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Transitioning to ‘Evidence for Excellence in Care’: Implementing evidence-based practice in NSW Ambulance

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Presentation outline

- 'Traditional' process used to inform clinical policies
- The case for change
- Our new model
- Example – applying the new model to inform our spinal care protocol
- Next steps and summary

'Traditional' process

Traditional 'medical model':

- Medical Director – assumes expertise across many areas
- 'Ad hoc' processes and use of evidence
- Uncertainty around alternative, more appropriate processes to guide policy related practices

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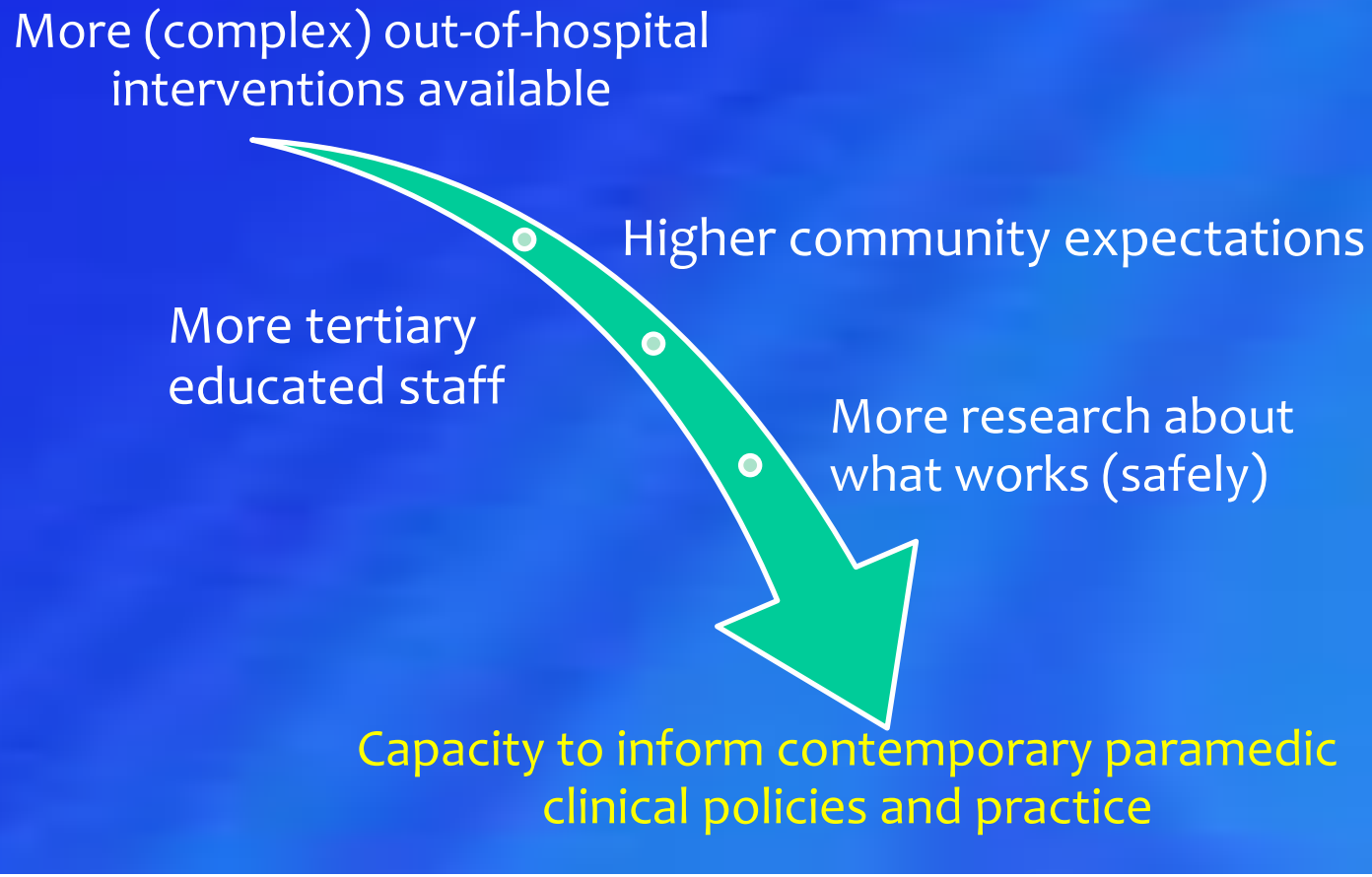
Paramedic clinical policies



