

**Postoperative pain assessment:
A review of nursing practices at
Tygerberg Academic Hospital**

by

Petrus Johannes Dippenaar

MBChB; DA(SA)

Department of Anaesthesiology and Critical Care

Stellenbosch University

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Supervisor:

Dr R. Naidoo

MBChB (UCT), DipObst(SA); DA(SA); MMed(Anes)(Stell), FCA(SA)

Department of Anaesthesiology and Critical Care

Stellenbosch University

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Abstract

Pain is a complex, subjective, physical and emotional experience with large individual variation. Murray et al has estimated a prevalence of 62% of severe postoperative pain in Tygerberg Academic Hospital Surgical Wards (TAHSW). Efficient pain management stems from accurate pain assessment. Cultural influences and level of education determines patients' willingness and ability to disclose the pain experience, as well as the health care provider's ability to accurately assess it. Nurses with a greater level of training and experience tend to acknowledge self-report of pain to establish the existence of pain, but use objective parameters to determine intensity. Pain rating scales should be used to grade intensity of pain, as this is the easiest dimension to delineate.

Acute pain has recently been regarded as the "fifth vital sign", and routine assessment has created greater awareness of pain. Unfortunately, the lack of proper management protocols, has resulted in an increase in the inappropriate administration of opioid analgesics with an increased incidence of postoperative respiratory depression. Level of sedation secondary to opioid administration correlates with the risk of apnoea. Respiratory depression mostly occurs at night during the first 24 hours, due to lack of proper monitoring. Nurses need to be trained to recognise the danger signs of opioid induced respiratory depression.

Method: This was a single centre, descriptive, observational study, conducted in the form of a questionnaire completed by nurses who perform postoperative observations on patients in surgical wards at Tygerberg Academic Hospital. The primary objective of the study was to determine how postoperative pain is assessed, with regards to frequency and methods of assessment. Secondary objectives were to determine use of pain rating scales, frequency of documentation of pain scores, triggers for opioid administration and knowledge of danger signs of opioid overdose. 150 volunteers were recruited to participate.

Results Nurses preferentially follow either orders (53.33%) or protocols (29.33%). Pain assessment is regarded as integral to postoperative care, and is regularly performed (61.33%). The greater the level of training and experience, the greater the dependence on own subjective evaluation of pain, in lieu of the subjective patient complaint (look at facial expressions 34.92% of the time). Nurses use a pain rating scale only 41.33% of the time when assessing pain. The greater the level of training, the greater the emphasis on documentation of pain intensity and the benefits thereof. Students acknowledge the benefits of documenting the pain rating score (91.43%) as a vital sign, but less than half comply in practice (42.86%). Across all levels of training, the inability to arouse a patient and noisy breathing, were missed as signs of severe respiratory depression, associated with excessive opioid sedation.

Conclusion: Postoperative pain at TAHSW is assessed using a combination of pain intensity rating scales and subjective assessments, acquired through patient enquiry made at intervals prescribed

according by doctor's orders, or ward protocols. Knowledge of the danger signs of excessive opioid sedation is sparse, but only students will continue morphine administration. This highlights the difference in omission and commission associated with knowledge and experience.

OPSOMMING

Pyn is ‘n ingewikkelde, subjektiewe, fisiese en emosionele ervaring met groot interpersoonlike verskeidenheid. Daar is ‘n baie hoë voorkoms van postoperatiewe pyn by Tygerberg Akademiese Hospitaal se Chirurgiese Sale (TAHSW), wat 62% nader. Effektiewe pynbeheer spruit uit akkurate assessering van pyn. Kultuurinvloede en vlak van opvoeding bepaal pasiënte se gewilligheid en vermoë om die pynervaring te weêrlê, asook die gesondheidsorgwerker se vermoë om die gepaardgaande lyding na waarde te skat. Verpleegsters met hoër vlakke van opvoeding en ervaring erken die pasiënt se klagte van pyn, en kan sodoende die bestaan van pyn bewerkstellig, maar gebruik objektiewe maatreëls om die intensiteit te bepaal. Pynskaal word gebruik om pynintensiteit te skat, want dit is die maklikste eienskap om te omskryf. Akute pyn was onlangs verhef tot die “vyfde vitale teken”, en roetine bepaling het ‘n groter bewustheid van pyn gekweek, en derhalwe pasiënthantering verbeter. Daar is ‘n baie hoë voorkoms van postoperatiewe asemnood vanweë opiaatgebruik. Diepte van sedasie stem noukeurig ooreen met risiko vir apnee. Die oorgrote meerderheid van asemnoodgebeure geskied snags, tydens die eerste 24 uur, vanweë gebrekkige monitering. Verpleegsters moet opgelei word om die gevaartekens van opiaat geïnduseerde asemnood te erken.

Metode: Hierdie was ‘n enkel sentrum, beskrywende waarnemingstudie. Dit is uitgevoer in die vorm van ‘n geskrewe opname deur verpleegsters wat verantwoordelik is vir postoperatiewe waarnemings van pasiënte in chirurgiese sale by Tygerberg Akademiese Hospitaal. Die hoofdoel van die studie was om te bepaal hoe postoperatiewe pyn geëvalueer word, in terme van gereeldheid en metode. Alternatiewe naspeurings sluit in onder meer die voorkoms van gebruik van pynskaal te bepaal, gereeldheid van aantekening van pynskaal, aanduidings vir morfientoediening en kennisvlak van die gevaartekens van opiaatoordosering. 150 vrywilligers het deelgeneem en moes ‘n gestruktureerde vraelys beantwoord.

Resultate: Verpleegsters neig om of geskrewe bevel te gehoorsaam (53.33%) of protokolle volg (29.33%). Pynevaluasie word beskou as ‘n onlosmaaklike deel van postoperatiewe sorg, en word gereeld gedoen (61.33% van skakelings). Hoër vlakke van opleiding en ervaring lei tot groter afhanklikheid van eie, subjektiewe pynevaluasie, eerder as die pasiënt se subjektiewe klagte (gesigsuitdrukking word 34.92% van die tyd gevolg). Verpleegsters gebruik ‘n pynskaal 41.33% van die tyd, wanneer pyn ontleed word.

Deelnemers met ‘n hoër vlak van opleiding plaas groter klem op die aantekening van pynintensiteit, en die voordele daarvan. Studente erken die voordele van aantekening van ‘n pynskaal (91.43%), maar meer as die helfte versuim om dit te doen (slegs 42.86% doen dit).

Gevolgtrekking: Postoperatiewe pyn in TAHSW word geëvalueer deur ‘n mengsel van pynskaal en subjektiewe indrukke, wat verkry word deur pasiënt ondervraging, op intervalle soos voorgeskryf deur doktersbevele. Die gebrekkige kennis met betrekking tot die gevaartekens van opiaat

geïnduseerde asemnood, en dieper sedasievlakke is merkwaardig. Dis ooglopend onder selfs hoogs opgeleide en ervare verpleegsters. Studente is onkundig oor die tekens van dieper sedasievlakke, en sal steeds morfien toedien gedurende sulke baie diep sedasievlakke. Hierdie onderskryf die verskil in die praktyk van toediening en weglating wat met gevorderde kennis, opleiding en ervaring gepaardgaan.

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INTRODUCTION

1.1 Background history and Motivation

There is a high prevalence of moderate to severe postoperative pain in Tygerberg Academic Hospital Surgical Wards (TAHSW).¹ The question has arisen whether the prevalence of postoperative pain is partly due to an inability to recognise and properly gauge the extent of pain, which then subsequently leads to inadequate pain management.¹ The accompanying challenge is that the postoperative pain experience shows large inter-individual variation.^{2,3}

There is a marked discrepancy between the prescribed doctor's instructions and practised analgesic strategies (by the nursing personnel) to manage postoperative pain.¹ The severity of experienced pain is not fully appreciated and consequently underestimated. This leads to inadequate treatment alongside fear of complications and organisational and cultural bias.² Nurses have a tendency to develop personal models of pain assessment and analgesic management according to the organisational structure in the ward. This, ubiquitous and unscientific practice, is founded on the hierarchical structure in the ward, influenced by the administrative needs and entrenched practices and beliefs of senior personnel.³

Purser et al have demonstrated how paramount pain assessment is to pain management.⁴ A myriad problems can be addressed by quantitatively assessing pain routinely, documenting it formally and managing it appropriately. Once the pain has been quantified, further qualitative evaluation can be done, to optimally manage the pain.^{5,6} The inter-individual variation will be better appreciated and analgesic management can be tailored to suit patients' needs¹. Documentation of the pain experience will lead to early identification of chronic pain sufferers and improved care in future.⁴

Nurses recognise the importance of acknowledging the patient's self-report to identify pain. Non-verbal cues are regarded as equally important in pain assessment, i.e. facial expressions, muscle tone and changes in vital parameters. These cues comprise of accepted and expected pain behaviour.⁷ Patient behaviour is often used as a barometer to titrate analgesia, especially pertaining to the administration of opioids.³ This leads to underdosing of patients with effective opioid analgesia in the absence of typical behaviour.⁸ This misinterpretation of patient behaviour, in view of the pain experience, also decidedly contributes to the high prevalence of opioid induced postoperative respiratory depression.⁹

Postoperative pain must be evaluated as a vital parameter and recorded as such to facilitate timely and appropriate management.² Pain intensity is the only dimension of pain which is readily and objectively evaluated and recorded, because it is the easiest to delineate. There are many rating scales

in use, all with varying sensitivity and ease of use.¹⁰ Education of patients and nursing staff is required in the use of these scales to achieve maximal benefit from pain assessment and appropriate management.⁵

1.2 Aims and Objectives

The aim of the study is to determine how postoperative pain is assessed in surgical wards by nursing personnel at Tygerberg Academic Hospital.

1.2.1 Primary Objectives

To describe the current assessment practices of postoperative pain by nurses in surgical wards at Tygerberg Academic Hospital, with regards to:

- Method of assessment
- Frequency of assessment

1.2.2 Secondary Objectives

To determine:

- Who assesses postoperative pain (demographic data of the nurse – age, level of training, day or night shift)
- If pain is quantitatively scored and how often it is documented
- Triggers for opioid administration
- Existing knowledge of red flag signs of opioid overdose, at which time opioid administration will be omitted
- If there is a difference in practice between day shift and night shift, and level of training

LITERATURE REVIEW

2.1 Introduction

The International Association for the Study of Pain (IASP) defines pain as an unpleasant physical and emotional manifestation which results from actual or potential harm to tissues or is described in terms of such harm.² The pain perception is a highly subjective and personal experience which is rooted in personal sensitivity as well as cultural background and emotional state. Pain is the main presenting complaint during most hospitalisations, because pain is the defining characteristics of most illnesses – even though the illness may not primarily manifest as pain^{1,2}.

