Post-crash victim transport to hospital door

How The Land Transport Sector can expedite Post Impact Care-the fifth pillar of the Safe System approach

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Post Impact Care- New Zealand situation

Many aspects of post-crash care are health services responsibilities, e.g. major trauma registry, co-ordination of air ambulance helicopter services.

This project is about the assistance Transport Sector Agencies can do to assist their health sector partners-it is not about medical response.

Agencies include:

- NZTA

- Road Controlling Authorities (Councils)

- Regional entities like Auckland Transport

- Road Policing

The Safe System Approach to Road Safety

The ultimate road safety goal is a road transport system devoid of fatal and serious injury;
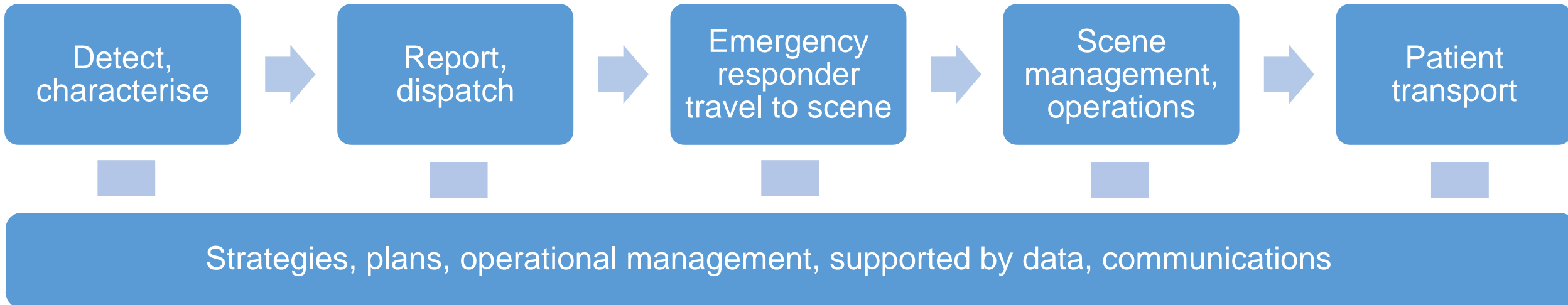 and

Good progress towards this can only be made if programmes allow for the fact that road users, including drivers, make mistakes.

- This means that we must address the crashes of at-fault drivers as well as drivers not at fault

- This includes rescuing them, which gives post impact care its place as the fifth pillar of the Safe System approach.

Response to a motor vehicle crash

Transport Sector partners can influence events between a crash and the patient's arrival at hospital

Chain of opportunities to reduce the severity of injury consequences

Detect, characterise → **Report, dispatch** → **Emergency responder travel to scene** → **Scene management, operations** → **Patient transport**

Strategies, plans, operational management, supported by data, communications

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Potential for improved outcomes

- Swift access to advanced care for injured patients can improve outcomes – both survival and quality of life

- International studies show higher fatality rates in rural areas, with risk from slower notification and longer times for emergency services to arrive

- Study of pre-hospital trauma deaths in Otago and Southland, 2000-2004, found 10% had survivable injuries, 35% potentially survivable injuries (70% were from motor vehicle crashes)

Relevant NZ Transport Sector goals and objectives

NZTA

- Shaping smart, safe transport choices – vehicles are safe (measured by the % of 5 star vehicles in the fleet)
- Delivering safe, resilient highway solutions – highway journeys are safer (Measured by fatal and serious crashes)

MoT

'Intelligent Transport Systems Technology Action Plan 2014-2018'
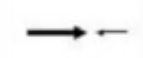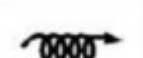
- Does not consider post-crash care but addresses relevant issues, like vehicle technologies for crash reduction, network management, C-ITS, real-time travel info.
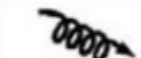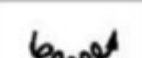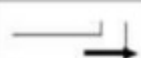- Monitoring international developments, research activities, demonstration trials

Working internationally and across NZ agencies for common technology standards

The shape of the project

- Review of existing knowledge

- Analysis of a sample of fatal crashes investigated by a Coroner find out how outcomes may have been improved by actions of members of the transport sector.

- Analysis of fatal crashes to assess the accessibility to hospital of their sites via the emergency services

- Capture of expert knowledge:

  - a structured workshop of Stakeholders and Emergency Service managers

  - a targeted online survey of frontline emergency workers from St Johns, Fire and Emergency NZ and Road Policing

- Integration of these strands of information to provides well-informed, practical recommendations for transport sector partners.