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Paramedic clinical policies

Changing our practice: what we did

Reviews of the academic literature (2012):

- Processes and frameworks used to inform clinical policies in:
  - Emergency medical services
  - Wider healthcare settings

Changing our practice: what we found

- Emergency medical services:
  - 7 papers – only 3 really useful

International Journal of Evidence-Based Healthcare

The Joanna Briggs Institute

doi:10.1111/1744-1609.12039

Int J Evid Based Healthc 2013; **11:** 299–304

EVIDENCE TRANSFER

Informing clinical policy decision-making practices in ambulance services

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Changing our practice: what we found

- Wider health care settings; non-systematic review:
  - Difficult to establish keywords
    - 'knowledge translation' (Davison et al)
      - before 1990; < 100 papers
      - 2012; 110,000 papers
  - SUPPORT Tools notably useful (Oxman, Lavis et al)

Davison C, & National Collaborating Centre for Determinants of Health. *Critical examination of Knowledge to Action models and implications for promoting health equity.* Antigonish, NS: National Collaborating Centre for Determinants of Health, St. Francis Xavier University;2013.

Oxman et al. SUPPORT tools for evidence-informed health policymaking (STP) 1: What is evidence-informed policymaking? Health Research Policy and Systems 2009;7

Changing our practice: agreeing on the new model

- Comprehensive report prepared:
  - Outlining the case for change
  - Methodology used to inform new model
  - Proposed new evidence-based model

- Consensus meetings
  - Stakeholders – NSW Ambulance senior managers/executive, staff specialist, Clinical Governance Committee (external Chair)
  - Document reviewed, amended and agreed (2 meetings)
  - CE approval early 2013

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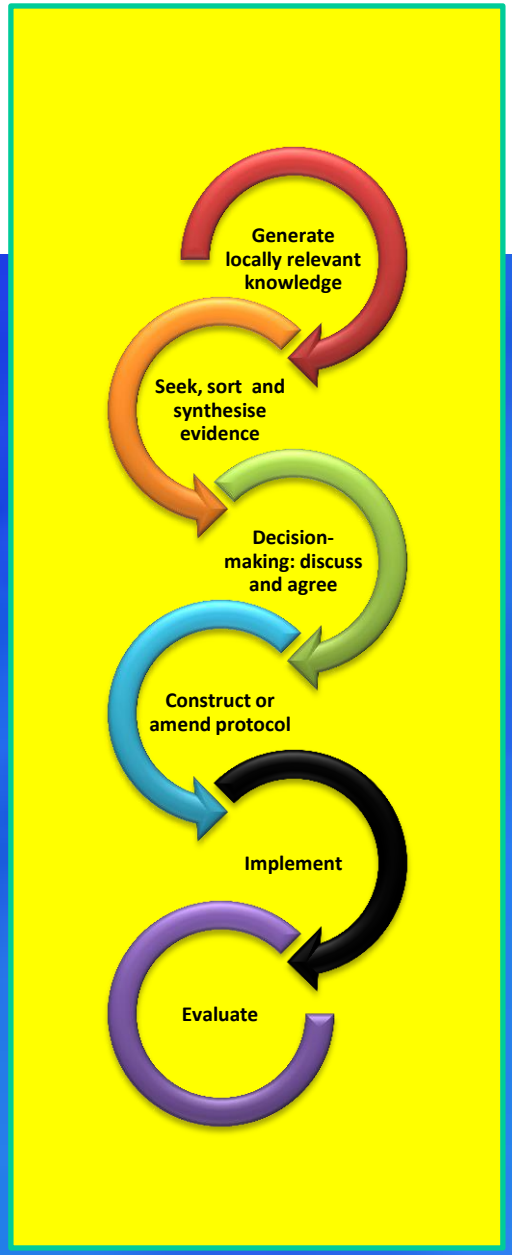
Our six-phase model

Policy review triggered by:

- Routine review
- Ministerial directives
- Adverse event (IIMS)
- New evidence (in-house surveillance system)
- Medication review group
- Peak body guideline publication (ILCOR)
- Paramedic/clinician query



