>
<tr>
<td>Skull and/or brain surgery (n=80)</td>
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<td>Radical prostatectomy (n=266)</td>
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<td>Adrenal gland surgery, open (n=22)</td>
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<td>Hysterectomy (n=106)</td>
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<tr>
<td>Cholecystectomy, open (n=335)</td>
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<td>Tonsillectomy (n=402)</td>
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<td>Haemorrhoids, plastic reconstruction (n=67)</td>
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<td>Appendectomy, open (n=227)</td>
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Minor surgeries

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1 Gerbershagen HJ et al. *Anesthesiology*. 2013; 118: 934–944
If we can improve POPM, we have the opportunity to:

- lessen the burden and complications of POPM
- improve clinical outcomes
- enable earlier patient discharge
- improve patient satisfaction with surgery

The focus of this session is to explore specific ways in which we can improve POPM
Today we will discuss the following topics:

- The importance of POPM
- The aims of POPM
- Some important principles for achieving optimal POPM
- An overview of current treatment options
What are your treatment goals in post-operative pain management?
Aims of post-operative pain management

- Improved pain relief
- Early mobilisation
- Reduced risk of complications
- Timely or early discharge
- Better clinical outcomes

Beyond pain relief, optimal POPM can help to achieve successful surgical interventions with good clinical outcomes.
Effective post-operative pain management brings holistic benefits for the patient

- High post-operative pain correlates with poor health-related quality of life scores\(^1\)

- Pain has been found to affect sleep in 83\% of post-operative patients\(^2\)

- Poor sleep on the first post-operative night is associated with longer hospital stay\(^3\)

**Improved pain relief**

- Early mobilisation
- Reduced risk of complications
- Timely or early discharge
- Better clinical outcomes

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Early patient mobilisation may be facilitated by effective pain relief

- Improved pain relief
- Early mobilisation
- Reduced risk of complications
- Timely or early discharge
- Better clinical outcomes

Pain upon movement is particularly common:\(^1\)

**Pain on movement in surgical patients without malignancy\(^1\)**

- Severe pain: 24%
- Moderate pain: 28%

**Effective post-operative pain relief is necessary in order to enable early patient mobilisation**

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\(^1\) Maier C et al. *Dtsch Arztebl Int.* 2010;107:607–14
Early mobilisation may reduce the risk of complications

- Improved pain relief
- Early mobilisation
- Reduced risk of complications
- Timely or early discharge
- Better clinical outcomes

A study has shown that early mobilisation reduces the risk of certain post-surgical complications and adverse events\(^1\)

**Impact of early mobilisation on complications\(^3\)**

- Incidence of pulmonary embolism
- Incidence of deep vein thrombosis

Early patient mobilisation may lead to timely or even early discharge from hospital

- Improved pain relief
- Early mobilisation
- Reduced risk of complications
- Timely or early discharge
- Better clinical outcomes

Early patient mobilisation has been identified as the most important precondition for fast recovery and early discharge

Impact of rapid rehabilitation on length of stay

<table>
<thead>
<tr>
<th></th>
<th>Days</th>
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</thead>
<tbody>
<tr>
<td>Standard rehab</td>
<td>4.39</td>
</tr>
<tr>
<td>Rapid rehab</td>
<td>3.85</td>
</tr>
</tbody>
</table>

Post-operative pain relief has been found to be a key factor in determining patient satisfaction with surgery\(^1\)

**Significant predictors of being satisfied with outcome\(^1\)**

<table>
<thead>
<tr>
<th>Variable (^1)</th>
<th>Significance</th>
<th>Odds ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expectations met</td>
<td>&lt;0.001</td>
<td>2.62</td>
</tr>
<tr>
<td>Satisfaction with pain relief</td>
<td>&lt;0.001</td>
<td>2.40</td>
</tr>
<tr>
<td>Satisfaction with the hospital experience</td>
<td>&lt;0.001</td>
<td>1.70</td>
</tr>
<tr>
<td>12-month Oxford Score*</td>
<td>&lt;0.001</td>
<td>1.08</td>
</tr>
<tr>
<td>Pre-operative Oxford Score*</td>
<td>&lt;0.001</td>
<td>0.95</td>
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</table>

