Complete Summary

GUIDELINE TITLE

Pain management in blunt thoracic trauma (BTT).

BIBLIOGRAPHIC SOURCE(S)

Eastern Association for the Surgery of Trauma (EAST). Pain management in blunt thoracic trauma (BTT). Winston-Salem (NC): Eastern Association for the Surgery of Trauma (EAST); 2004. 79 p. [114 references]

GUIDELINE STATUS

This is the current release of the guideline.

COMPLETE SUMMARY CONTENT

SCOPE
METHODOLOGY - including Rating Scheme and Cost Analysis
RECOMMENDATIONS
EVIDENCE SUPPORTING THE RECOMMENDATIONS
BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS
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INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES
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SCOPE

DISEASE/CONDITION(S)

Pain associated with blunt thoracic trauma (BTT)

Note: Blunt thoracic trauma is defined here to include soft tissue trauma and injuries to the bony thorax such as rib fractures and flail chest.

GUIDELINE CATEGORY

Management
Treatment

CLINICAL SPECIALTY

Anesthesiology
Emergency Medicine
Thoracic Surgery

INTENDED USERS

Advanced Practice Nurses
Nurses
Physicians

GUIDELINE OBJECTIVE(S)

- To identify the optimal method(s) of pain control for patients with blunt chest trauma
- To address the following questions utilizing an evidence-based approach for outcome evaluation:
    - Which patients with blunt chest trauma are at particular risk for respiratory morbidity due to pain and deserve special attention to pain management?
    - With consideration for safety, feasibility, and therapeutic effectiveness, what is the optimal method of pain control in blunt chest trauma?
    - For the recommended modality/modalities, what technical recommendations can be made for the administration of analgesia in blunt chest trauma?
        - Anesthetic and technology concerns
        - Nursing considerations

TARGET POPULATION

Patients with blunt chest trauma (BTT) including soft tissue trauma and injuries to the bony thorax such as rib fractures and flail chest

INTERVENTIONS AND PRACTICES CONSIDERED

Management/Treatment

1. Epidural analgesia (EA)
2. Intravenous analgesia (IVA)
3. Paravertebral analgesia (PVA)
4. Extrapleural analgesia (EPA)
5. Intrapleural analgesia (considered, but no specific recommendation made)
6. Intercostal block (ICB) (considered, but no specific recommendation made)
7. Continuous epidural infusion vs. intermittent injection (not recommended)
8. Anesthetics (e.g., bupivacaine)
9. Narcotics (e.g., fentanyl, morphine)
10. Combination anesthetic + narcotic
11. Clinical performance measures (pain scale, pulmonary exam/function, arterial blood gas [ABG])
12. Monitored setting (cardiac monitoring and continuous pulse oximetry)

MAJOR OUTCOMES CONSIDERED

- Subjective pain perception
- Mortality
- Ventilator days
- Intensive care unit (ICU) length of stay
- Hospital length of stay
- Incidence of pneumonia
- Respiratory depression
- Complication rate

METHODOLOGY

METHODS USED TO COLLECT/SELECT EVIDENCE

Hand-searches of Published Literature (Primary Sources)
Searches of Electronic Databases

DESCRIPTION OF METHODS USED TO COLLECT/SELECT THE EVIDENCE

A computerized search was conducted of the Medline, Embase, and Cochrane controlled trials databases for North American and European English language literature for the period from 1966 through July 1, 2003. The initial search terms were "chest injuries," "thoracic injuries," "rib fractures," and "flail chest." These were cross-referenced for the secondary terms "analgesia," "anesthesia," and "pain." This search initially yielded 213 articles. 128 of these articles were excluded as being case studies, reviews, letters, or otherwise irrelevant to the questions being asked. This yielded a file of 85 articles for review. An additional 51 articles were obtained from the references of these studies yielding a total of 136 studies for review and grading. Ninety-one of these were deemed appropriate for inclusion in the final evidentiary tables.

NUMBER OF SOURCE DOCUMENTS

91

METHODS USED TO ASSESS THE QUALITY AND STRENGTH OF THE EVIDENCE

Weighting According to a Rating Scheme (Scheme Given)

RATING SCHEME FOR THE STRENGTH OF THE EVIDENCE

Evidence Classification Scheme

Class I: Prospective randomized controlled trials (PRCTs) - the gold standard of clinical trials. Some may be poorly designed, have inadequate numbers, or suffer from other methodological inadequacies, and thus may not be clinically significant.

