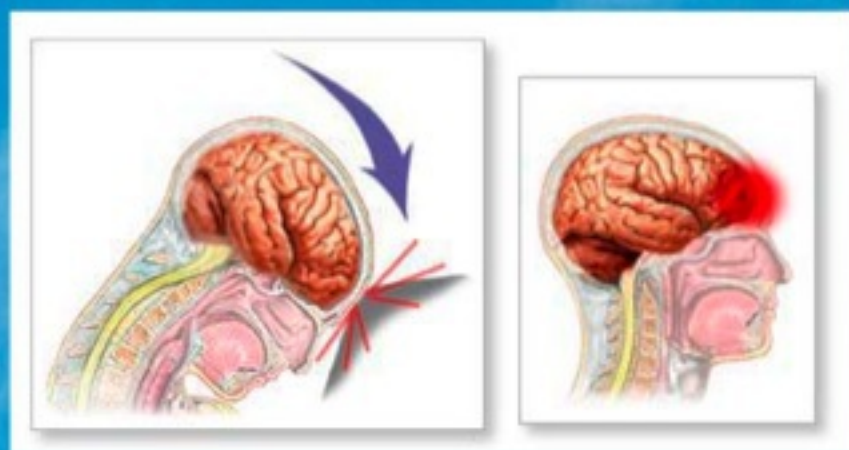# Improving the diagnosis and management of mild TBI among children presenting to the emergency department

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THE UNIVERSITY
OF AUCKLAND
NEW ZEALAND
Te Whare Wānanga o Tāmaki Makaurau

MTBI background

- "Silent Epidemic"
- 90% of all TBI among children = "mild"
- 1:5 children experience 1 MTBI < 16 years
- 3 to 5 times as many seen in 1^0 care
- Significance:
  - Complications e.g. somatic symptoms, cognitive deficits, behavioural problems
  - Large burden on individuals, families, and the healthcare system

WHO TBI Task Force Operational Definition of Mild TBI

One or more of the following:

- Confusion or disorientation
- Loss of consciousness </=30mins
- Post traumatic amnesia >24hrs
- Transient neurological abnormalities such as focal signs, seizure, and intracranial lesion

And:

- Glasgow Coma Scale score 13-15
- Manifestations of TBI are not due to drugs, alcohol, or medications, are not caused by other injuries or treatment for other injuries, and are not caused by other problems (e.g. psychological trauma, language barrier, or coexisting medical conditions) or penetrating craniocerebral injury.

Recent research

Aim: To determine if children with head injuries, who are discharged home from ED, are managed according to best practice standards

Objectives:

- Collection of data for determining the diagnosis of TBI
- Application of criteria for safe discharge
- Provision of information and advice about TBI
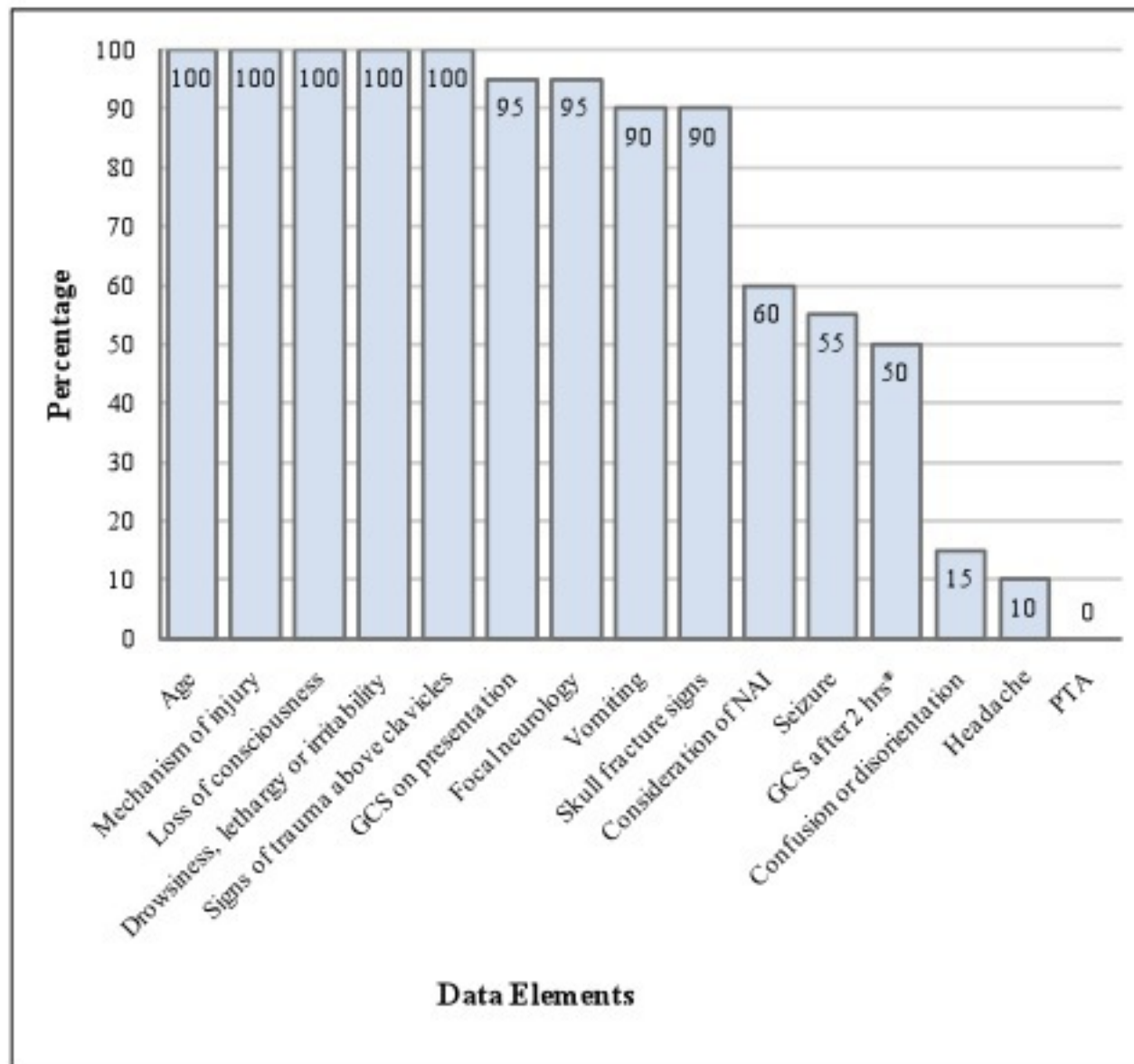- Description of follow-up practices