Cultural background profoundly influences the actions associated with the pain experience and what is ultimately seen as threshold. These cultural reasons also impact the ability of health care providers to identify pain and accurately gauge the severity thereof. This invariably results in a misunderstanding of the amount of suffering and inadequate or inappropriate management.²

Nurses in acute care settings without the necessary training in pain evaluation and management often demonstrate bias in the assessment of a patient's level of pain, founded on descriptions of patient demeanour, behaviour and demographics.¹¹

Inadequate perioperative management of pain leads to complications, which involves thromboembolic and pulmonary phenomena, prolonged ICU and hospital stay and more frequent readmissions to hospital.¹² Poor pain management has cost implications for society (inability to work; increasing health care costs) and the individual (psychological distress, lower grade of functioning, lower quality of life and chronic pain).⁴

2.2 Incidence and Risk Factors of Postoperative Pain

Murray and Retief, who investigated postoperative pain, showed a high incidence (41-61%) of moderate to severe pain experienced in the first 24 hours postoperatively in developed countries.¹ At Tygerberg Academic Hospital, this incidence approaches 62%. Risk factors which contribute to severe postoperative pain include: young age, female gender, emergency surgery, and open abdominal surgery, orthopaedic procedures involving lower limbs and sloughectomies for burns patients. The existence of pre-operative pain is a positive predictor of likely severe postoperative pain. Regional techniques (spinal blocks and peripheral nerve blocks) are associated with the worst postoperative pain experiences when the anaesthetic effect resolves, in the absence of systemic analgesia, which was usually only administered upon identification of pain and only via the intramuscular route.¹

There are a myriad problems which contribute to this burden of postoperative pain. The majority of patients (according to cultural practices) tolerate the pain until it becomes unbearable, before acknowledging the pain openly to a nurse, at which time they expect prompt relief. A large inter-individual variation exists in the postoperative pain experience for similar surgical procedures.¹¹

A marked discrepancy between prescribed and practised analgesic strategies exists. Patients often miss timed and prescribed dosages of simple analgesics, which leads to breakthrough pain and compounds the negative postoperative pain experience.¹ The latter can be ascribed to shortages in qualified nursing personnel, extra administrative duties connected to the administration of scheduled

drugs and the fear of opiate abuse and complications of overdose.¹ The enquiry after the presence of pain is usually informal or deduced based on vital signs and body language, which leads to a misinterpretation of its severity.¹¹

2.3 Advantages of Formal Pain Assessment

Pain assessment with the use of validated pain rating scores is vital to pain management.⁴ The aforementioned problems can be addressed by quantitatively assessing pain routinely, documenting it formally and managing it appropriately.¹

Patients will be encouraged to report pain early, before it becomes 'severe'. Nurses will be more aware of the pain experience and be able to treat it early.¹ This will eliminate unnecessary suffering and pain-related postoperative complications.⁴ The inter-individual variation will be better appreciated and analgesic management can be tailored to suit patients' needs.¹

Algorithms can be developed with suggested analgesics and actions to be taken if a response to prescribed analgesia is suboptimal.⁴ This will lead to the optimal use of simple strategies and ensure optimal pain control in the general postoperative populace and reserve the use of advanced strategies for complicated patient cases.¹ Documentation of the pain experience will lead to early identification of chronic pain sufferers and improved care in future.⁴

2.4 Pain Assessment Tools

2.4.1 General Measures of Information Gathering: Questions and Answers

Appropriate assessment of pain allows the health care provider to be fully aware of the patient's pain status, and the patient to participate in his own care.³ Patients are required to be actively involved in the assessment of their pain, to facilitate accurate evaluation: it is their pain, they know the intensity and their needs.⁷

Pain assessment initiates with the self-report of the presence of pain. This is facilitated with a question from the nurse. Once the presence of pain has been established, it can be elaborated upon with further questioning with regards to the nature of the pain.⁷ Factors which need to be addressed in pain questioning include: location, intensity, quality, onset, duration, variability, relieving and aggravating factors and the patient's preferred method of relieving pain.^{8,13} It is important to tailor the enquiry and observations to the patient's level of education and comprehension. Pain has to be assessed at rest and during movement – especially if it impinges on coughing and breathing. If pain is minimal at rest, but severe upon movement, it needs to be addressed to facilitate postoperative mobilisation.¹³

Harper et al have shown how nurses recognise the importance of acknowledging the patient's self-report to identify pain, but rely on other descriptors and own experience to determine pain intensity.⁷

Effectivity of analgesic management is usually not measured with follow-up pain questions after administration.³

2.4.2 General Measures: Non-verbal cues

Non-verbal cues are regarded as equally important to assess pain. These cues are accepted and expected pain behaviour, which depends on the pre-morbid status of the patient and the surgical intervention which was done. The most common non-verbal cue is facial expression (most notably grimacing), and others include groaning, restlessness, aggression, reluctance to move and support rendered to the injured area. These cues are often evaluated alongside changes in physiological parameters (blood pressure and pulse rate) or biochemical parameters (blood glucose). These non-verbal manifestations are assessed to establish the presence of pain and the effect of management.⁷ Even though the reliance on non-verbal cues has been entrenched in pain assessment practices, its validity has not been formally assessed, unlike that of formal pain intensity rating scales.^{7,11}

Patient behaviour is often used as a barometer to titrate analgesia, especially with the use of opioids.³ This has poor clinical utility, because these are not very accurate estimates of pain existence and intensity. There is a lot of inter-individual variation and many factors can influence physiological parameters and behaviour.⁷ The assessment of these parameters often hinders appropriate pain management. Nurses seldom prevent foreseeable pain and only manage pain once it has manifested.³

2.4.3 Bureaucracy in General Measures of Pain Assessment

It has been proven that nurses often develop personal models of pain assessment and analgesic management according to the organisational structure in the ward. This pertains to the staff hierarchy, administrative needs of the ward and the entrenched practices as propagated by the senior staff members.³

They plan pain relief according to their own attitudes and not merely based on self-report of pain. They generally feel that their knowledge and experience in pain assessment are superior to the patient's ability to report subjective pain.⁷ This self-confidence to evaluate patient pain experience accurately is based on previous experience, ability to interpret changes in physiological parameters and non-verbal cues. Experience in postoperative management creates expectations of the patient's pain experience and behaviour based on the surgical procedure which was done.⁷

Experience results in practice which devolves in a repetitive routine. Knowledge and practice becomes spontaneous and tacit, and pain is not actively assessed anymore. Nurses are convinced that they can gauge the patient's level of pain, and therefore do not regard the self-report as significant.⁷

2.4.4 Agreement between subjective pain report and objective pain perception

There is a clear distinction between believing what the patient says and accepting it. This is particularly important in cases of suspected over reporting and under reporting of pain. Reasons for over reporting include the following: uninformed patients, poor understanding of pain intensity scales, gender and cultural differences. The most prominent reason ascribed to over reporting, from a nursing perspective, is for secondary gain to maintain habitual use, or addiction.⁷

Under reporting is unfortunately a problem of greater pre-eminence, and most likely due to: a patient uninformed of his role in pain management; patient does not want to be a nuisance and bother busy nursing personnel, the regard of pain as an integral part of the postoperative experience or culturally indoctrinated stoicism and pride.^{3,7}

Agreement between the nurse and patient on the presence and severity of pain is not a pre-requisite in accepting the patient's self-report of pain. This acceptance must be conveyed to the patient, followed by an appropriate response. Appropriate actions to be taken in this instance include: exploring why the patient denies or over reports pain (cultural expectations); explain pain relief options and inform the patient of the consequences of refusing or inappropriate analgesic use. This is to avoid personal misgivings from impacting on proper patient care.⁷

2.4.5 Specific Strategies of Pain Assessment

The American Agency of Investigation and Quality in Public Health and the American Pain Society regard pain as the fifth vital sign.² Acute pain has also been elevated to this position in South Africa by the South African Society of Anaesthesiologists.¹⁴ This places it on the same footing as temperature, pulse rate, blood pressure and respiratory rate with regards to the need for regular measurement and accurate documentation.²

The taking of this vital sign has been assigned to nursing care, because the nursing staff spend more time with the patients, as they are permanently stationed in the ward. This can ensure more humane care in accordance to the patient's rights. Recording a patient's pain intensity experience in a standardised fashion, i.e. a Numeric Rating Scale (NRS), aids other Health Care Providers in estimating the severity of the burden and management can be tailored accordingly.²

Ideally, the pain record should involve information on the site, intensity, types of pain, duration of pain, alleviating and aggravating factors and response to analgesia.² This is time consuming, and is often relegated to a single number indicative of the pain intensity (Numerical Rating Scale – NRS).⁵ This does not address the multidimensional nature of pain, but opens the door for further assessment.⁶

Once the existence of a severe pain has been established, further assessment is warranted with the use of supplementary assessment tools, such as the Brief Pain Inventory (BPI) or Short-Form McGill Pain Questionnaire. These assessments require five minutes to complete and provide further information on the pain, i.e. intensity, interference with physical activities, social activities, sleep, relationships, mood and cognitive functioning.⁶

2.4.6 Pain Intensity Rating Scales in Use

Pain intensity is the only dimension of pain which is readily evaluated and recorded, because it is the easiest to delineate. Unfortunately, it is not as easy to utilise, nor is it the only dimension of importance.¹⁰

Pain occurs within a specific context. Pain intensity is predicated upon the meaning of the pain to the patient and the expected duration of the entire experience. Therefore, effective pain management is greatly dependent on the patient's ability to understand and use pain assessment tools, and the accurate interpretation by the health care professional of the results. There are many pain intensity rating scales in use, but the three scales most frequently utilised are the Visual Analogue Scale, Numerical Rating Scale and Verbal Rating Scale.¹⁰

2.4.6.1 The Visual Analogue Scale

The Visual Analogue Scale is presented as a 100mm line with key verbal descriptors on the anchors – “no pain” (0mm) to “worst possible pain” (100mm). The patient is required to make a 1mm mark as indication of the pain intensity. The score is measured from the 0 anchor to the patient's mark. This allows for 101 levels of pain intensity. Its use is limited to paper and electronic format. Ideally, the scale should not be photocopied, as the dimensions of the scale may be altered. The orientation of the scale (vertical or horizontal) also affect the accuracy of representation of pain obtained from patients. It correlates well with conventional reading traditions (up to down/ left to right) of the patient group.¹⁰

The failure rate with the use of a Visual Analogue Scale ranges from 4-11%, which can be minimised with patient education and understanding. Diminished mental capacity limits the likelihood to report pain and the propensity to use Visual Analogue Scale as a tool. Advanced age is characterised by the impaired ability of abstract thought. Visual Analogue Scales are therefore not useful in these patients.¹⁰

2.4.6.2 Numerical Rating Scale

Numerical Rating Scales consist of 11, 21 or 101 points, with descriptive anchors at the extremes delineating intensity of pain experience: “no pain” to “worst possible pain”. It is graphically and

verbally delivered, easy to use and document. Graphically, the numbers are contained in boxes to create an 11 or 21 point scale. The final numbers are determined by the levels of discrimination offered. This is the ideal instrument for pain evaluation for auditing and research purposes.¹⁰

2.4.6.3 Verbal Rating Scale

Verbal Rating Scale are simple adjectives used to delineate pain intensity: none, mild, moderate, severe pain. This is readily converted to numerical data for documentation purposes. The biggest problem with the latter is the lack of accurate congruence between the numerical and the verbal descriptor. This is the least sensitive scale, but the most user friendly.¹⁰

2.4.6.4 Sensitivity of Pain Rating Scales

A pain rating scale's sensitivity is defined as the intrinsic ability of the scale to determine change if change is present. The greater the amount of descriptors in the scale, the greater will be the sensitivity. A small change is readily visible on the Visual Analogue Scale, but a greater change is required for a similar influence on the Verbal Rating Scale. Visual Analogue Scales and Numerical Rating Scales are more amenable to identify change, than the Verbal rating Scales. Generally, 11-21 points on a scale are sufficient to accurately determine pain intensity. Scales which contain 101 points offer more descriptors than the patient can utilise. Scales with 11 points of reference are most readily and consistently used by patients. The majority of patients are confident to accurately convey their pain intensity with the use of only 4 to 6 descriptors.¹⁰