Class II: Clinical studies in which the data were collected prospectively, and retrospective analyses which were based on clearly reliable data. These types of

studies so classified include observational studies, cohort studies, prevalence studies, and case control studies.

Class III: Most studies based on retrospectively collected data. Evidence used in this class includes clinical series, databases or registries, case reviews, case reports, and expert opinion.

METHODS USED TO ANALYZE THE EVIDENCE

Systematic Review with Evidence Tables

DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE

All studies were reviewed by two committee members and graded according to the standards recommended by the Eastern Association for the Surgery of Trauma (EAST) Ad Hoc Committee for Guideline Development. Grade I evidence was also sub-graded for quality of design utilizing the Jahad Validity Scale published in *Controlled Clinical Trials* in 1996. Any studies with conflicting grading were reviewed by the committee chairperson and were all Grade I studies.

METHODS USED TO FORMULATE THE RECOMMENDATIONS

Expert Consensus

DESCRIPTION OF METHODS USED TO FORMULATE THE RECOMMENDATIONS

Recommendations were formulated based on a committee consensus regarding the preponderance and quality of evidence.

RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS

Level 1: The recommendation is convincingly justifiable based on the available scientific information alone. It is usually based on Class I data; however, strong Class II evidence may form the basis for a level 1 recommendation, especially if the issue does not lend itself to testing in a randomized format. Conversely, weak or contradictory Class I data may not be able to support a level 1 recommendation.

Level 2: The recommendation is reasonably justifiable by available scientific evidence and strongly supported by expert critical care opinion. It is usually supported by Class II data or a preponderance of Class III evidence.

Level 3: The recommendation is supported by available data but adequate scientific evidence is lacking. The recommendation is generally supported by Class III data. This type of recommendation is useful for educational purposes and in guiding future studies.

COST ANALYSIS

A formal cost analysis was not performed and published cost analyses were not reviewed.

METHOD OF GUIDELINE VALIDATION

External Peer Review
Internal Peer Review

DESCRIPTION OF METHOD OF GUIDELINE VALIDATION

The draft document is submitted to all members of the panel for review and modification. Subsequent to this the guidelines are forwarded to the chairmen of the Eastern Association for the Surgery of Trauma (EAST) ad hoc committee for guideline development. Final modifications are made and the document is forwarded back to the individual panel chairpersons.

The guidelines are then presented to the EAST membership. This is accomplished in two ways, oral presentation at the national meeting or via the Internet. This allows the members an opportunity to ask questions, make suggestions, and improve the guidelines. Approximately 3 months after presentation, final revisions are made to the document and the guidelines are submitted to the Guideline Editorial Review Board. This board is made up of members of the American Association for Surgery of Trauma (AAST). The purpose of this review is to assure that the recommendations are supported by the evidence, that all the evidence pertinent to the guideline has been collected, and to offer expert opinion in areas where there is debate or lack of adequate data. The revised document is then sent back to the panel chairpersons and the chairman of the guidelines committee. After completing the revisions, the guideline is forwarded to the Journal of Trauma and to the EAST Web page. Authorship is inclusive of the EAST subcommittee as well as the American Association for Surgery of Trauma editorial review committee.

RECOMMENDATIONS

MAJOR RECOMMENDATIONS

The levels of recommendation (I-III) and classes of evidence (1-3) are defined at the end of the "Major Recommendations" field.

Efficacy of Analgesic Modalities

Level 1

1. Use of epidural analgesia (EA) for pain control after severe blunt injury and non-traumatic surgical thoracic pain significantly improves subjective pain perception and critical pulmonary function tests compared to intravenous (IV) narcotics. EA is associated with less respiratory depression, somnolence and gastrointestinal symptoms than IV narcotics. EA is safe, with permanent disability being extremely rare and negligible mortality attributable to treatment.

Level II

1. Epidural analgesia may improve outcome as measured by ventilator days, intensive care unit (ICU) length of stay, and hospital lengths of stay.
2. There is some class I and adequate class II evidence to indicate that paravertebral or extrapleural infusions are effective in improving subjective pain perception and *may* improve pulmonary function.

Level III

1. Though paravertebral or extrapleural analgesia is effective, there is an inadequate quantity of comparative evidence or information regarding safety to establish any recommendation with regard to overall efficacy.
2. The information regarding both the effectiveness and safety of intrapleural and intercostal analgesia is contradictory and experience with trauma patients is minimal. Consequently no recommendation can be made regarding overall efficacy of this modality.