Methods

- Clinical audit of ED records

- Children aged 0-14 years discharged in 2007 from Starship Hospital ED following a head injury

- Stratified purposeful sampling strategy: 60 patients, 15 from four ethnic groups

- Processes of care relating to the objectives were compared with best practice standards derived from guidelines
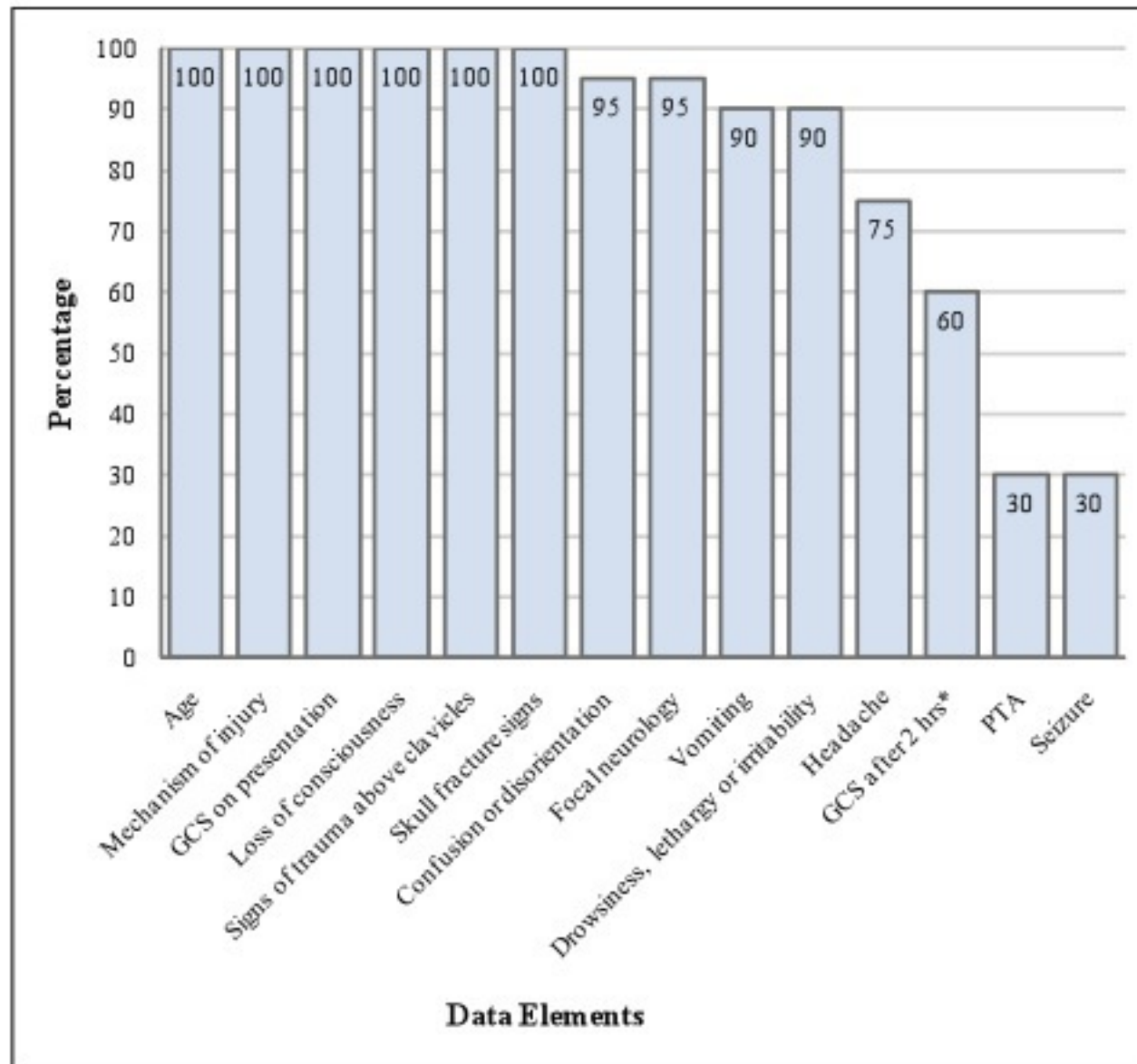
Key findings