* Assessment of physical status, based on 12 questions relating to pain and functional ability

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Various factors contribute to effective post-operative pain management

- Effective team working and communication
- Simple, well-defined protocols
- Active involvement of the patient
- Routine tracking of clinical variables
- Timely and demand-orientated pain medication
Simple, well-defined protocols

Active involvement of the patient

Routine tracking of clinical variables

Timely and demand-orientated pain medication
Good multidisciplinary communication is important for the provision of effective post-operative pain management

- A study has identified that experience exchange between physicians and caring staff is a key factor for success in POPM\(^1\)

- This requires:
  - Involvement of all stakeholders
  - Clarity of roles and responsibilities
  - Effective patient handover meetings
  - Staff training to enhance knowledge
  - Cooperation with the acute pain service (APS)

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\(^1\) Gerbershagen HJ et al. *Anesthesiology*. 2013;118:934–944
All stakeholders need to be included to achieve the best outcomes for the patient

- It is important that all involved staff appreciate the importance of POPM and understand the treatment plan for their patients

- POPM should be considered by all involved staff in order to ensure optimal therapeutic and patient outcomes
Roles and responsibilities of different members of the team need to be clear

- Evidence from published literature indicates that there are divergent views among HCPs about who is responsible for POPM¹

Good communication during patient handover is required to avoid information omissions and medication errors

- A study has shown that omission of important information, such as POPM plans, and communication breakdowns can occur during handovers.¹

The length of handover from operating room to post-anaesthesia care unit ranges from 1 to 300 seconds with an average of 73 seconds.²

### How could patient handover be improved?

1. **Complete preparation before patient arrival**
   - Set aside time for verbal handover; avoid performing tasks during this time

2. **Ensure all relevant members of staff are present**
   - One care provider speaking at a time; avoid distractions and interruptions

3. **Provide opportunity to ask questions and voice concerns**
   - Use supporting documentation (lab results, pain assessments, etc.)

4. **Use structured checklist of topics to guide communication**
   - Formal handover training and standardised protocols

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Staff training to enhance knowledge and skills of all involved stakeholders can improve patient outcomes

- A study has shown that POPM training can lead to improved patient outcomes\(^1\)

\[\text{Post-operative pain in patients before and after the implementation of staff education programme}^{1}\]

<table>
<thead>
<tr>
<th></th>
<th>Before</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moderate to severe pain on movement</td>
<td>76</td>
<td>53</td>
</tr>
<tr>
<td>Moderate to severe pain at rest</td>
<td>32</td>
<td>12</td>
</tr>
</tbody>
</table>

- Training may also help to reduce treatment errors\(^2,3\)

All involved staff should be given regular training on post-operative pain management

- Regular training updates on POPM are recommended by the European Society for Regional Anaesthesia and Pain Therapy (ESRA)\(^1\)

According to a European survey, 33% of physicians say that their institutions offer no POPM training\(^2\)

- All staff involved in the treatment of post-operative pain require regularly updated training\(^1\)

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Which topics could be covered by staff training?

- Awareness of unmet needs
- Physiology and pathology of pain
- Pharmacology of analgesics
- Treatment and assessment protocols
- Consultation strategies

1 European Society of Regional Anaesthesia and Pain Therapy. Postoperative Pain Management Good Clinical Practice
An acute pain service (APS) can improve post-operative pain management

- A study has shown that an APS can reduce mean and maximum pain scores\(^1\)

In a European survey, only 37.2% of physicians reported that post-operative pain was managed by an APS in their institution\(^2\)

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### What are important factors for an acute pain service?

<table>
<thead>
<tr>
<th>1</th>
<th>Systems for regular assessment and treatment of acute pain</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Development of guidelines for side effect alleviation and management</td>
</tr>
<tr>
<td>3</td>
<td>Provision and dissemination of information and resources for patients</td>
</tr>
<tr>
<td>4</td>
<td>Education for other staff members on assessment and treatment of acute pain</td>
</tr>
<tr>
<td>5</td>
<td>Audit and evaluation of the effectiveness of acute pain management</td>
</tr>
<tr>
<td>6</td>
<td>Support for research into acute pain</td>
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</tbody>
</table>

1 Royal College of Anaesthesiology Guidelines
Simple, well-defined protocols

- Effective team working and communication
- Active involvement of the patient
- Routine tracking of clinical variables
- Timely and demand-orientated pain medication
Specific treatment protocols are needed to reduce post-operative pain

- Studies have shown that the presence of analgesia protocols correlates with a lower frequency of pain$^1,2$
- There is a need for protocols for specific surgeries and patient populations$^3$

Many institutions do not have sufficient protocols for all areas of post-operative pain management.