Percentage changes in pain scores are a better reflection of changes in pain intensity, than changes in absolute descriptors. Results obtained from Visual Analogue Scale and Numerical Rating Scale have a large degree of agreement, due to a good correlation in scale design. The lower end of both scales yield similar results during assessment, but the correlation drifts apart with an escalating pain experience.¹⁰

The Verbal Rating Scale is conveniently used in clinical practice, but it lacks linearity. Conversion between a Verbal Rating Scale and Numerical Rating Scale is done on an 11 point plot: 1-4 indicates mild pain, 5-6 moderate pain and >7 severe pain. Verbal Rating Scale translated to a Visual Analogue Score will be as follows: >30mm on 100mm Visual Analogue Scale indicates moderate pain and >54mm indicates severe pain.¹⁰

The precision of the current pain score depends to a certain degree on the patient's score history. If the pain experience is globally assessed with a structured questionnaire (Brief Pain Inventory) at a specific point in time (i.e. immediately postoperatively), then an isolated score is ideal. Isolated scoring, without the patient regarding his or her own score history, can produce results which are

incongruent with other indicators of disease progress. Repeated Visual Analogue Scoring can produce discrepancies of up to 20%. This can be diminished by availing the patient of previous scores for comparison.¹⁰ Numerical Rating Scales and Verbal Rating Scales are less likely to fail than Visual Analogue Scales (approximately 2%).¹⁰

Patient preferences are dependent on many factors. It remains a balancing act between sensitivity (Visual Analogue scale) and simplicity (Verbal and Numerical Rating Scales). Patients with limited linguistic and abstraction abilities tend to favour the use of categorised scales.¹⁰

2.5 Nursing Incentives for Pain Assessment

Nurses are generally in favour of standardised documentation of pain as a vital sign and regard it as important in patient care. Reasons for this are that it ensures patients' well-being, patients should not experience pain in hospital and it serves as a parameter of the patient's progress. They acknowledge that patients may not own up to experiencing pain unless solicited due to cultural reservations; pain impacts on all other vital parameters and alleviating pain is fulfilling a basic human right.²

2.6 Problems with Pain Intensity Scale Use

Drawbacks of using a pain intensity scale, especially a numeric prototype (NRS), are found in patients at the extremes of age, with limited understanding due to lack of education or dementia.⁶ These groups have shown greater efficiency in the use of a Pain Thermometer or Faces Pain Scale.²

Nursing staff can regard a quantitative tool, like NRS, with derision as being meaningless and adapt the tool to suit their own style or resort to qualitative assessment (open-ended questioning) to save time. This leads to a breakdown in communication and monitoring the pain experience becomes arbitrary. Experienced nursing personnel are more likely to underestimate pain, because of having been employed before the standardised implementation of pain assessment, or previous training focused less on pain management than recently trained staff.⁵

Limiting factors which impede the successful implementation of a pain assessment initiative are: language barriers (the language employed by professionals tends to be technical) and a lack of education in pain assessment techniques on the part of the health care provider.² Routine pain screening declines if not regularly and institutionally monitored and mentored with constructive feedback.⁵

Elevating pain to the position of fifth vital sign has created a culture of provider pain awareness in the absence of provider preparedness.⁶ In view of this, implementation of standard pain assessment

protocols must be accompanied by training, education and incentive – and linked to appropriate action, so as not to be a solitary vital sign on a sheet.^{5,6}

2.7 Pain Assessment beyond Words

Self-report of pain is the foundation of pain assessment in any patient. This becomes considerably more challenging if the patient is unable to speak. In the absence of verbal cues pain can be assessed by behavioural cues: facial expressions, body movements, muscle tension and vocalisation. A reliable quantitative tool in non-verbal patients is the Behavioural Pain Scale.¹¹

Acute pain causes a neurohumoral response which usually, but not exclusively, manifests as significant increases in pulse rate, respiration and systolic blood pressure. These changes are not specific for pain, and cannot be used to discriminate pain from other causes of distress. Nursing staff tend to believe these changes are pathognomonic of pain and treat it as such.¹¹ The absence of the abovementioned change in vital parameters also does not preclude pain. Knowledge in clinical practice develops from equal amounts of theoretical knowledge and practical experience.¹¹

Regarding pain as the fifth vital sign, and documenting and managing it as such, has been more complex than initially anticipated. This has led to an increase in the administration of opioid analgesics and subsequently more opioid associated complications. The greatest challenge has been in the geriatric population, whose co-morbid conditions and polypharmacy need to be considered alongside appropriate analgesic management.⁶

2.8 Pitfalls with Pain Documentation

The problem underlying this increase in access to prescription medication is a shared misconception by the patient and the health care provider. Pain is viewed as purely sensory and this nature is only pharmacologically addressed, as it is the most expedient and fulfil the expectations of both parties. This leads to inefficient pain management strategies and a surge in the prevalence of chronic pain conditions.⁶

If pain is routinely solicited alongside other vital parameters, it has to be addressed, even though it is not the main complaint. Time constraints in the health care setting cause compromise by treating the pain superficially, and detracting attention from the presenting complaint. This negatively impacts the report and relationship between the patient and the health care provider in the light of conflicting ideologies and expectations. Unnecessary diagnostic tests may be requested in an attempt to address the chronic pain (a secondary complaint) fully. This may not yield expected results.⁶ Chronic pain (unlike acute pain) cannot be regarded as a vital sign. This is due to the multifactorial causality and

self-sustaining pervasive existence of chronic pain. Pain reported is not necessarily pain suffered, and management thereof can prove deleterious.⁶

2.9 Danger of Opioid overdose

Coetzee et al have shown the persistence of an unacceptably high incidence of postoperative respiratory depression from use of opioids which ranges from 0.1-1.0%, regardless of type of opioid used or the route of administration. This is due to the unique pharmacokinetic and pharmacodynamic properties of morphine, as well as marked interindividual variation in patient response to opioids. Prolonged periods of desaturation give rise to other complications, such as poor wound healing, cerebrovascular ischemic events, cardiac arrhythmias and myocardial ischemic events.^{9,15,16}

2.10.1 Morphine

Morphine has a low lipid solubility with a pKa value of 8.0. This renders a very small fraction of approximately 10-20% unionised drug in the plasma after administration. There is a long equilibration half-time between the plasma and brain. This means that cerebral penetration and cerebral egress are both very time consuming.^{9,17}

The usual administered dose of morphine ranges from 0.14-0.2mg/kg body weight. In certain cases of severe pain this can be increased to 0.17mg/kg with an additional 0.085mg/kg in the subsequent hour after initial dose. There is a variation in response to morphine which leads to unpredictable plasma and effect site concentrations. It is very difficult to estimate beforehand which patients will be sensitive or resistant to the effects of morphine.⁹ Increased opioid sensitivity is the most likely mechanism of opioid induced respiratory depression and not overdose of opioid therapy. It can cause an irreparable respiratory event and even demise in certain patients who have only received a relatively small dose of morphine.¹⁷

Opioids have a central inhibitory effect on the respiratory centre in the brain, which causes lower respiratory rate and alveolar ventilation. This ultimately leads to hypercarbia, respiratory acidosis and hypoxemia.⁹ The challenge with morphine administration is the time lapse between analgesic effects and the manifestation of respiratory depression. The maximal analgesic effect can take a long time (1 hour), but subjectively there is some relief after a few minutes. Maximal respiratory depression occurs later than the maximal analgesic effect. Belcher et al have found that plasma drug concentrations are more stable with longer acting drugs, as the peak and trough concentrations of shorter acting drugs are exaggerated.¹⁶ The occurrence of postoperative hypoxemia is equivalent between the use long and short acting opioids.^{9,16}

2.10.2 Opioid induced respiratory depression

The majority of opioid induced respiratory depression which results in death or severe cerebral damage, occurs in the first 24 hours postoperatively and is preventable. This is the most vulnerable period in postoperative patient care, because of the overlapping effects of general anaesthesia, optimising of opioids analgesia, sedating anti-emetics and sleep deprivation.¹⁵

Health care providers need to identify patients at risk for respiratory depression pre-operatively.¹⁵ Comorbidities which are known to be independent risk factors for postoperative respiratory depression: obstructive sleep apnoea, hypertension, diabetes mellitus, coronary artery disease, existing cardiac dysrhythmias, history of congestive cardiac failure, postoperative acute renal failure and history of chronic opioid use.^{15,17}

Obstructive sleep apnoea or high risk of having obstructive sleep apnoea (male, age >50 years, BMI .35kg/m²) is the single most dangerous pre-operative risk factor for postoperative respiratory depression. Obstructive sleep apnoea increases the sensitivity of the cerebral respiratory centre to opioids. Acute postoperative renal failure increases risk of postoperative respiratory depression due to decreased opioid clearance, acidosis and multiple organ dysfunction.¹⁷

Institutional risk factors for postoperative respiratory depression also contribute to adverse events, i.e. more than one opioid modality in use, more than one physician prescribing opioids and non-opioid sedatives at a time and extensive periods of time between nursing monitoring and the occurrence of the respiratory event.¹⁵ There is a higher incidence of respiratory depression during the night due to significant diurnal variation in levels of patient arousal and less staff numbers and vigilance.¹⁷ Non-opioid sedatives most likely to be prescribed and interact with opioids to cause respiratory depression are benzodiazepines and phenothiazines.¹⁵

The majority of respiratory depressive events occur within the first 24 hours postoperatively due to lack of proper monitoring or infrequent monitoring from lack of personnel. Standard postoperative nursing assessment occurs on arrival and then varies from 15 minutes for 1 hour to once every 4-6 hours. More than 60% of patients who experience adverse events from postoperative respiratory depression were somnolent with/out snoring beforehand. These events were preventable and were ascribed to inadequate postoperative monitoring, in the form of vital signs which were not recorded, inattention to danger signs of somnolence and low arterial oxygen saturation, long intervals between patient evaluation and lack of proper monitoring with pulse oximetry and capnography.¹⁵

Nursing staff need to be trained and educated in the danger signs of possible respiratory depression, i.e. respiratory rate <8 breaths/min, somnolence, arterial oxygen saturation of <90% in the absence of

an abnormal baseline saturation, pinpoint pupils, administration of high dose opioids in opioid naïve patients and the manifestation of respiratory depression (snoring, cyanosis, airway obstruction) which requires urgent intervention.¹⁵

Terman et al described how only 20% of nurses regard excessive sedation as high risk of respiratory depression and 50% only looks at respiratory rate.¹⁵ Ramachandran et al remarked that sedation scores are not consistently documented, neither are respiratory rates or levels of arterial oxygen saturation.¹⁷ This is critical because postoperative ventilatory patterns with prolonged apnoeic episodes have been proven to correlate well with the level of sedation.¹⁵

Belcher et al referred to how nurses respond to low levels of arterial oxygen saturation by waking patients up, encouraging the patients to ventilate adequately until a better saturation reading is seen and record the improved reading and but neglect proper follow up visits to patient.^{15,16} Oximetry only measures arterial oxygen saturation and does not reflect the extent of hypoventilation if the patient receives supplementary oxygen. A patient can maintain arterial oxygen saturation well on even 25-30% supplementary oxygen, despite experiencing severe respiratory depression.¹²