Analysis of fatal crashes investigated by a Coroner

- Dataset of 85 fatal crashes with coroner reports (2008 – 2016)
- Time, location (incl. grid reference), contributing factors, text from attending Police and crash movement codes retrieved from The NZTA Crash Analysis System (CAS)
- Injury and emergency response information, if available, extracted from coroner's findings, crash reports, media reports
  - Very little explicit response information was available
  - The post-crash response is seldom mentioned by coroners
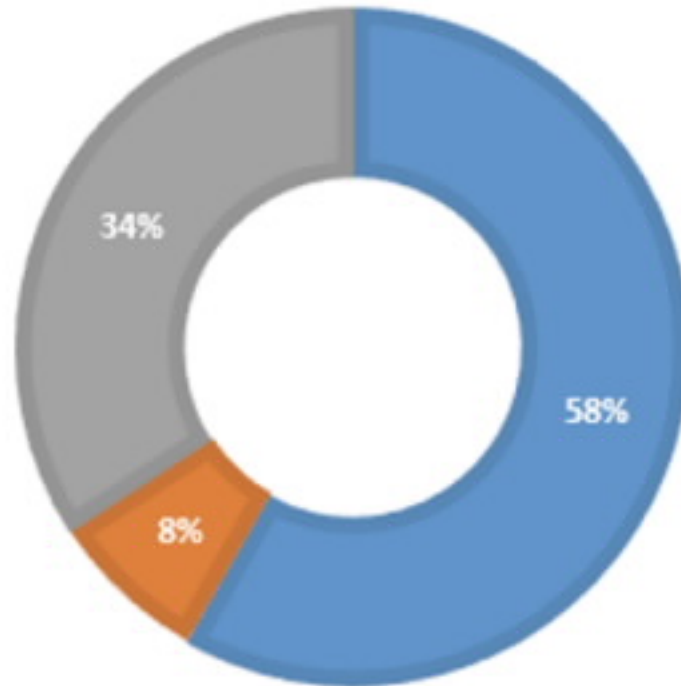
Time and place of death

DIED AT SCENE?

■ Yes ■ Some ■ No

34%

58%

8%

ALL VICTIMS DIED INSTANTLY?

■ Yes ■ Probably ■ No ■ Unknown

13%

20%

10%

57%

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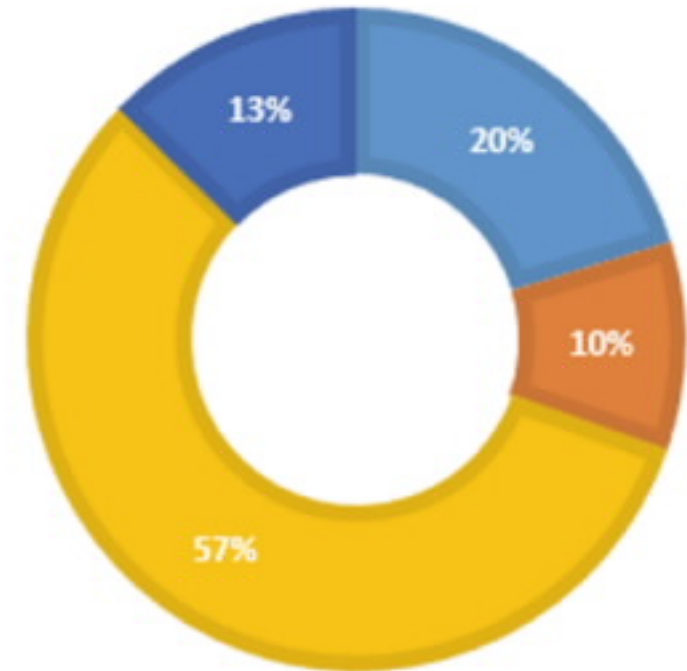
Response time and crash scene access

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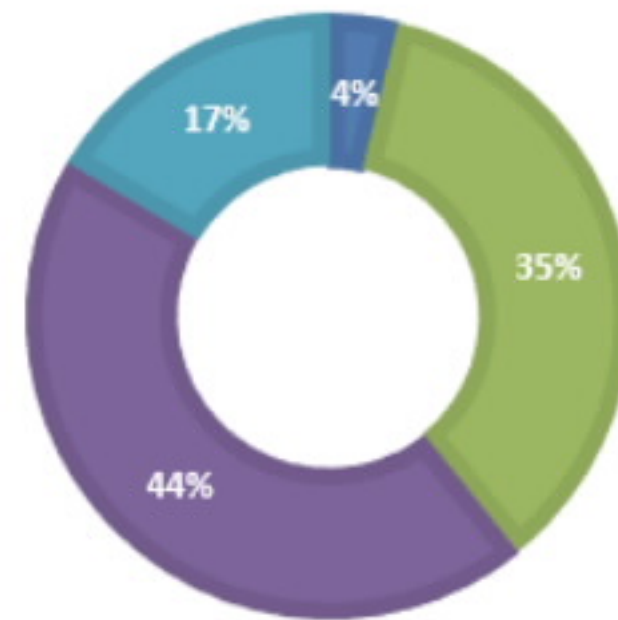
Travel time by air and land rescuers to fatal crash site*

Chart: "Time in minutes" (y-axis) vs. rescue type categories (x-axis). Legend: Air Rescue (blue), Land Rescue (orange).