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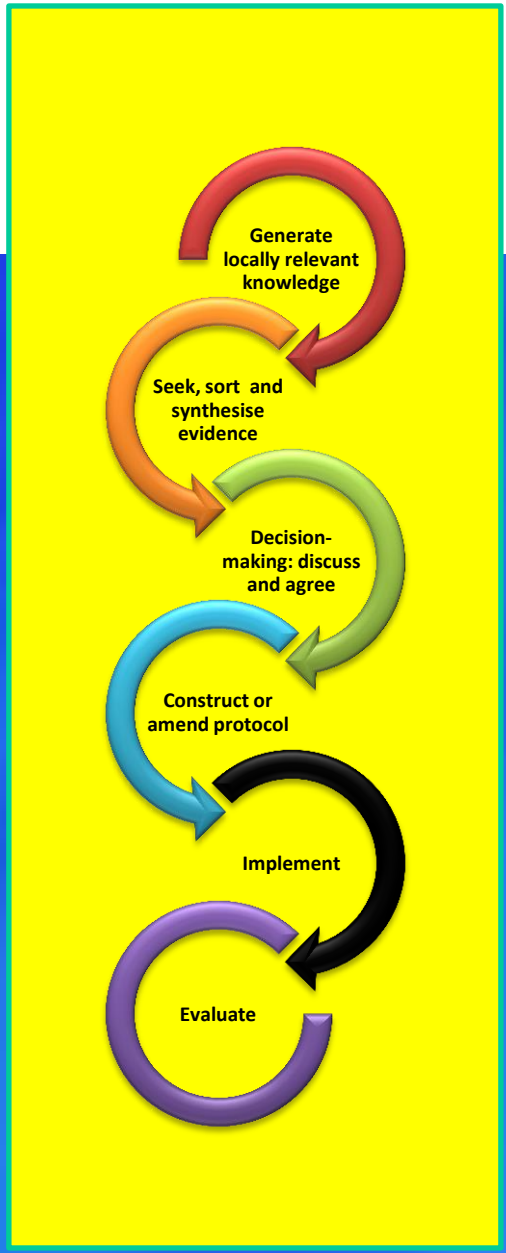
Utilising the new model

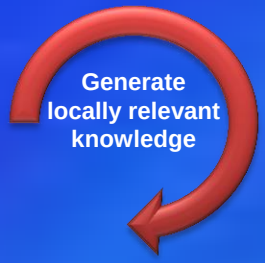
Informing review of the

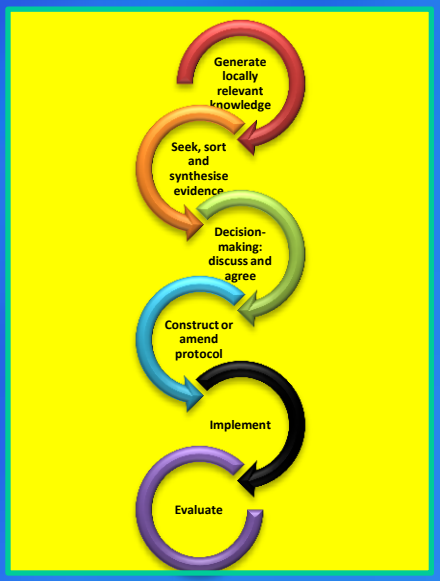
'T5 Spinal Injuries' protocol'

- Identify an appropriate, validated spinal clearance tool



Implementing the model: Spinal Injuries protocol



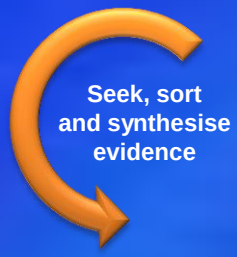


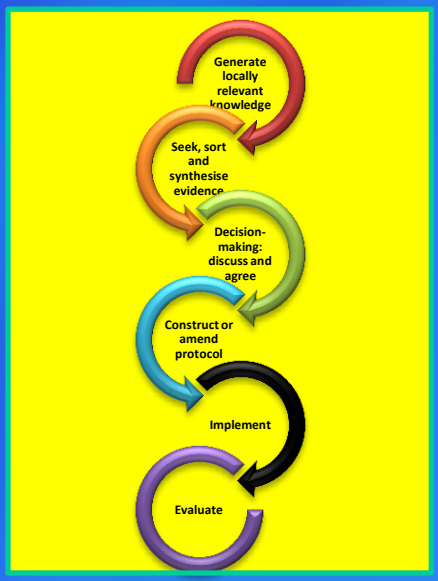
- Clinical and epidemiological research
  - Priority driven
  - Clinical research – collaborative approach
  - Data linkage expertise