In clinical practice

Supplemental oxygen can be difficult to administer: it is uncomfortable, difficult to keep in place, limits mobility of the patient and oxygen requirements is a false surrogate measure of the patients progress to and readiness for discharge.¹²

Peculiarities of morphine induced respiratory depression include⁷:

- Profound respiratory depression can last hours after a single dose
- Respiratory depression is also associated with greater tolerance of airway obstruction
- Concomitant sleep worsens respiratory depression and airway obstruction
- Pain stimulates respiration and opposes the respiratory side effects of morphine
- Pain relief can unmask respiratory depression if morphine is administered with a regional technique
- Low respiratory rate is a very unreliable indication of respiratory depression.
- Low respiratory rate seldom occurs with respiratory depression, despite low arterial oxygen saturation
- There is a very poor correlation between pupil size and the respiratory effects of morphine
- Women are more sensitive to develop respiratory depression from morphine than men⁹

2.10.3 Prevention and Remediation

Respiratory depression from opioids can be prevented and minimised by:^{9,12,15}

- Instilling the comprehension that noisy breathing sounds in a patient with decreased level of consciousness constitutes airway obstruction. This can be despite the exaggerated breathing movements in patients with obstructed airways.⁹
- Knowledge that measuring respiratory rate does not measure proper respiratory effort, or disprove respiratory depression⁹
- Regular evaluation of sedations scores with the Ramsay Sedation Scale/ Observer's Assessment of Awareness/Sedation Scale (OAA/S) (*See Appendix A), to identify patients at risk of respiratory depression early⁹
- Routine multimodal analgesia to decrease the opioid need and opioid dose (i.e. regional techniques and simple analgesics)¹⁵
- If opioids are administered to patients at night, or patients who fall asleep, supplementary oxygen must be applied with a face mask and respiration must be evaluated with continuous pulse oximetry or capnography⁹
- Improved monitoring and feedback via continuous pulse oximetry and/or capnography¹²
- Better education of health care personnel in prescribing and monitoring of side effects of opioids¹⁵
- Pre-operative identification of risk factors for postoperative hypoxemia¹²
- Patients who are identified as being high risk for respiratory depression pre-operatively need to be admitted to a high care facility postoperatively for monitoring^{9,15}

Nursing personnel generally respond appropriately and timeously to postoperative pulse oximeter alarms if coupled with a notification system. The prevention and management of postoperative respiratory depression requires more comprehensive monitoring and response protocols. Capnography has been proposed as a means to continuously monitor ventilation, but has met with problems of poor patient compliance and its unfamiliarity with nursing staff.¹⁵

Challenges with continuous electronic monitoring, esp. of pulse oximetry, include:^{12,15}

- Poor patient compliance as patients remove the monitor
- Patient sleep disturbances from alarm sounding
- Requires a central alarm system to the nurse's station, otherwise the alarm is inaudible to nurses or alarm fatigue is developed by staff members
- Inability and unwillingness of staff to adapt to and employ new monitors
- False alarms

- Capital investment

2.11 Conclusion

Pain is a highly subjective and personal experience with large interindividual variation. Consequently, there is a high incidence of moderate to severe postoperative pain (62%) at Tygerberg Academic Hospital.^{1,2} Pain assessment is a complex endeavour influenced by many variables concerning the provider and the patient.² This affects how pain experience is conveyed, acknowledged and agreed upon between the provider and the patient. This is largely influenced by the provider's level of experience and training in the management of the specific pain condition.^{2,11}

Proper pain management is predicated upon proper pain assessment and upon the self-report of pain.^{4,7} Nurses generally acknowledge the pain complaint to establish the presence of pain, but use their own discretion, devices and objective markers (pain behaviour and vital signs) to determine severity.⁷ Pain behaviour is often used to titrate analgesia.³ Nurses also maintain personal models of pain assessment and analgesic management based on the organisational structure in the ward.³

Acute pain has recently been instituted as the "Fifth Vital Sign". The recording of this in a standard format (pain intensity scale) can establish the severity of the burden and allow for individualisation of care.² Pain scales are used to grade intensity only, as this is the easiest dimension to delineate.⁵ Pain has to be evaluated within context as well, to identify the impact on the patient's daily activities and quality of life, or postoperative experience.¹⁰

Pain as the "Fifth Vital Sign" has created greater awareness of pain, but the lack of proper management protocols, has resulted in an increase in the administration of opioid analgesics. This led to an increased incidence of opioid related complications, most notably postoperative respiratory depression.^{5,6}

Postoperative respiratory depression from opioid use (0.1-1%) remains a major concern.^{9,15,16} This occurs later than maximal analgesic effect and even with small dosages in susceptible patients.^{16,17} Obstructive sleep apnoea is the most dangerous risk factor, and this factor along with others must be identified pre-operatively.^{15,17} Proper postoperative plans and analgesic strategies must be advised to limit the occurrence of postoperative respiratory depression.^{9,15} Sedations scores must be used to identify patients at risk of respiratory depression early, because it correlates with the risk of apnoea.^{9,15} This entails frequent and diligent monitoring by personnel who are familiar with the danger signs of opioid induced respiratory depression, and the management thereof.^{15,17}

METHODOLOGY

3.1 Research design

This was a single centre, observational, descriptive study. The study population consisted of nurses who perform postoperative observations on patients in adult surgical wards at Tygerberg Academic Hospital.

In light of the descriptive nature of the study, no null hypothesis was formulated, and no p value was determined. A convenience number of 150 participants was selected as representative of approximately 70% of the nursing population which performs duties in surgical wards at Tygerberg Academic Hospital.

3.2 Study Method

The participants were randomly recruited into the study, based on their availability and willingness to participate. The participants were approached by myself and volunteer registrars from the Department of Anaesthesiology and Critical Care. These registrars were briefed on the nature and particulars of the study, as well as instructed on how to obtain informed consent from the participants.

Participants were approached during the course of their shift. A comparable proportion of participants working night shift and day shift was sought. Care was taken not to interfere with regular duties, and to avoid inconvenient times (shift change over).

Participants were enrolled in a private area, i.e. the phlebotomy room, which is available in each ward. The aims, objectives and methodology of the study were explained to the participants. Their voluntary role and right to refuse participation were clearly stipulated. If the participant was not proficient in Afrikaans or English, a translator was used. The translator was asked to sign the informed consent as a willing participant in the proceedings. Insurance that due process has been followed was established with the use of a third party as witness.

After informed consent was obtained the participants were asked to complete the questionnaire. The questionnaires were handed to them personally with an assurance of anonymity. The questionnaires were filled out on site. The investigator or volunteer was nearby to allow the immediate clarification of questions and alleviation of concerns. The questionnaires were numbered and de-identified for the purposes of anonymity. The data was de-identified on the data sheet to preserve anonymity.

3.3 Inclusion and Exclusion Criteria

Inclusion criteria entailed all nurses (registered nurses, staff nurses and students) who perform routine observations and/or administer medication in all adult surgical wards during the postoperative period. Day staff and night staff members were included.

Exclusion criteria entailed all intensive care units, because analgesia is usually administered with advanced techniques or as infusions, and wards in which pain assessment and management has already been standardised with protocols (Burns Unit). The only nurses not included in the study were those unwilling to participate and individuals on leave during the sampling process.

3.4 Research Instruments

A detailed questionnaire was assembled with single best answer questions and questions requiring ranking of options according to importance, for ease of completion. (*See Appendix B). Data collected from each participant included: demographic data, current practice of postoperative pain assessment and knowledge on signs of morphine overdose. The data was processed onto a Microsoft Excel® spreadsheet and thereafter presented for statistical analysis. The database is password protected, with allowed access only to myself and Dr Naidoo (the supervisor). The database will be in safe keeping for 15 years, after which it will be deleted. This is in keeping with the South African Standards for Good Clinical Practice.

The Biostatistics Unit at the Faculty of Health Science, Stellenbosch University, assisted with the analysis of the data. Statistical analysis was conducted using MedCalc Statistical Software version 15.6.1 (MedCalc Software bvba, Ostend, Belgium).

3.5 Ethical Aspects

- The study methodology was not disruptive to routine.
- There were minimum interventions and risks to the participants.
- The study population was fairly distributed.
- Participant autonomy was upheld through proper consent prior to enrolment in the study.
- Participant confidentiality was upheld by obtaining the informed consent and conducting the survey in the phlebotomy room or nurse's office.
- Informed consent was obtained from all participants, by the investigator or volunteer who recruited the participant.
- The services of a translator was sought, if the participant was not proficient in Afrikaans and English. The translator was present and integral in all proceedings regarding informed consent and completion of the questionnaire.

- A number was assigned to each participant. Data capturing and presentation was done with these numbers. The participants were de-identified and therefore participant identity and confidentiality were protected.
- Participants were able to withdraw from the study at any time.
- Only the primary researcher (myself) and my supervisor have access to the data sheet containing the true identity of participants. The data is stored in a file designated for its use in the safe keeping of the primary researcher. The database is password protected and secured. It will remain in the aforementioned state for 15 years, after which it will be destroyed.
- In view of the complete voluntary nature of participation, there was no re-imburement. This decreased the risk of volunteer bias.
- The aim of this study was to determine how postoperative pain is assessed in surgical wards by nurses. This is aimed at the improvement of patient care.
- This research study was submitted for approval by the Health Research Ethics Committee at Stellenbosch University (Ref no: S17/10/261) and was conducted according to the South African Guidelines for Good Clinical Practice, as determined by the Helsinki Declaration.

RESULTS

4.1 Demographic Data

The study enrolled 65% of the surgical nursing population (150 participants of a total possible of 230). Of these participants 42% (n=63, total 86) were registered nurses, 34.67% (n=52, total 144) were Staff Nurses and 23.33% (n=35) were Students. Registered nurses are nursing practitioners who completed a four year degree (BCur) at a university, and staff nurses are nursing practitioners who completed a 3 year diploma course at a university of technology. Both groups are registered in the aforementioned capacity at the SANC (South African Nurses' Council).

The time at which the participants were enrolled are Day Shift 62.67% (n=94) and Night Shift 37.33% (n=56). Further extrapolation of shifts according to level of training is as follows: Registered Nurses 60.32% (n=38, total 56) day shift vs 39.68% (n=25, total 30) night shift; Staff Nurses 46.15% (n=24, total 84) day shift vs 53.85% (n=28, total 56) night shift; Students 91.43% (n=32) day shift vs 8.57% (n=3) night shift. Registered Nurses were mostly recruited during day shifts and Staff Nurses during Night shifts. Students work more day shifts, as expected.