- Only 33.5% of physicians say that written protocols are always followed in daily practice.¹

![Presence of POPM protocols in European institutions*¹]

* Data from PATHOS survey, covering 746 European hospitals in Austria, Belgium, France, Germany, Portugal, Spain and Switzerland.¹

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What should local guidelines include?

1. Treatment standard
2. Guidance on adaptation of treatment standard*
3. Provisions for rescue/additional analgesia
4. Follow-up assessment of pain intensity
5. Safety information
6. Clearly defined roles and responsibilities

*i.e. How to tailor for different scenarios and allowing for adaptation of care dependent on surgery type, patient needs etc.*

1 Erlenwein et al. Anaesthesist. 2015; 64:218-26
Example protocol from PROSPECT (http://www.postoppain.org)

Overall recommendations for postoperative pain management for total knee arthroplasty

- Pre-operative patient assessment
  - GA + Femoral nerve block (pre-operative)
  - Spinal anaesthesia (with LA) + Femoral nerve block (pre-operative)
    - There is insufficient evidence to recommend one treatment pathway in preference to the other

Postoperative

- Femoral nerve block
  - High intensity pain, VAS ≥ 50 mm
    - Systemic analgesia
      - Conventional NSAID/COX-2-selective inhibitors + IV PCA strong opioids (titrated to effect) + paracetamol
    - Moderate or low intensity pain, VAS <60 mm
      - Systemic analgesia
        - Conventional NSAID/COX-2-selective inhibitors +/- weak opioids (titrated to effect) + paracetamol

- Cooling and compression techniques
Simple, well-defined protocols

Routine tracking of clinical variables

Timely and demand-orientated pain medication

Active involvement of the patient
Patient screening can help to identify those at high risk for post-operative pain

- Patients can also be screened pre-operatively, to identify those who are at high risk for post-operative pain\(^1\)

- A review has found the following to be good predictors of post-operative pain:\(^1\)
  - Type of surgery
  - Age
  - Anxiety
  - Pre-operative pain

\(^{1}\) Ip HYV et al. Anesthesiology. 2009;111:657–77
Information on post-operative pain management should be provided to the patient pre-operatively

- Pre-operative patient education has been found to improve patient satisfaction

- A study has shown that the provision of written pre-operative information increases the patient’s ability to participate in treatment discussions

Proportion of cases in which POPM options are discussed

- Discussed: 61.2%
- Not discussed: 38.8%

Which topics could be covered pre-operatively?

- What to expect
- Assessment routines for pain and other variables
- Available treatment methods
- What to do when experiencing pain
- How post-operative pain affects mobility, recovery, etc.

These topics can be covered by providing verbal information, brochures, posters, videos or web pages.

1 European Society of Regional Anaesthesia and Pain Therapy. Postoperative Pain Management Good Clinical Practice
Shared decision-making has benefits

- Different patients have been found to want different levels of involvement in the decision-making process.\(^1\)

- A study has found that patient involvement in decision-making correlates with patient satisfaction.\(^2\)

How can shared decision-making be implemented?

1. Establish a relationship with the patient
2. Identify their preferences for information
3. Identify their preferences for involvement in decision-making
4. Respond to patient’s ideas, concerns and expectations
5. Identify options and assess relative to patient’s preferences
6. Present options and help them to reflect on the impact that each might have
7. Agree upon a decision in partnership
8. Outline an action plan

1 Godolphin W. Healthc Q. 2009;12:e186–e190
Simple, well-defined protocols

Active involvement of the patient

Routine tracking of clinical variables

Timely and demand-orientated pain medication
Patients are often experiencing pain and inadequate pain management

- **20–40%** of patients experience severe pain following surgery\(^1\)

- **50%** of patients report moderate to severe pain on the first day after surgery\(^2\)