Implementing the model: Spinal Injuries protocol

Research Officer:

Protocols & Practice





- ‘Evidence synthesis’ document:
  - Executive summary and recommendations
  - Context
  - Review methodology
  - Results of academic and grey literature searches
  - Appendix: critical appraisal tool

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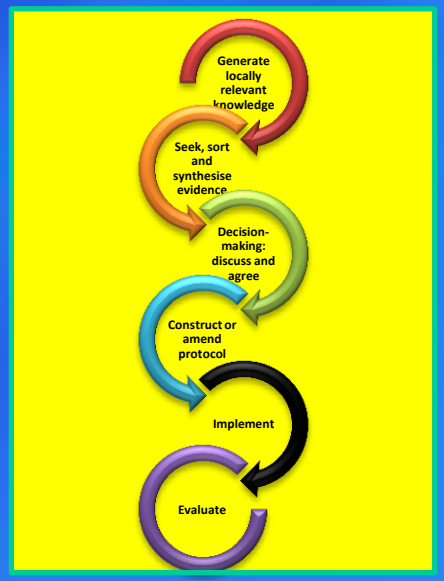
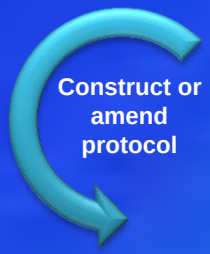
Implementing the model: Spinal Injuries protocol

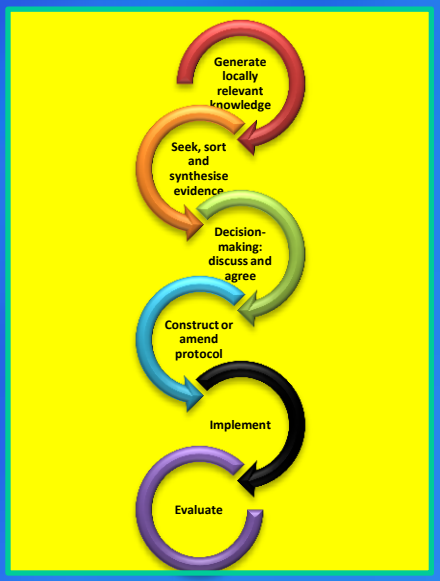


- New Clinical Interventions and Procedures Committee:
  - Canadian C-Spine – best model in literature
  - 'Local' evidence considered with 'scientific' evidence: final consensus to opt for NEXUS
  - Started September 2013, consensus March 2014

Implementing the model: Spinal Injuries protocol



- Clinical Professional Development
  - Amendments to old protocol



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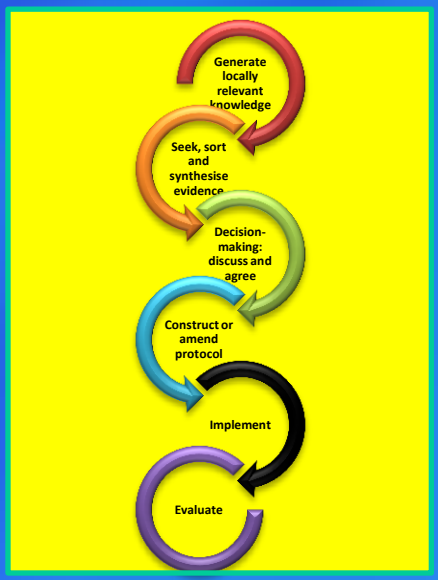
Implementing the model: Spinal Injuries protocol

- New protocol launched June 2014
  - Clinical Training Officers, Education
  - Scheduled Training sessions.



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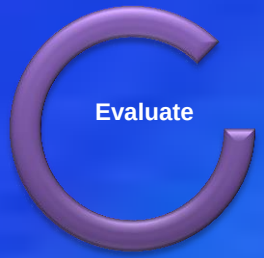
SPINAL INJURIES PROTOCOL T5

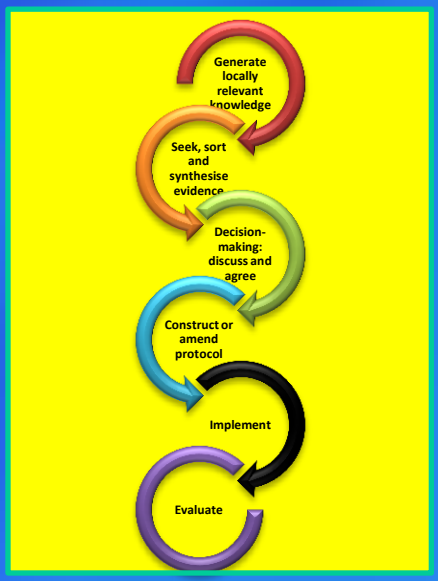
Spinal cord injuries are relatively uncommon but have the potential to cause significant morbidity and mortality.