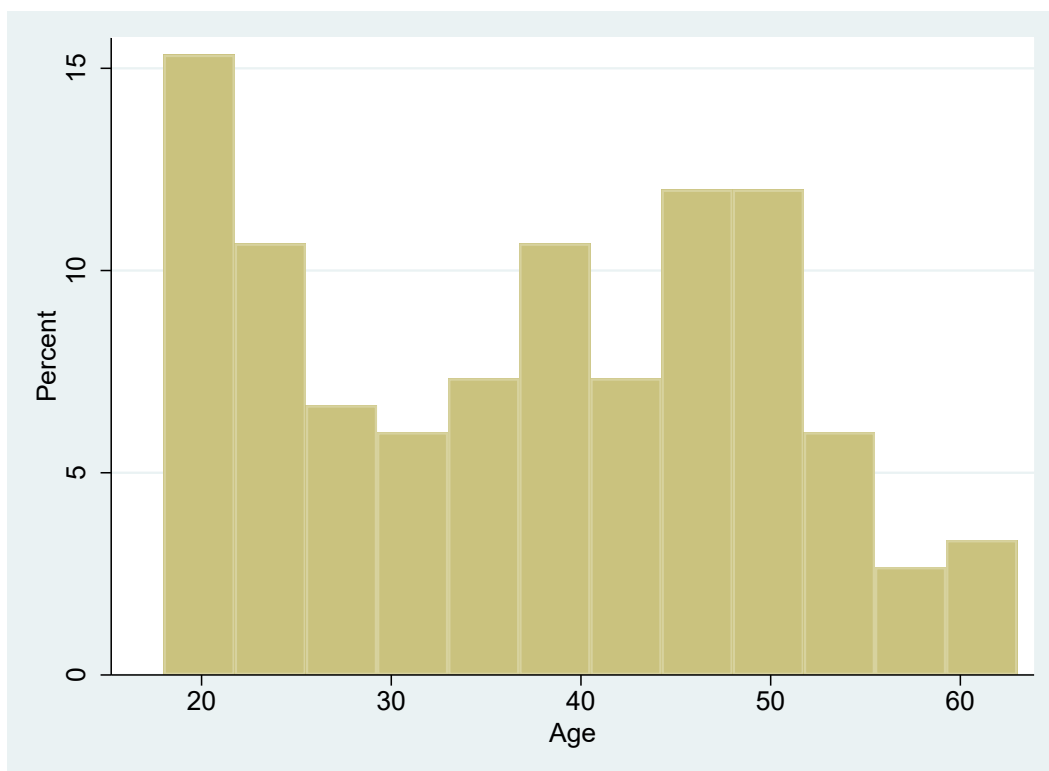


Figure 1 Percentage distribution of participants according to age

There is a mixture of young and old participants (see Figure 1). The largest groups are around 20 years of age, and between 40 and 50 years of age.

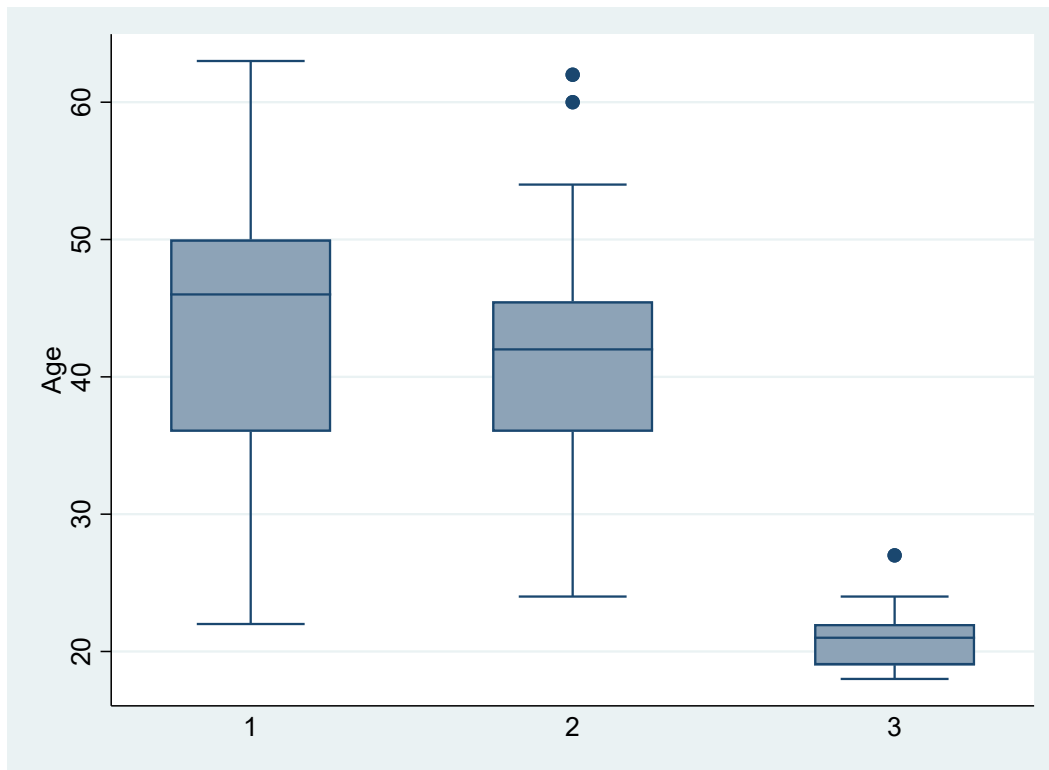


Figure 2 Distribution of Age according to Level of Training

(1= Registered Nurses; 2= Staff Nurses; 3= Students)

Registered Nurses are slightly older than Staff Nurses. Students have an expected younger age distribution in the boxplot (see Figure 2).

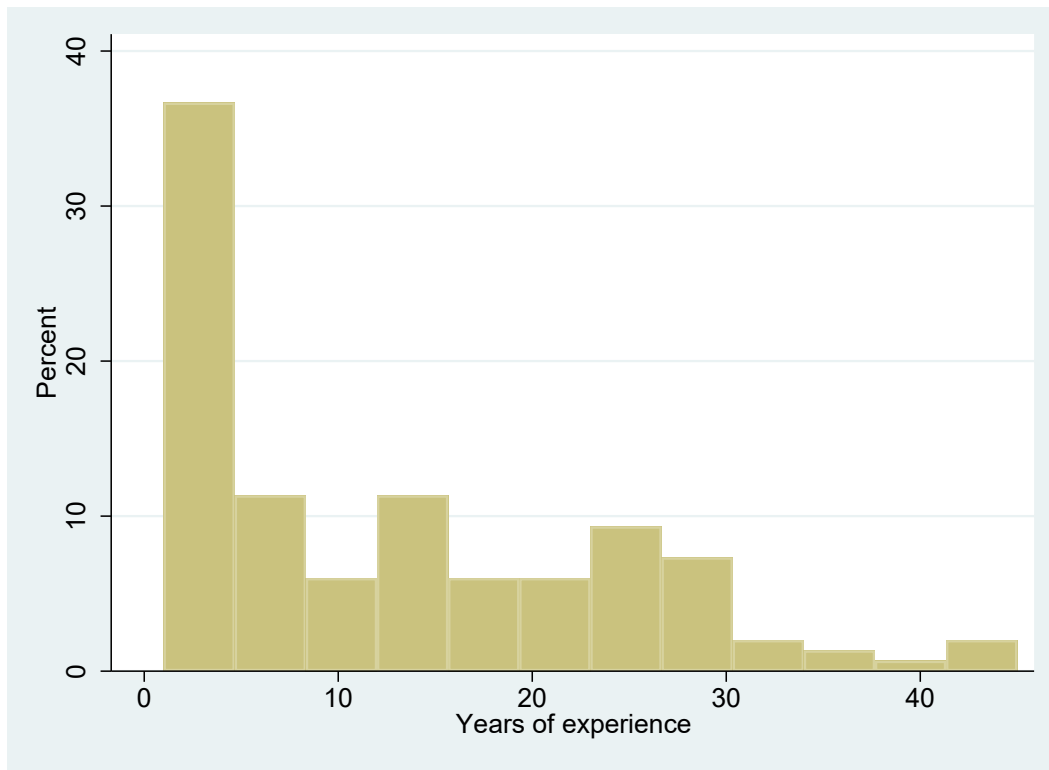


Figure 3 Distribution of Years of Experience

The majority of participants have <5 years of experience (see Figure 3).

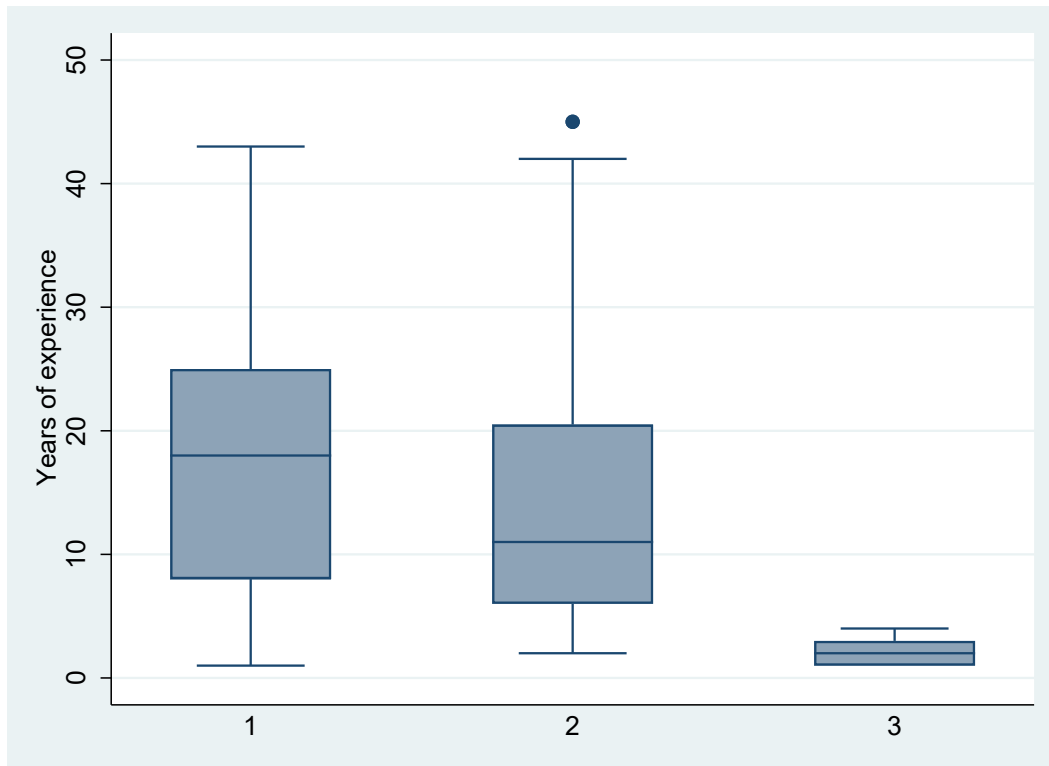


Figure 4 Distribution of Years of Experience according to Level of Training

(1= Registered Nurse; 2 = Staff Nurse; 3 = Student)

The range of years of experience is comparable between the Registered Nurses and Staff Nurses, with the mean experience of Registered Nurses being slightly higher than that of Staff Nurses (see Figure 4).

4.2 Postoperative Observations and Pain Assessment

4.2.1. How often were postoperative observations of vitals performed?

Approximately 53.33% (n =80) participants indicated that it is done strictly according to the anaesthetic postoperative instructions; 29.33% (n =44) at fixed intervals after admission from recovery, according to ward protocol; 11.33% (n =17) at the beginning, middle and end of shift and only 6% (n =9) on arrival from recovery and again before shift change.

If this is stratified further according to level of training, observations are strictly done according to anaesthetic postoperative instructions according to all groups (Registered Nurses 53.97% (n = 34); Staff Nurses 59.62% (n = 31); Student 42.86% (n = 15)). The second most selected option for all groups remain strict adherence to a ward protocol. There appears to be no difference between the subgroups of level of training in this regard.