- **55%** of surgical patients are dissatisfied with their pain management\(^3\)

- **51%** of patients > 65 years only report their pain if it has become unbearable\(^4\)

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According to ESRA, repeated assessment of pain is a vital element in effective POPM\(^1\)

- Post-operative pain should be assessed regularly (every 4–8 hours) on the ward, and even more regularly in the post-anaesthesia care unit\(^1\)

**VISUAL ANALOGUE SCALE (VAS)**

- No pain
- Worst possible pain

* VAS: visual analogue scale (used to measure pain)

Helps to enable determination of the suitability and adequacy of prescribed drugs, and their doses and dosage intervals\(^2\)

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\(^1\) European Society of Regional Anaesthesia and Pain Therapy. Postoperative Pain Management Good Clinical Practice; \(^2\) Rahman MH and Beattie J. *The Pharmaceutical Journal* 2008;275:207
Pain assessment procedures are inadequate in some institutions

A European survey has shown that pain assessment procedures vary considerably between institutions\(^1\)

Survey responses from physicians regarding their institution for three different questions\(^1\)

- Pain not assessed: 34.3%
- Pain assessed on surgical ward: 48.5%
- Pain routinely measured: 62.7%
- Pain scores documented on patient chart: 44.3%
- Threshold pain level determined: 39.5%

Multiple answers were possible for some questions. Data from PATHOS survey, covering 746 European hospitals in Austria, Belgium, France, Germany, Portugal, Spain and Switzerland.\(^1\)

Beyond pain, routine assessment of other related parameters is also important.

- In addition to pain level, it is important to track and record other clinical variables which may aid the tracking of recovery.¹

- Pain severity
  - at rest
  - on movement
- Impact of pain on
  - sleep
  - mood
  - appetite
  - mobility
- Signs of complications
  - nausea
  - vomiting
  - pruritus
  - etc.

## Pain management outcomes

<table>
<thead>
<tr>
<th>Drug and modality</th>
<th>Medication used, PCA, epidural, nerve block, etc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dose/regimen</td>
<td>Descriptive dose in mg, mL</td>
</tr>
<tr>
<td>Adjuncts given</td>
<td>Acetaminophen, ibuprofen, ketorolac, gabapentin, etc.</td>
</tr>
<tr>
<td>Site assessment</td>
<td>Intact, erythema, pain, etc.</td>
</tr>
<tr>
<td>Catheter assessment</td>
<td>Intact, occlusion, leak, etc.</td>
</tr>
<tr>
<td>Motor block</td>
<td>0–5 muscle strength scale</td>
</tr>
<tr>
<td>Sensory block</td>
<td>Yes/no</td>
</tr>
<tr>
<td>Pain severity – rest</td>
<td>0–10 Numerical rating scale (NRS)</td>
</tr>
<tr>
<td>Pain severity – activity</td>
<td>0–10 NRS</td>
</tr>
<tr>
<td>Impact of pain on sleep</td>
<td>0–10 NRS</td>
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<td>Impact of pain on mobility</td>
<td>0–10 NRS</td>
</tr>
<tr>
<td>Sedation scale</td>
<td>0, 1, 2, 3, S</td>
</tr>
<tr>
<td>Adverse effects</td>
<td>Nausea, vomiting, pruritus, constipation, etc.</td>
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<tr>
<td>Satisfaction with pain management (overall)</td>
<td>0–10 NRS</td>
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Simple, well-defined protocols
Active involvement of the patient
Routine tracking of clinical variables
Timely and demand-orientated pain medication
Timely and demand-orientated pain medication can improve post-operative pain management

Characteristics of an optimal treatment for timely, demand-orientated post-operative pain relief include:

- Fast onset of action
- Sustained pain relief
- Appropriate dosage
- Follows individual course of pain
- Risk of errors should be low
- Less personnel-intensive
- No restriction of mobility
- Non-invasive

Anything else?
Onset of action is important for effective management of acute post-operative pain

- Rapid onset of pain relief has shown to be advantageous for the treatment of acute post-operative pain\(^1\)

![Graph showing Time to maximum plasma concentration (Tmax)](image)

- Route of administration has been shown to impact plasma uptake\(^2\)

<table>
<thead>
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<th>Opioid</th>
<th>(t_{1/2ke0}) (h)</th>
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<td>Morphine(^3)</td>
<td>2.8</td>
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<td>Hydromorphone(^4)</td>
<td>0.8</td>
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- Some commonly used opioids have slow blood-brain equilibration times\(^3,4\)

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Patients may experience analgesic gaps…

…while waiting for nursing staff to administer doses of analgesic

…during the transition from one analgesic modality to another

…throughout the night

>50% of patients experiencing night-time pain do not tell nurses

Patients may experience analgesic gaps...