The principle aim of management is to limit neurological deficit by preventing movement of the injured or potentially injured spinal column.

Implementing the model: Spinal Injuries protocol



- Difficult to resource for all policy changes – opportunities for postgraduate paramedics, others.



Challenges to date

- Need to read the Evidence Synthesis to meaningfully contribute to discussions!
- 'Opinion' or 'Dr Google' still first options for many
- Embedding an evidence-informed approach to all our clinical and operational decision-making
- Subsequent review (Patient Assessment policy) stuck in 'discuss and agree' phase

Next steps

- Evidence Review Network
  - Increase surveillance
  - Harness paramedic expertise
  - More proactive approach to new evidence
- Refining Evidence Synthesis document
- Evaluate success – user friendliness of Evidence Syntheses, the whole model.

Summary

- New model
- Systematic and transparent six-phase process – built to withstand scrutiny
- Concept enjoys high level support
- Immediate feedback – very positive

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Questions?

Evidence Synthesis: appraising the evidence

Canadian PEP tool for Spinal review:

- Levels of evidence – type of study
- Directions of evidence – supportive, neutral, opposed

Dalhousie University Department of Emergency Medicine. Canadian Prehospital Evidence Based Protocols. http://emergency.medicine.dal.ca/ehsprotocols/protocols/TOC.cfm.

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Evidence Synthesis: appraising the evidence

'Research Officer: Protocols & Practice'

Levels of Evidence (Table A1) is a way of ranking studies according to the strength of their methodology. Studies that are more likely to be without bias are ranked higher than those where factors other than the intervention may be causing the observed results/effect. The Canadian PEP separates studies into three levels: randomised controlled trials (level I), studies with comparison groups (level II) and studies without comparison groups (level III). As is common in pre-hospital research, few randomised controlled trials have been conducted.

Table A1: Levels of Evidence – From Dalhousie University (2013) (72)

Level I	Evidence obtained from at least one properly randomised controlled trial or systematic reviews or meta-analysis that contain RCTs.
Level II	Evidence obtained from non-randomised studies with a comparison group or systematic reviews of non-randomised studies with a comparison group. Registry-type studies in which comparisons are made are included here.
Level III	Evidence from studies with no comparison group or simulation studies or animal studies.
Excluded from PEP	Opinion articles, editorials or articles not reporting primary studies.

Direction of Evidence (Table A2) refers to whether the article supports or opposes the proposed intervention. There are three directions of evidence: supportive, neutral and opposed. Studies that support the use of an intervention are deemed to be neutral in this review if they are performed in a non-pre-hospital setting. Unless otherwise noted, all non-pre-hospital studies that show a positive effect for the intervention are categorised as neutral.

This is slightly different to the Canadian PEP, which leaves the assessment of whether a study is applicable to pre-hospital to the discretion of the reviewer. For the sake of consistency with the Canadian process, studies of EDs classified by PEP as supportive (green) remain classified as such in the tables. Note is made, however, in the descriptive text about any potential disagreement between NSW Ambulance assessment and PEP.

Reasons for neutral grading are included in the evidence synthesis summary tables.

Table A2: Direction of Evidence – From Dalhousie University (2013) (72)

Green	Direction of results of this study are supportive for the use of this intervention
Yellow	Direction of the results of this study are neutral for the use of this intervention
Red	Direction of the results of this study oppose the use of this intervention