4.2.2 How frequently do participants enquire about pain?

- during **all** observation rounds 61.33% (n = 92) and **all** medication rounds 25.33% (n = 38);
- during **some** observation rounds 10.67% (n = 16);
- only if there is obvious pain 2% (n = 3);
- 1 nurse stated that it is not her duty.

Further stratification of these results according to level of training, renders no difference between groups. Patients are preferentially asked if they have pain during all observation rounds in all 3 groups: Registered Nurses 61.90% (n = 39); Staff Nurses 57.69% (n = 30) and Students 65.71% (n = 23). Enquiring after pain during medication rounds as second most popular choice holds true in all 3 groups.

4.2.3. Preferred indicator for morphine administration?

Participants were asked to rank options from 1 to 5 according to preferred indicator for morphine administration. Rank 1 is regarded as most important to the participant, and 5 as the least important. All the ranks were added for each option, and the option with the lowest total sum, is the option selected with higher ranking.

The indicator held in highest regard is

- Facial expressions (sum 362; mean 2.41), followed by:
- Asking the patient if they want an injection for pain (sum 436; mean 2.90), then
- Increase in pulse rate and blood pressure (sum 443; mean 2.95) and finally to
- Ask the patient to grade the severity of the pain (sum 471; mean 3.14).

The least popular indicator was looking at movements and muscle tone (sum 541; mean 3.60).

Registered Nurses chose looking at facial expressions as the most important indicator (34.92% - n = 22) and asking the patient if they want an injection for the pain as the least important (33.33% - n = 21). Staff Nurses chose asking the patient if they want an injection for the pain as the most significant option (32.69% - n = 17) and asking the patient to grade the severity of the pain as the least significant option (25% - n = 13). Students set great store by asking the patient if they want an injection for the pain (40% - n = 14) and lastly looked at movement and muscle tone (25.71% - n = 9).

4.3 Rating of Perceived Pain

4.3.1. Frequency at which nurses enquire about pain intensity during their patient visits?

The results showed that 70% (n = 105) always did; 26.67% (n = 40) sometimes did; 2.67% (n = 4) rarely did and 0.67% (n = 1) never did. All groups preferentially “Always” enquire after pain intensity (Registered Nurses 77.78% (n = 49); Staff Nurses 65.38% (n = 34); Students 62.86% (n = 22)). Of the participants 41.33% (n = 62) always determined pain intensity with the aid of a pain rating scale, while 34.67% (n = 52) sometimes used a pain rating scale. 12.67% (n = 19) rarely used a pain rating scale and 11.33% (n = 17) never used a pain rating scale.

4.3.2 Awareness of pain assessment tools by nursing staff?

Word descriptions (mild/moderate/severe) was overall the most familiar pain rating scale used (66.67% - n = 100), followed by the Numeric Rating Scale (62.67% - n = 94) and Faces Pain Scale (40.67% - n = 89). Only 4 participants knew of the Visual Analogue Scale (2.67%), and 4 participants (2.67%) did not know any pain rating scales (see Figure 5). Of the participants who knew no pain rating scales, 3 were students. (Pearson chi2 Pr = 0.041).

Word descriptions were the most familiar pain scale in all 3 groups according to level of training (Registered Nurse 71.43% - n = 45; Staff Nurse 69.23% - n = 36; Student 54.29% - n = 19). This is followed by the Numeric Rating Scale (Registered Nurse 71.43% - n = 45; Staff Nurse 55.77% - n = 29; Student 57.14% - n = 20). The Faces Pain Scale came in third place across the board (Registered Nurse 47.62% - n = 30; Staff Nurse 42.31% - n = 22; Student 25.71% - n = 9).

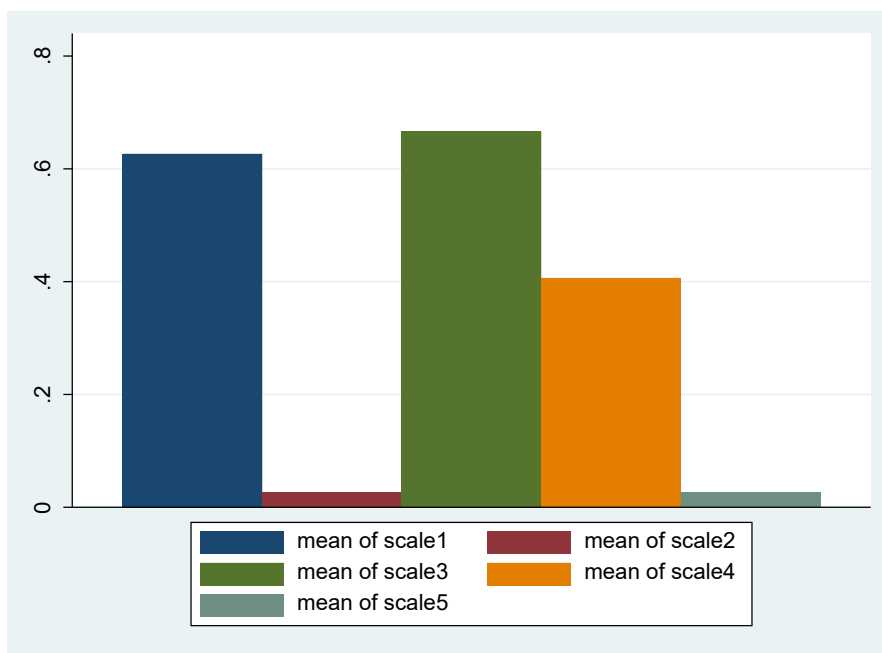


Figure 5 Means of pain rating scales of which participants bear knowledge (Scale 1 = Numeric Rating Scale; Scale 2 = Visual Analogue Scale; Scale 3 = Word Descriptions; Scale 4 = Faces Pain Scale; Scale 5 = None)

4.3.3. Use of pain assessment tools by nursing staff?

The most popular pain rating scale, as indicated by most regular use, was Word Descriptions (48% - n = 72), followed by Numeric Rating Scale (38.67% - n = 58) and lastly Faces Pain Scale (6.67% - n = 10). Only 9 participants (6%) admitted to not using a pain rating scale at all (see Figure 6).

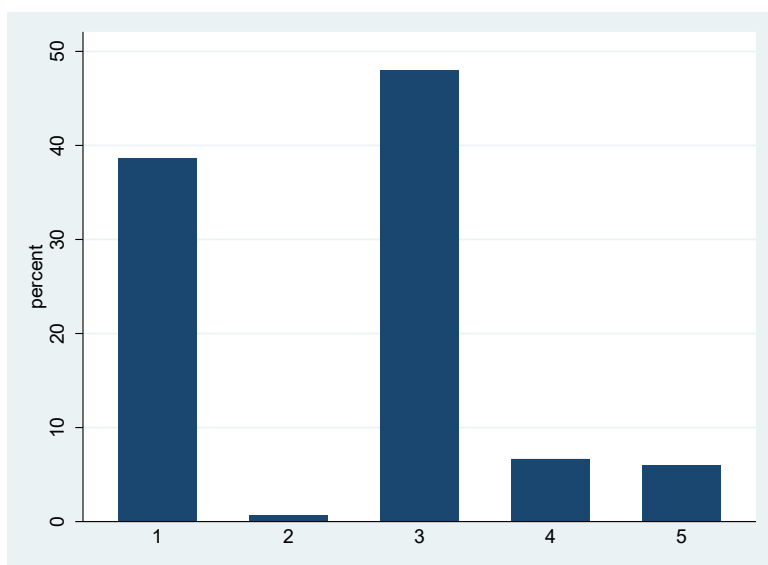


Figure 6 Percentage of pain rating scales used regularly (1 = Numeric Rating Scale; 2 = Visual Analogue Scale; 3 = Word Descriptions; 4 = Faces Pain Scale; 5 = None)

There is a slight discrepancy of preferred pain rating scale use between groups based on level of training. Registered Nurses prefer to use Numeric Rating Scale (46% - n = 29) over Word Descriptions (44.44% - n = 28). Staff Nurses prefer to use Word Descriptions (55.77% - n = 29) over Numeric Rating Scale (28.85% - n = 15). There is an equally slight propensity for students to favour Word Descriptions (42.86% - n = 15) over Numeric Rating Scales (40% - n = 14). There were 3 participants in each group which denied using any pain rating scale at all.

4.3.4. Documentation of pain assessments?

Approximately 67.33% (n = 101) of all participants document the pain intensity as elicited from the rating scale. There is a major difference in documentation of pain between groups, based on level of experience (Pearson chi2 $P < 0.001$) (see Figure 7). Registered nurses document the amount of pain 82.54% (n = 52) of the time. Staff nurses document pain intensity 65.38% (n = 34) of the time. Students only document pain 42.85% (n = 15) of the time.

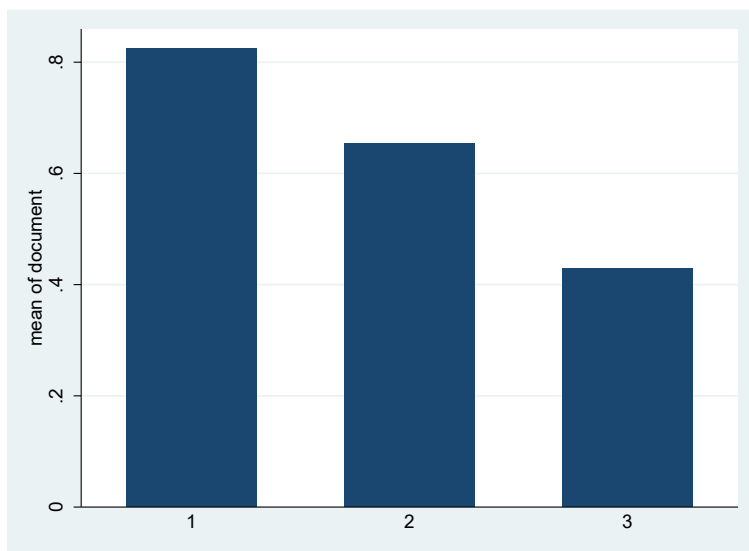


Figure 7 Mean of the documentation of pain intensity according to level of training (1= Registered Nurse; 2= Staff Nurse; 3= Student)

Approximately 85.33% (n = 128) of all participants regard it as beneficial to document pain scores on a chart alongside other vital signs. Of all the Registered Nurses 85.71% (n = 54) regard it as beneficial; 80.77% (n = 42) of the Staff Nurses and 91.43% (n = 32) of the students can also see the benefit. Students think it is very important to document pain intensity, but the majority does not comply.

4.4 Knowledge of the signs of morphine overdose

4.4.1. Nursing awareness of clinical signs of opioid overdose?

Participants were requested to rank from 1 to 4, according to their knowledge, the important signs of opioid overdose. Number 1 as regarded as the most important sign and number 4 the least important. All the ranks for each option were added and the option with the lowest total sum is the option selected with higher ranking.

- Low Respiratory Rate (sum 303; mean 2.02) was overall regarded as the most important sign, followed by
- Low Blood Pressure (sum 362; mean 2.41), then
- Not Able to Wake Patient Up (sum 382; mean 2.54) and finally
- Noisy Breathing (sum 453; mean 3.02).

Registered nurses regarded Low Respiratory Rate as the most important sign (49.21% -n = 31), and ranked it higher than the rest in the group (Pearson chi² p=0.013). Registered nurses regarded Noisy Breathing as the least important sign (31.75% – n = 20).