...as a consequence of equipment issues\(^1\)

According to a study, 12% of IV PCA patients experience analgesic gaps that result from equipment issues such as kinks in tubing and catheter infiltration or displacement\(^1\)

...due to delayed onset of pain relief, caused by slow blood-brain equilibration\(^2,3\)

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\(t_{1/2ke0}\): blood-brain equilibration half-time

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How can analgesic gaps be minimised?

1. Patient-controlled analgesia
2. Improved efficiency of administration procedures
3. Staff training to better identify equipment issues
4. Protocols that take into account onset of action
Opioids should be delivered in appropriate doses to minimise the risk of adverse events

- Appropriate doses should be used, as opioid adverse events have been shown to be dose-dependent\(^1\)

- A study has found that continuous infusion results in 24% higher opioid intake than patient-controlled analgesia, with no difference in pain scores\(^2\)

How can inappropriate dosages be avoided?

1. **Multimodal pain management**
   - Combining two or more analgesic agents with different mechanisms of action to provide additive, if not synergistic, pain relief

2. **Bolus rather than continuous infusion**
   - Has been shown to reduce the need for additional PCA and the overall consumption of analgesic

3. **Faster onset of action**
   - The most lipophilic opioids have a faster onset of action, as compared with hydrophilic opioids (morphine)

4. **Patient-controlled analgesia**
   - Patient-controlled analgesia may help to ensure that appropriate levels of opioid are used, as doses are delivered only when necessary

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A study has found that 61% of nurses believe that post-operative pain routines are too general and not individualised to patient factors¹

- There has been found to be variation in patients’ individual responses to medications and therapies used to treat post-operative pain²

- Patient-controlled analgesia is considered to allow patients to control their pain according to their personal analgesic needs³

Which factors should be considered when formulating an individualised plan?

1. Previous experiences and patient preferences
2. Expected severity of post-operative pain
3. Ability of treatment to follow the course of pain

IV PCA is associated with both device-related and operator errors

In a review of reported errors, 79.1% of all IV PCA-related errors were attributed to device malfunction

Operator errors more likely to be associated with more serious AEs than device safety problems

* Manufacturer and User Device Experience (US database for device errors)

1 Hankin CS et al. *Am J Health-Syst Pharm.* 2007;64:1492–9
Many errors have been shown to result from inexperienced staff\textsuperscript{1}

<table>
<thead>
<tr>
<th>Factor</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agency or temporary staff</td>
<td>6.6%</td>
</tr>
<tr>
<td>Shift change</td>
<td>9.4%</td>
</tr>
<tr>
<td>Workload increase</td>
<td>20%</td>
</tr>
<tr>
<td>Inexperienced staff</td>
<td>26%</td>
</tr>
<tr>
<td>Distraction</td>
<td>38%</td>
</tr>
</tbody>
</table>

Factors contributing to errors in patient-controlled analgesia\textsuperscript{1}

Training should be renewed six monthly or yearly, and improved communication amongst staff should be encouraged\textsuperscript{2}

\textsuperscript{1} Hicks RW et al. *Am J Health-Syst Pharm.* 2008;65:429–40; \textsuperscript{2} Ahmed I et al. *Ir J Med Sci.* 2010;179:393–7
A study has shown that *5.9%* of opioid medication errors result in moderate to severe patient harm.¹

*The percentage stated above is the sum of percentages of moderate, severe and deadly harm caused by opioid medication errors.*

How can the risk of errors be minimised?

1. Staff training
2. Improved communication
3. Error-checking protocols
Post-operative pain management should be less personnel-intensive

- A study has found that each dose of ‘as needed’ oral analgesic takes over 10.9 minutes of staff time\(^1\)

- Shortening this time may:\(^1\)
  - allow more efficient use of nursing time
  - improve patient care
  - improve effectiveness of analgesic dosing
  - improve patient satisfaction

A study has found that, over a 48-hour period, IV PCA requires more than 75 minutes of staff time per patient.