Clinical Application of Pain Management Modalities to Treatment of Blunt Thoracic Trauma (BTT)

Level I

1. EA is the optimal modality of pain relief for blunt chest wall injury and is the preferred technique after severe blunt thoracic trauma.

Level II

1. Patients with 4 or more rib fractures who are $\geq$65 years of age should be provided with EA unless this treatment is contraindicated.
2. Younger patients with 4 or more rib fractures or patients aged $\geq$65 with lesser injuries should also be considered for EA.

Level III

1. The approach for pain management in blunt chest trauma requires individualization for each patient. Clinical performance measures (pain scale, pulmonary exam/function, arterial blood gas) should be measured as judged appropriate at regular intervals.
2. Presence in elderly patients of cardiopulmonary disease or diabetes should provide additional impetus for EA as these comorbidities may increase mortality once respiratory complications have occurred.
3. Intravenous narcotics, by divided doses or demand modalities, may be used as initial management for lower risk patients presenting with stable and adequate pulmonary performance as long as the desired clinical response is achieved.
4. High-risk patients who are not candidates for epidural analgesia should be considered for paravertebral (extrapleural) analgesia commensurate with institutional experience.

5. A specific recommendation cannot be made for intrapleural or intercostal analgesia based on the available evidence but its apparent safety and efficacy in the setting of thoracic trauma has been reported.

Technical Aspects of Epidural Analgesic Agents

Level I

1. There is insufficient Class I and Class II evidence to establish any specific techniques of EA as a standard of care.

Level II

1. Combinations of a narcotic (i.e., fentanyl) and a local anesthetic (i.e., bupivacaine) provide the most effective EA and are the preferred drug combinations for use by this route. Use of such combinations allows decreased doses of each agent and may decrease the incidence of side effects attributable to each.

Level III

1. While reliable literature describes the safe use of EA on regular surgical floors, most victims of blunt thoracic trauma receiving this modality of treatment will have other primary indications for a higher level of care. Consequently, such patients in general, should be nursed in a monitored setting with cardiac monitoring and continuous pulse oximetry.
2. There is insufficient evidence at this time to make a recommendation regarding the use of continuous epidural infusion vs. intermittent injection in trauma patients.

Definitions

Strength of Recommendations

Level 1: The recommendation is convincingly justifiable based on the available scientific information alone. It is usually based on Class I data; however, strong Class II evidence may form the basis for a level 1 recommendation, especially if the issue does not lend itself to testing in a randomized format. Conversely, weak or contradictory Class I data may not be able to support a level 1 recommendation.

Level 2: The recommendation is reasonably justifiable by available scientific evidence and strongly supported by expert opinion. It is usually supported by Class II data or a preponderance of Class III evidence.

Level 3: The recommendation is supported by available data but adequate scientific evidence is lacking. It is generally supported by Class III data. This type of recommendation is useful for educational purposes and in guiding future clinical research.

Evidence Classification Scheme

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Class III: Most studies based on retrospectively collected data. Evidence used in this class includes clinical series, databases or registries, case reviews, case reports, and expert opinion.

CLINICAL ALGORITHM(S)

None provided

EVIDENCE SUPPORTING THE RECOMMENDATIONS

TYPE OF EVIDENCE SUPPORTING THE RECOMMENDATIONS

Conclusions were based on evidence obtained from prospective, randomly assigned, double-blinded studies (Class I); prospective, randomly assigned, non-blinded studies (Class II); or retrospective series of patients or meta-analysis (Class III).

The type of supporting evidence is identified and graded for each recommendation (see "Major Recommendations").

BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS

POTENTIAL BENEFITS

Appropriate management of pain in patients with blunt thoracic trauma (BTT)

POTENTIAL HARMS

- The disadvantages of systemic narcotics are the tendency to cause sedation, cough suppression, respiratory depression, and hypoxemia.
- There are numerous real and theoretical disadvantages to epidural analgesia (EA). Insertion may be technically demanding. Epidural anesthetics can cause hypotension, particularly in the face of hypovolemia, and occasional epidural infection. Epidural hematoma, accidental entry into the spinal canal, and spinal cord trauma can also occur. Inadvertent "high block" may lead to respiratory insufficiency.
- Intravenous analgesia tends to have significantly more respiratory depression, central sedative effects, and gastrointestinal effects. Conversely epidural modalities tend to have more peripheral neurological effects, pruritus, and when anesthetic agents are used, mild hypotensive effects.