Evidence Synthesis

Table 5: Augmented NEXUS

Reference	Study design and population	Sensitivity	Specificity	Outcome measures	Findings of note
Domeier, 1999 (17) N = 6500 US	NEXUS criteria augmented with **mechanism of injury** Multicentre prospective cohort study 209 with spinal injuries. Level of evidence: II Supportive for NEXUS without mechanism of injury criterion.	Without mechanism of injury assessment, 97% for high risk group 94% for low-risk group	NA	Mechanism of injury and yes/no determinations of the clinical criteria: altered mental status, neurologic deficit, evidence of intoxication, spinal pain or tenderness, and suspected extremity fracture.	"Mechanism of injury does not affect the ability of clinical criteria to predict spinal injury in this population."
Muhr et al, 1999 (18) N = 298 patients US	NEXUS criteria augmented with **pain with motion** and **loss of consciousness during event** Prospective study with a retrospective review of medical incident reports Level of evidence: II Supportive	NA	NA	Assessment using augmented criteria, outcome measures re neurological deficit and/or spinal injury.	"An out-of-hospital spinal clearance algorithm administered by paramedics can reduce SI by one-third. Any application of a spinal clearance algorithm should be accompanied by rigorous medical
Burton et al, 2005 and 2006 (15, 16) N = 207,545 US	NEXUS criteria augmented with **C-spine high risk scenarios** Prospective study of 207,545 EMS encounters with pre-hospital, 2,220 patient assessments, 7 acute spine fractures Level of evidence: II Neutral	100% (when paramedic records use of protocol) 87% (across state after protocol roll out)	41.5% (param records 59.5% (across state)		

Table 8: Comparison of NEXUS and CCR

Reference	Study design and population	Sensitivity	Specificity	Outcome measures	Findings of note
Eyre, 2006 (1)	Literature review 10 articles Level of evidence: III (not systematic review) Neutral – not focussed on pre-hospital	CCR – 100% NEXUS – 99.6%-100%	CCR – 42.5% NEXUS – 12.9%	Prefers CCR: "The literature has consistently demonstrated the CCR to be both more sensitive and specific than the NEXUS Low-Risk Criteria for detecting cervical spine injuries. C-spine injuries, while relatively rare, can result in devastating outcomes, thus encouraging physicians to remain conservative and cautious."	
Michaleff et al (2012) (40)	Systematic review 15 studies of moderate quality Level of evidence: II Neutral – not focussed on pre-hospital	NEXUS – 83%-100% CCR – 90%-100%	NEXUS – 2%-46% CCR- 1%-77%	Prefers CCR: "Based on studies with modest methodologic quality and only one direct comparison, we found that the Canadian C-spine rule appears to have better diagnostic accuracy than the NEXUS criteria. Future studies need to follow rigorous methodologic procedures to ensure that the findings are as free of bias as possible."	
Stiell et al, 2003 (39) N = 8283 Canada	Prospective cohort study Assessed by 394 physicians 169 patients with clinically important injuries Level of evidence: II Neutral – not focussed on pre-hospital	CCR – 99.4% NEXUS – 90.7%	CCR – 45.1% NEXUS – 36.8%	Assessment by both criteria compared to radiography or proxy outcome tool.	Prefers CCR: "The CCR would have missed 1 patient and the [NEXUS] would have missed 16 patients with important injuries."
Ehrlich et al, 2009 (38) N = 275 US	Retrospective, case-matched study of trauma patients <10 years 7 patients with significant c-spine injuries Level of evidence: II Opposed – to the use of spinal clearance on children under 10 years	CCR – 86% NEXUS – 43%	CCR – 94% NEXUS – 96%	Retrospective assessment vs clinical findings.	"Although CCR and NEXUS criteria may reduce the need for C-spine imaging in children 10 years and younger; they are not sensitive or specific enough to be used as currently designed."

Evidence Synthesis

2. Augmented NEXUS

An augmented NEXUS tool was reported in four papers, most of which supported the use of NEXUS (15-18) (Table 5). These studies were published between 1999 and 2006 and all were undertaken in the US. All studies were concerned with pre-hospital applications of NEXUS and provided level II evidence:

- In two studies (reported in three papers), the **NEXUS criteria** were **combined with the CCR criteria regarding mechanism of injury** (15, 17, 19). One of these studies examined a state wide roll out of a the spinal assessment protocol. The authors found that the protocol had excellent sensitivity (100%) and good specificity (41.5%) when they examined the linked data for patients who were treated by paramedics that filled out an assessment form (15). However, when the assessment accuracy for the entire state was examined, the levels of sensitivity (87%) and specificity (59.5%) were much lower (19).
- The other paper that examined the combining of NEXUS with mechanism of injury assessment examined how mechanism of injury affected the reliability of the spinal clearance tool, and found that there was no effect on the ability to predict spinal injury (17).
- The remaining study augmented NEXUS by adding measures regarding pain with motion (a CCR criterion) and loss of consciousness during the event (a criterion not associated with either NEXUS or CCR). The authors claimed that the tool could reduce spinal immobilisation by a third (18).