Shortening this time may:
- allow more efficient use of staff time
- improve patient care
- improve effectiveness of analgesic dosing
- improve patient satisfaction

Personnel times for 48 h of IV PCA

<table>
<thead>
<tr>
<th>Time (mins)</th>
<th>0</th>
<th>10</th>
<th>20</th>
<th>30</th>
<th>40</th>
<th>50</th>
<th>60</th>
<th>70</th>
<th>80</th>
<th>90</th>
</tr>
</thead>
<tbody>
<tr>
<td>48 hrs IV PCA treatment</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

79 mins

How could post-operative pain management be less personnel-intensive?

Changes in work processes of medication administration could increase efficiency and save nursing time.
Early patient mobilisation can reduce length of stay and reduce the risk of complications

...length of hospital stay\(^1\)

<table>
<thead>
<tr>
<th>Length of stay (days)</th>
<th>Standard rehabilitation</th>
<th>Rapid rehabilitation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4.4</td>
<td>3.9</td>
</tr>
</tbody>
</table>

...the risk of complications\(^2\)

<table>
<thead>
<tr>
<th>Incidence (%)</th>
<th>Standard mobilisation</th>
<th>Early mobilisation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incidence of pulmonary embolism</td>
<td>2.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Incidence of deep-vein thrombosis</td>
<td>27.6</td>
<td>1.0</td>
</tr>
</tbody>
</table>

Early patient mobilisation is facilitated by…

…reducing post-operative pain

- Poorly controlled post-operative pain has been associated with impaired ambulation\(^1\)

…using treatment methods that do not impair patient mobility

- Some equipment* may result in reduced mobility\(^2\)

* Such as an intravenous line, an indwelling intravenous catheter and intravenous tubing that tethers the patient to a computerised pump attached to an intravenous pole

---


Invasive treatment methods carry the risk of needle-stick injury and infection

- Invasive therapies require a catheter, which may bring a risk of infection

Catheter-related bloodstream infection (CRBSI) incidence in Europe

<table>
<thead>
<tr>
<th>Country</th>
<th>Estimated number of CRBSIs per year</th>
</tr>
</thead>
<tbody>
<tr>
<td>UK</td>
<td>8940</td>
</tr>
<tr>
<td>Italy</td>
<td>8500</td>
</tr>
<tr>
<td>Germany</td>
<td>8400</td>
</tr>
<tr>
<td>France</td>
<td>14400</td>
</tr>
</tbody>
</table>

According to a Royal College of Nursing survey, 48% of nurses have experienced a needle-stick injury at some point in their career.

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1 Tacconelli E. *J Hosp Infect.* 2009;72:97–103,
How can the risk of needle-stick injuries and infections be minimised?

1. Reduce the use of invasive therapies
2. Staff training
3. Safety devices
Today we will discuss the following topics:

| The importance of POPM       |
| The aims of POPM             |
| Some important principles for achieving optimal POPM |
| An overview of current treatment options |
There are many treatment options currently available for post-operative pain

<table>
<thead>
<tr>
<th>Current treatment options for post-operative pain include:</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Intravenous patient-controlled analgesia (IV PCA)</td>
</tr>
<tr>
<td>- Oral therapies</td>
</tr>
<tr>
<td>- Epidural analgesia</td>
</tr>
<tr>
<td>- Peripheral nerve blocks</td>
</tr>
<tr>
<td>- Continuous infusion</td>
</tr>
</tbody>
</table>
Advantages and disadvantages of intravenous patient-controlled analgesia (IV PCA)

Studies have identified the following advantages and disadvantages:

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Versatility*&lt;sup&gt;1&lt;/sup&gt;</td>
<td>Invasive (risk of infection etc.)&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td>Improved pain control and patient satisfaction&lt;sup&gt;1&lt;/sup&gt;</td>
<td>Impairment to mobility&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td>Safety&lt;sup&gt;1&lt;/sup&gt;</td>
<td>Equipment problems (kinked tubing etc.)&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

* i.e. can be programmed to account for individual needs and responses and can be rapidly adjusted and titrated

How can we manage the impact of the disadvantages for IV PCA?