Staff nurses chose Low Blood Pressure as the sign most indicative of opioid overdose (42.31% - n = 22) (Pearson chi² Pr = 0.003), and Not being able to Wake the patient Up as the least indicative (40.38% - n = 21).

Students indicated Not being able to Wake the patient Up as the most important sign (42.86% - n = 15) and Noisy Breathing as the least important sign (48.57% - n = 17) of opioid overdose.

4.4.2. Nurses ability to elicit safety parameters before administering an opioid dose?

Participants were given 5 scenarios and must indicate whether or not they will administer or omit an opioid dose. The scenarios were constructed according to physical signs of increased levels of sedation.

- Overall 82% (n = 123) of participants will administer morphine if the patient responds readily to his/her name spoken in normal tone.
- 40.67% (n = 61) participants will administer morphine if the patient has a slow response to his/her name spoken in normal tone
- 31.33% (n = 47) will still administer morphine if the patient responds only if his/her name is called repeatedly and loudly
- 19.33% (n = 29) participants will continue administration of morphine if the patient only responds after a physical stimulus
- 12% of participants (n = 18) will persistently administer morphine if the patient still does not respond after a physical stimulus (see Figure 8).

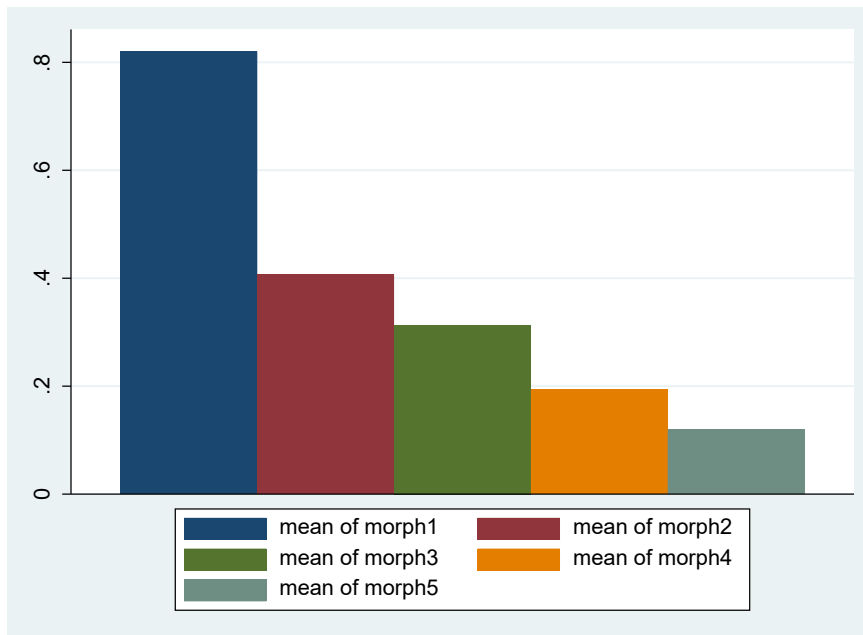


Figure 8 Mean for continued morphine administration with increasing level of sedation (Morph1 = Responds readily to name spoken in normal tone; Morph2 = Slow response to name spoken in normal tone; Morph3 = Responds only if name is called repeatedly and loudly; Morph4 = Responds only after physical stimulus; Morph5 = Does not respond after physical stimulus)

The results on continued morphine administration with deepening levels of sedation were stratified according to level of education (see Figure 9). Approximately 95.24% (n = 60) Registered Nurses, 88.46% of Staff Nurses (n = 46) and 48.57% (n = 17) of students will administer morphine if the patient responds readily to name spoken in normal tone. There is a significant difference between groups in this scenario (Pearson chi2 $p < 0.001$), indicating that Registered Nurses will more readily give morphine, if the patient is alert and awake.

If a patient is slow to respond to his/her name in normal tone, 33.33% (n = 21) of Registered Nurses, 34.62% (n = 18) of Staff Nurses and 62.86% (n = 22) of Students will administer morphine. If a patient responds only if his/her name is called repeatedly and loudly, only 11.11% (n = 7) of Registered Nurses, 32.69% (n = 17) of Staff Nurses and 65.71% (n = 23) of Students will continue to administer morphine.

Once a patient only responds to a physical stimulus, only 7.94% (n = 5) of Registered Nurses, 17.31% (n = 9) of Staff Nurses and 42.86% (n = 15) of students will still administer morphine. Lastly, if a patient does not even respond to a physical stimulus, only 1.59% (n = 1) of Registered Nurses, 5.77% (n = 3) of Staff Nurses and 40% (n = 14) of students will persistently administer morphine. Students will persist in administration of morphine, despite deep levels of sedation.

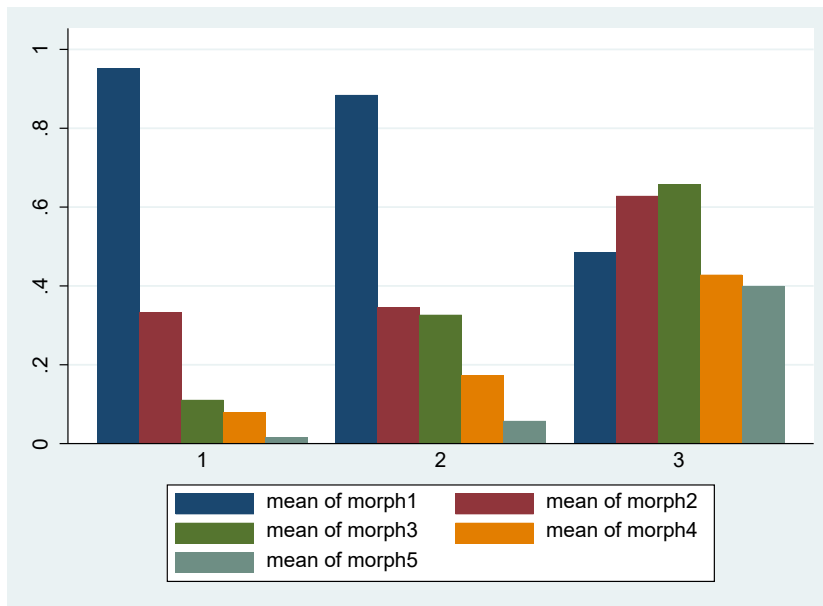


Figure 9 Mean for continued morphine administration despite increased levels of sedation, according to level of training (1= Registered Nurses; 2= Staff Nurses; 3= Students) (Morph1 = Responds readily to name spoken in normal tone; Morph2 = Slow response to name spoken in normal tone; Morph 3 = Responds only if name is called repeatedly and loudly; Morph4 = Responds only after physical stimulus; Morph5 = Does not respond after physical stimulus)

DISCUSSION

5.1 Frequency of assessment

Participants readily enquired after patients' pain experience during all observation rounds, which holds true for all levels of training. Enquiring after pain only during medication rounds is the second most popular choice in all 3 groups. 53% of participants perform postoperative observations (blood pressure, pulse rate, respiratory rate and temperature) strictly according to the anaesthetic postoperative instructions. Secondly, observations are performed 29.33% of the time at fixed intervals after admission from recovery, according to ward protocol. There is no difference between groups if this data is stratified according to level of experience. There appears to be strict adherence to either prescriptions or traditional protocols.

This is a measure of expediency. The medication round is the only time the pain can properly be addressed, and when pain enquiries may not interfere with other duties, i.e. taking vital signs or other ward work. Medication rounds at TAHSW are conducted at approximately 6 hour intervals – twice during day shift and twice during the night shift.

Unfortunately, the observation rounds are usually done by students, who are not allowed to administer medication. This will make a question on the pain experience redundant. Limited numbers of registered nurses make student supervision less effective. The hierarchy within nursing ranks could possibly prevent students from relaying patients' request for analgesia to senior staff members.

Despite this, communication links have to be established, which will ensure that all relevant information shared with students gets delivered to the registered nurse. It may be advisable for the student who performed the observations, and to whom the complaint was conveyed, to accompany the registered nurse on her medication round. The student will then be more readily reminded of the previous complaint, may aid the patient in making his/her concerns known when faced with a senior staff member, and may comment on the possible change in patient condition.

This will also be a learning opportunity for the student. The registered nurse will conduct her own evaluation, and treat the pain accordingly – as prescribed. This may ensure that the patients concerns are addressed timeously, and might reduce the general incidence of post-operative pain experiences amongst patients. Emphasis must also be placed on re-evaluation of the pain intensity after administration of analgesic agents, to evaluate the efficacy and appropriateness thereof.

5.2 Triggers for opioid administration

The indicator held in highest regard to prompt morphine administration is facial expressions. This is particularly true for Registered Nurses, who will rather use this objective parameter as indication for morphine administration, than the subjective option of asking the patient if they want morphine. The latter is regarded as the least important in this subgroup. This correlates with the established practice of experienced personnel to rely on objective markers to quantify the severity of pain, rather than the patient's self-report.⁷ These non-verbal cues have poor clinical utility, have not been scientifically validated and is dependent on a spectrum of cultural, educational and interpersonal aspects, influencing an individual's pain experience. This can result in suboptimal pain management.

Staff nurses and students regard self-report of pain, on the part of the patient, as the most important indicator for morphine administration. Staff nurses regarded grading the severity of the pain as the least important factor. This indicates an attitude that the mere fact of pain is enough to prompt morphine administration, irrespective of the severity. Staff nurses generally do not administer medication, and are not well trained in the gradation of pain intensity, or the stepwise multimodal management of pain. If pain is present it must be dealt with expeditiously and effectively, irrespective of intensity. Pain of lower intensity should rather be addressed with non-opioid analgesia.

The least popular trigger was looking at movements and muscle tone, which was especially true in the case of students. This is probably due to a lack of exposure and experience in managing patients with postoperative pain. The greater the knowledge and experience in pain assessment, the greater the tendency to identify pain based on typical pain behaviour, physiological parameters and non-verbal cues.⁷

This discrepancy found amongst the different levels of training sheds a light on one of the most fundamental clinical complaints that brings a patient and the health system together: Pain! Perhaps consideration within this study should have been given for nurses' awareness of the World Health Organisation's (WHO) analgesic ladder for pain therapies.¹⁸ This may have been useful to gauge their understanding of the difference between the use of simple analgesics like paracetamol, weak opioids and strong opioids.¹⁹

It may be advisable to place a copy of the WHO analgesic ladder within all surgical wards at Tygerberg hospital, to assist nurses in their decision on what pain medication to administer when. This will encourage the optimal use of simple analgesics and regular dosage intervals, to prevent breakthrough pain.¹⁸

5.3 Method of Assessment

At least 70% of participants always enquire after the severity of pain and only sometimes 26.67% of the time. This is the case irrespective of level of training. A pain intensity rating scale was “always” clinically utilised by 41.33% of participants and “sometimes” by 34.67%.

Word descriptions (mild/moderate/severe) was overall the most familiar pain intensity rating scale, as well as the one with the highest clinical utility. It is clinically validated and very consumer friendly, but not as sensitive or reproducible as the Visual Analogue Scale or the Numeric Rating Scale.¹⁰ It also has a limited ability to detect change in pain intensity if present. This impedes its use in clinical follow up questions after analgesic administration.¹⁰ Only 4 participants did not know any pain rating scales, of which 3 were students.