- Data elements were documented to a high standard

- Diagnosis of MTBI:
  - Not evident that data elements were applied systematically to diagnose MTBI or estimate the probability of MTBI
  - 30 of 60 cases filled criteria for definite or possible TBI
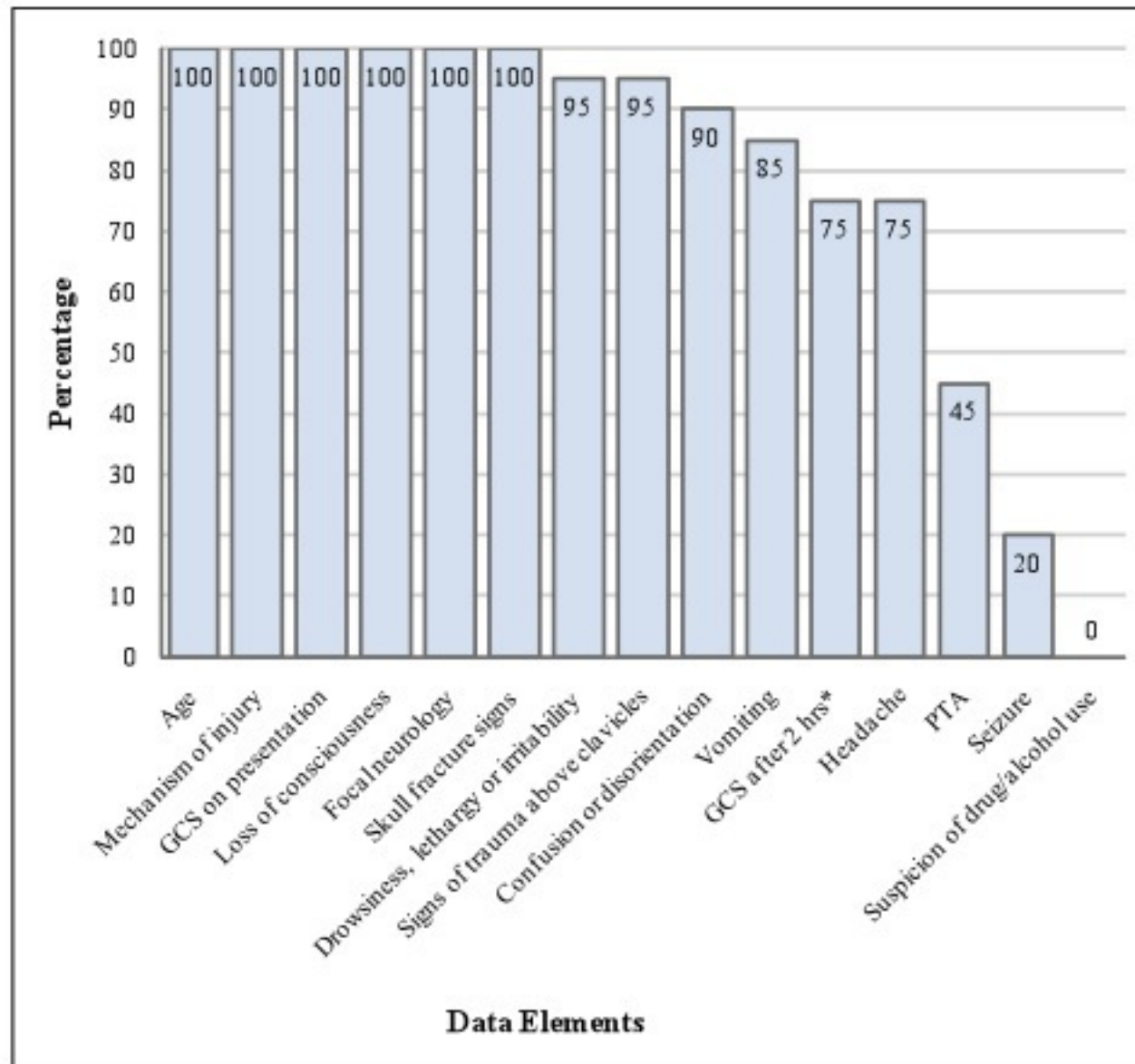 - Discharge codes used interchangeably