CONTRAINDICATIONS

CONTRAINDICATIONS

- The contraindications to epidural may prove problematic in the trauma patient. These include fever, coagulation abnormalities of even minor degrees and altered mental status.
- It should be noted for completeness that as of April 1998, the Food and Drug Administration had recorded fifty spontaneous anecdotal safety reports describing the development of epidural hematomas with the concurrent use of low molecular weight heparins (i.e., enoxaparin sodium) and epidural analgesia. The use of these medications for deep venous thrombosis prophylaxis may be a relative contraindication to epidural modalities.

IMPLEMENTATION OF THE GUIDELINE

DESCRIPTION OF IMPLEMENTATION STRATEGY

The final version of the guideline is forwarded to the Journal of Trauma and to the Eastern Association for the Surgery of Trauma (EAST) Web page.

The guideline developers make the following recommendations regarding implementation:

Implementation involves extensive education and inservicing of nursing, resident, and attending staff members and has one important guiding principle: the guidelines must be available to the clinicians in real time while they are actually seeing the patient. The two most common ways to apply these are by using either a critical pathway or a clinical management protocol. A critical pathway is a calendar of expected events that has been found to be very useful within designated Diagnosis-Related Groups (DRGs). In trauma, where there are multiple diagnosis-related groups used for one patient, pathways have not been found to be easily applied with the exception of isolated injuries. Clinical management protocols (CMPs), on the other hand, are annotated algorithms that answer the "if, then" decision making problems and have been found to be easily applied to problem-, process-, or disease-related topics. The CMP consists of an introduction, an annotated algorithm and a reference page. The algorithm is a series of "if, then" decision making processes. There is a defined entry point followed by a clinical judgment and/or assessment, followed by actions which are then followed by outcomes and/or endpoints. The advantages of algorithms are that they convey the scope of the guideline, while at the same time organize the decision making process in a user-friendly fashion. The algorithms themselves are systems of classification and identification that should summarize the recommendations contained within a guideline. It is felt that in the trauma and critical care setting, CMPs may be more easily applied than critical pathways; however, either is acceptable provided that the formulated guidelines are followed. After appropriate inservicing, a pretest of the planned guideline should be performed on a limited patient population in the clinical setting. This will serve to identify potential pitfalls. The pretest should include written documentation of experiences with the protocol, observation, and suggestions. Additionally, the guidelines will be forwarded to the chairpersons of the multi-institutional trials committees of the

Eastern Association for Surgery of Trauma, the Western Association for Surgery of Trauma (WEST), and the American Association for Surgery of Trauma (AAST). Appropriate guidelines can then be potentially selected for multi-institutional study. This process will facilitate the development of user friendly pathways or protocols as well as evaluation of the particular guidelines in an outcome based fashion.

INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES

IOM CARE NEED

Getting Better

IOM DOMAIN

Effectiveness

IDENTIFYING INFORMATION AND AVAILABILITY

BIBLIOGRAPHIC SOURCE(S)

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ADAPTATION

Not applicable: The guideline was not adapted from another source.

DATE RELEASED

2004

GUIDELINE DEVELOPER(S)

Eastern Association for the Surgery of Trauma - Professional Association

SOURCE(S) OF FUNDING

Eastern Association for the Surgery of Trauma (EAST)

GUIDELINE COMMITTEE

Not stated

COMPOSITION OF GROUP THAT AUTHORED THE GUIDELINE

Not stated

FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST

Not stated

GUIDELINE STATUS

This is the current release of the guideline.

GUIDELINE AVAILABILITY

Electronic copies: Available in Portable Document Format (PDF) from the Eastern Association for the Surgery of Trauma (EAST) Web site.

Print copies: Available from the Eastern Association for the Surgery of Trauma Guidelines, c/o Stanley Kurek, Jr., DO, FACS, Medical University of South Carolina, Department of Surgery, 96 Jonathan Lucas Street, 420 CSB, P.O. Box 250613, Charleston, SC 29425; Phone: (843) 792-3780; Email: guidelines@east.org

AVAILABILITY OF COMPANION DOCUMENTS

The following is available:

- Utilizing evidence based outcome measures to develop practice management guidelines: a primer. 18 p. 2000. Available in Portable Document Format (PDF) from the Eastern Association for the Surgery of Trauma (EAST) Web site.

PATIENT RESOURCES

None available

NGC STATUS

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