There is a slight discrepancy of preferred pain rating scale use between groups based on level of training. Registered Nurses prefer to use Numeric Rating Scale over Word Descriptions. Staff Nurses and students prefer to use Word Descriptions over Numeric Rating Scale. This indicates that simpler, user friendly rating scales are used by participants who lack the proper training and expertise. The Verbal Rating Scale lends itself to this expediency, but not reliable re-evaluation and follow-up, as in the case of a Numerical Rating Scale.⁵

If nurses are not educated in the use of more sensitive and reproducible pain intensity scales (like the Numeric Rating Scale), these scales will be derided and disregarded. The nurses will resort to using open ended questioning and layman qualitative assessments as matter of expediency, which neither has proven validity nor clinical utility. This would further compromise a patient’s pain management by involving a poorly validated technique of assessment.

The pain intensity scale must be used to primarily quantify the pain, but also changes in the pain experience, especially after analgesic administration. Emphasis must be placed on follow-up assessments after interventions.

Consequently, a unified and standardised assessment tool, to evaluate patients’ pain experience needs to be adopted among the TAHSW. Literature suggests that tools which encompass the physical and the psycho-social component of the pain experience are much more useful, because pain has been defined as an unpleasant physical and emotional experience. The pain experience can be further explored with contextual questioning, i.e.:

- Where is the pain?
- How strong is it?

- Is it there all the time or does it come and go?
- What does it feel like?
- What makes it worse?
- What makes it better?¹⁹

The Short Form McGill questionnaire has been suggested for research purposes only. Expediency will hamper its utility, if not usefulness in regular practice.¹⁹

5.4 Documentation of pain intensity

Nearly two-thirds of all participants document the pain intensity as derived from the rating scale. There is a major difference in documentation of pain between groups, based on level of experience, where Registered nurses document the pain intensity more than 80% of the time, and Staff Nurses document pain intensity only 60% of the time. Nurses are in favour of the documentation of pain intensity as an integral part of patient care. This draws attention to the patient's needs and experience and leads to improved patient care and the fulfilment of their basic rights². Students fail to document pain more than half the time. Greater emphasis needs to be placed during student nursing training on the importance of documentation.

All levels of training equally regard it as beneficial to document pain intensity on a chart, alongside other vital signs. Routine pain screening and documentation deteriorates if not institutionally monitored and mentored, and in the absence of positive feedback and incentive⁵.

Documentation may also allow us to audit and follow-up on the pain experience of patients at TAHSW more frequently. Posting visual aids in the utilisation of the Numerical Rating Scale in the TAHSW will serve as reminders and helpful tools for both nurses and patients in pain intensity evaluation. Pain intensity must be recorded on the vital sheet, alongside the other vital signs. Follow-up assessments must be done after interventions and also recorded on the vital sheet. This will allow all health care providers to be aware of the patient's pain experience in the last 24 hours – periods of breakthrough pain, and periods of high prevalence (bed washing, physiotherapy).

The contextual assessment of pain (Brief Pain Inventory or Short Form McGill Questionnaire) can be completed daily. This should be printed on a separate form and completed by the patients. This will provide context to the patient's pain experience, evaluate the psychosocial aspects involved, as well as efficacy of current analgesic strategies.

As an incentive, these inventories can be collected and audited on a frequent basis. The ward with the best analgesic scores, and best pain experience amongst patients, can be rewarded. This incentive will encourage nursing personnel to readily adopt regular, standardised, validated pain assessment and management strategies and transcend it into regular practice. This will ensure a more pleasant patient experience.

5.5 Knowledge of the signs of morphine overdose

It is disconcerting to learn how few participants are familiar with the danger signs of opioid overdose. This is evident in the fact that Low Respiratory Rate was overall regarded as the most important sign, which is expected in at least 50% of participants¹⁵. This has been proven to be a very unreliable sign of respiratory depression, because it seldom occurs despite low arterial oxygen saturation and does not reflect respiratory effort⁹. This was followed in order of preference by Low Blood Pressure, then Not Able to Wake Patient Up and lastly Noisy Breathing.

This indicates a failure of participants to recognise the dangers of advanced level of sedation, with associated respiratory compromise, and especially airway obstruction. This is particularly evident and upsetting in Registered Nurses who regarded Low Respiratory Rate as the most important sign (and subsequently ranked it higher than the rest in the group) and Noisy Breathing as the least important sign. They are ignorant of the fact that depressed level of consciousness in the presence of noisy breathing constitutes airway obstruction⁹. These should be listed as the most dangerous signs.

Staff Nurses indicated Low Blood Pressure as the most dangerous sign, and “Not being able to Wake the patient Up” as the least dangerous. Students regarded “Not being able to Wake the patient Up” as the most important sign, Noisy Breathing was relegated as the least important sign. This indicates complete oblivion with regards to the correlation between deepening level of sedation and respiratory depression¹⁵.

The majority of participants will readily administer morphine to a completely awake patient, but is less likely to do so with increasing levels of sedation. Registered nurses will more readily administer morphine than Staff Nurses, in cases of awake patients and light sedation. Both Registered Nurses and Staff Nurses are less willing to administer morphine with during deeper levels of sedation, with Registered Nurses being more cautious than Staff Nurses. A high proportion of students (40%) will continue to administer opioids despite very deep levels of sedation, as evidenced by the patient's inability to respond to physical stimulus. This highlights the difference in omission and commission associated with knowledge, level of training and experience.

There are seminars for the accrual of Continued Professional Development (CPD) points for all the nurses employed in clinics and wards at Tygerberg Academic Hospital on Friday mornings. These are arranged by the Nurses' Training Committee of Tygerberg Academic Hospital. Unfortunately, these meetings do not occur regularly and topics are determined by the medical calendar (breast cancer month, mental health month etc.). A suggestion can be made to schedule these meetings more regularly (monthly), wherein a detailed, step-wise education plan in pain assessment and management can be conducted. During these sessions the nurses can be introduced to the different pain assessment strategies and advised on which to utilise in standard clinical practice, and how to implement its use – especially with regards to follow-up assessment. This will allow for re-iteration of importance of optimal use of simple strategies, but also the indicators for administration of opioids. If opioids are to be administered, nursing personnel need to be familiar with the signs of opiate overdose and respiratory depression. This will allow for greater vigilance, better patient selection and improved patient care.²⁰

Ideally, all staff members who administer opioids should be trained in basic airway management techniques. At present, this is only reserved for anaesthetic and intensive care nurses. A future survey can explore this phenomenon, in an aim to justify resources spent on the training of nursing staff in life-saving strategies. This will ultimately reduce morbidity and mortality related to opioid administration in the general ward.

5.8 Strengths

1. This was the first study conducted at Tygerberg Hospital to evaluate postoperative pain assessment practices in the general postoperative wards.
2. The anonymity allowed for honest answers without fear of consequences.
3. The volunteer or investigator was nearby to answer questions and address concerns immediately

5.9 Limitations

1. This is a single centre study, with 150 participants. The results cannot be generalised to nursing personnel who care for postoperative patients at large.
2. The study was done on willing volunteers only, and does not reflect the practices of participants who were unwilling to be enrolled.
3. The formal informed consent form attached to the questionnaire led to many refusals to participate. This was despite repeated reassurances that anonymity will be maintained.

4. Recruitment of participants would have been much easier, and more participants could have been enrolled, had the informed consent been assumed by participation. This would have been enabled by a clause in the introduction of the questionnaire, which states that filling out the questionnaire assumes willing and voluntary participation. No personal identifiers or descriptors, other than needed for demographic data, would have been necessary.
5. The format of a written questionnaire resembled a written test too acutely, which many individuals were unwilling to be submitted to.
6. This was an assessment of a subjective view on practice, and was subject to idealisation and embellishment.
7. The majority of nursing staff encountered during day shifts were nursing students, in view of staff conditions at Tygerberg Hospital, who do not dispense medication.

CONCLUSION

Pain is ubiquitous and prevalent throughout the postoperative experience. There are myriad reasons for this: poor communication, bias, staff shortages and lack of training and education. The greatest challenge lies in the proper identification and quantification of the pain experience which can be overcome through training of nurses to utilise validated pain intensity scores. This will influence the timing and strategies employed to alleviate the suffering. Standardisation of the assessment of the pain experience, and education in the proper documentation and management of pain, will markedly improve the patient's postoperative experience. Education in the dangers and pitfalls of opioid administration, and basic airway management skills, will destigmatise opioid use and ensure proper analgesia in the appropriate candidate. Admitting a problem is the first step to recovery. Identifying a problem is the first step to a solution.

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APPENDIX A: OBSERVER'S ASSESSMENT OF ALERTNESS AND SEDATION SCORE

OAAS	Clinical State
5	Responds readily to name spoken in normal tone
4	Lethargic response to name spoken in normal tone
3	Responds only after name called loudly and/or repeatedly
2	Does not respond to mild prodding or shaking
1	Does not respond to noxious stimuli

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APPENDIX B: QUESTIONNAIRE

Title: Postoperative pain assessment: A review of nursing practices at Tygerberg Academic Hospital

This Questionnaire refers to the monitoring of postoperative patients who had surgery in the last 24 hours. Please indicate the most appropriate option for each question.

How often do you take **postoperative** observations (BP, heart rate, respiratory rate)?

- Beginning, middle and end of shift
- Fixed intervals after admission from recovery, according to ward protocol
- Strictly according to the anaesthetic postoperative instructions
- On arrival from recovery and again before shift change

How often do you ask patients if patients have pain?

- During all observation rounds
- During some observation rounds
- During medication rounds
- Only if there is obvious pain
- None of the above, because it is not my duty

Number and rank from 1 - 5 the most commonly used method to decide if Morphine is needed:

- _ Ask patient if they want pain injection
- _ Ask patient to grade severity of pain

- _ Looking at facial expressions
- _ Looking at movements and muscle tone
- _ Increase in pulse rate and blood pressure

Do you ask how strong the pain is during a patient visit?

- Always
- Sometimes
- Rarely
- Never

If yes, do you use a pain rating scale?

- Always
- Sometimes
- Rarely
- Never

Which scales do you know? (Can mark more than one)

- Numeric Rating Scale (Give a number from 0-10)
- Visual analogue scale (make a mark on a line 0 - 100 mm)
- Word descriptions (mild/moderate/severe)
- Faces Pain Scale
- None

Which scale do you most often use?

- Numeric Rating Scale (Give a number from 0-10)
- Visual analogue scale (make a mark on a line 0 - 100 mm)
- Word descriptions (mild/moderate/severe)
- Faces Pain Scale
- None

Do you document the amount of pain?

- Yes
- No

Do you think it will be beneficial to document pain score on a chart, like all other vital signs?

- Yes
- No

What is the most important sign of Morphine overdose? Number and rank from 1 - 4.

- _ Low respiratory rate
- _ Noisy breathing
- _ Not able to wake patient up
- _ Low blood pressure

You suspect the patient has pain. Indicate in the following cases if you would give, or not give the prescribed Morphine.

- | | |
|--|---------------|
| <input type="checkbox"/> Responds readily to name spoken in normal tone | Give/Not Give |
| <input type="checkbox"/> Slow response to name spoken in normal tone | Give/Not Give |
| <input type="checkbox"/> Responds only if name is called repeatedly and loudly | Give/Not Give |
| <input type="checkbox"/> Responds only after physical stimulus | Give/Not Give |
| <input type="checkbox"/> Does not respond after physical stimulus | Give/Not Give |

Demographics

Age _____

Level of training – Registered Nurse/ Staff Nurse / Student

Years of Experience _____

Day shift/ Night Shift

Ward _____