1. Capnography monitoring may provide early warning of respiratory depression

2. Staff training may reduce the risk of equipment errors

3. Strict aseptic technique should be used to minimise the risk of infection
Advantages and disadvantages of oral therapies

A study has identified the following advantages and disadvantages:

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Convenient(^1)</td>
<td>Slow onset of action(^1)</td>
</tr>
<tr>
<td>Non-invasive(^1)</td>
<td>Highly dependent on patient compliance(^1)</td>
</tr>
<tr>
<td>Lack of need for specialist training(^1)</td>
<td>Increased possibility of drug-drug and drug-nutrient interactions(^1)</td>
</tr>
</tbody>
</table>

---

How can we manage the impact of the disadvantages for oral therapies?

1. Treatment protocols should take account of the slow onset of action
2. Patient education may help with compliance
Advantages and disadvantages of epidural analgesia

Studies have identified the following advantages and disadvantages:

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attenuation of the stress response(^1)</td>
<td>Potential for serious complications(^2)</td>
</tr>
<tr>
<td>Reduced incidence of various post-operative disorders(^1)</td>
<td>Risk of errors (misplacement of catheter etc.)(^3)</td>
</tr>
<tr>
<td>Leads to improved gastrointestinal function(^1)</td>
<td>Risk of inadequate anaesthesia or analgesia(^3)</td>
</tr>
</tbody>
</table>

How can we manage the impact of the disadvantages for epidural analgesia?

1. Consideration of risk factors for neurological injury
2. In cases of motor block, infusion rate should be lowered
3. Test doses containing epinephrine may help to identify failures
Advantages and disadvantages of peripheral nerve blocks

Studies have identified the following advantages and disadvantages:

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Better post-operative pain control*¹</td>
<td>Risk of catheter dislodgement or obstruction²</td>
</tr>
<tr>
<td>Reduces the need for opioids¹</td>
<td>Risk of long-term and/or permanent nerve injury²</td>
</tr>
<tr>
<td>Earlier mobilisation¹</td>
<td></td>
</tr>
</tbody>
</table>

* than systemic PCA

How can we manage the impact of the disadvantages for peripheral nerve block?

1. Consideration of risk factors for neurological injury
2. Suturing of the catheter, or use of adhesive, may minimise the risk of dislodgement
3. Use of blunt, short-bevel needles and ultrasound guidance
Advantages and disadvantages of continuous infusion

Studies have identified the following advantages and disadvantages:

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Few fluctuations in drug concentration(^1)</td>
<td>Greater amount of additional analgesia required(^3,4)</td>
</tr>
<tr>
<td>Less expensive equipment(^2)</td>
<td>Higher number of non-responders(^5)</td>
</tr>
</tbody>
</table>

*when compared to patients given the same hourly dose via automated bolus or PCA

\(^2\)when compared to PCA

---

Capnography monitoring may provide early warning of respiratory depression.

Continuous infusion should generally be avoided due to the high risk of adverse events.
Summary
There are many available treatment options, each with advantages and disadvantages

<table>
<thead>
<tr>
<th>Post-operative pain management aims to:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduce post-operative pain</td>
</tr>
<tr>
<td>Aid early patient mobilisation</td>
</tr>
<tr>
<td>Reduce complications and adverse events</td>
</tr>
<tr>
<td>Reduce hospital length of stay</td>
</tr>
<tr>
<td>Improve clinical outcomes</td>
</tr>
</tbody>
</table>

Important gaps to be addressed:
- Patients often experiencing pain
- Patients often reporting inadequate pain management
- Patient satisfaction linked to how they rate their surgery
What are the most important opportunities for improvement in practices or services?

- Effective team work and communication
- Simple, well-defined protocols
- Active patient involvement
- Routine tracking of clinical variables
- Timely and demand-orientated pain medication
What are the most important opportunities for improvement in therapeutic options?

Key therapeutic principles include:

- Fast onset of action
- Sustained and reliable pain relief
- Appropriate dosage
- Follow individual course of pain
- Low risk of errors
- No restriction of mobility
- Non-invasive
Any questions?