Documentation of data elements: 0-4 years (n=20)

Documentation of data elements: 5-9 years (n=20)

Documentation of data elements: 10-14 years (n=20)

Additional findings relating to documentation

- Criteria for safe discharge
  - 80% did not specifically document the adequacy of support structures

- Information and advice
  - 88% had documentation that information was given
  - 1 record - consideration of language needs
  - 4 records - consideration of prevention issues

- Follow-up
  - Discharge summary letter to GP
  - 14 children referred to GP
  - 20 patients with definite/possible brain injury had no specific follow-up plans

Discussion points

- Possible contributors to variability in documentation
  - Main aim of ED management of TBI is detection of clinically significant acute complications
  - Recognition and identification of MTBI is a challenge

- Actions to improve quality of care
  - Improve recognition and appropriate follow-up of MTBI
  - Develop integrated services
  - Prevention advice
  - Cultural support

- Further research
  - An improved evidence base about MTBI among children is required

Translational Research Project

Aim

To develop and implement a computerised decision support system (CDSS) tool to improve the diagnosis, management, and follow-up of acute MTBI among children in the ED setting

Objectives

1. To explore the management of children with MTBI in other settings

2. To identify barriers to current best practice

3. To develop a CDSS for the diagnosis, management, and follow-up of children with MTBI

4. To follow-up children with MTBI assessed using the CDSS tool

Computerised (clinical) Decision Support System(CDSS)

"Clinical Decision Support systems link health observations with health knowledge to influence health choices by clinicians for improved health care". *R. Hayward, Centre for Health Evidence*

Table 1: Functions of CDSS and how they can be used in paediatric clinical practice Ramnarayan, P. J. *Arch Dis Child 2002;87:361-362*

Function	Example of routine use
Alert	Clinical-laboratory systems highlighting abnormal values
Diagnosis	Producing a differential diagnosis for paediatric rheumatic diseases
Reminder	Reminding the clinician to schedule an immunisation visit
Suggestion	Suggesting adjustments to adjust mechanical ventilation
Interpretation	Paediatric electrocardiogram interpretation
Prediction	Predicting mortality from a Paediatric Index of Mortality (PIM) score
Critique	Reviewing total parenteral nutrition prescriptions
Assistance	Assisting selection of optimal antibiotic choices in neonatal infections

Methods

Phase One: *Identifying barriers to best practice*

- Retrospective audit of 60 children presenting with MTBI to a Whitecross A & M clinic and Kidz First ED

- Interviews with Clinicians to identify barriers to care

Phase Two: *Translation of knowledge into best practice*

- Development of the evidence-based CDSS tool. Focus on "when to CT/refer" and identifying and managing MTBI.

Methods *continue*

Phase Three: *Evaluation*

- Follow-up study of 40 children who have been assessed by the CDSS
- Detailed interviews with 20 clinicians who have piloted and used the CDSS
- Retrospective audit of 60 cases to establish if CDSS resulted in best-practice care

Phase Four: *Cohort Study Foundation*

- The CDSS will allow development of a detailed long-term cohort of children who have suffered MTBI

Investigators & Study Advisory Group

- Principal Investigators: Dr Bridget Kool & Dr Stu Dalziel
- Co investigators: Dr Mike Shepherd, Dr Hine Elder, Prof. Shanthi Ameratunga, Dr Sue Wells, Prof. Jim Warren

Study Advisory Group

White Cross Accident and Medical, Brain Injury New Zealand; Kaiatawhai, Starship; Dr Jocelyn Neutze (Paediatric emergency care specialist) Dr Kathryn Edward and EeWei Lim (paediatric rehab specialists), Pip Bishop (paediatric OT); paediatric neuropsychologist (TBC); Dr Matire Harwood, (Clinical Director for Tāmaki Healthcare); ACC

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White Cross Accident and Medical

Kidz First

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