Category	Air Rescue	Land Rescue
Urban Mean Time from base to crash site	6	10
Urban-Median Time from base to crash site	4	6
Rural -Mean Time from base to crash site	14	12
Rural-Median Time from base to crash site	12	10

■ Air Rescue ■ Land Rescue
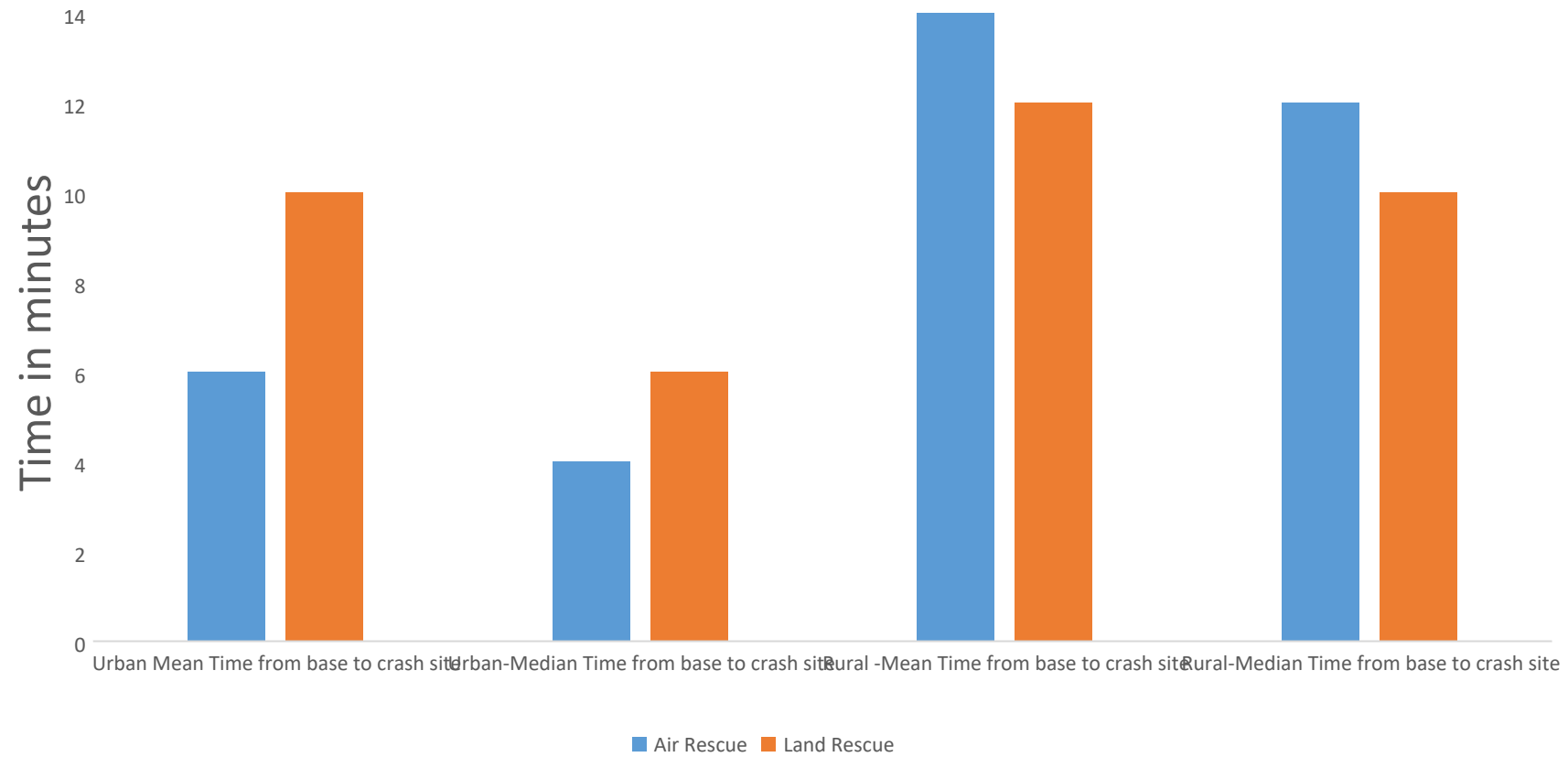
* Excludes time between reporting and start of rescue vehicle journey. All fatal Crashes for 2016

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Time at the crash site

- Many factors- including smooth working together of Ambulance, Fire and Rescue and Police personnel

Image from Major Trauma Network (www.majortrauma.nz)

opusinternational.com

Travel from crash site to hospital door

- There are 20 major trauma hospitals. Of these 7 are tertiary hospitals where the most serious cases are taken.

- We can't tell from the crash data whether a victim would go to a tertiary hospital or not and ~ 20% of all trauma cases are taken to a hospital and then transferred to another one.

- This made estimation of travel times to hospital a "bridge too far".

- We can get an idea of times from the Major Trauma Network . estimates for all trauma

Time from scene to first hospital – all trauma

Time (hours)	<1	1-2	2-4	>4	>24	No Trauma Time
Northern	30%	39%	17%	7%	5%	2%
Midland	21%	35%	29%	10%	2%	4%
Central	26%	41%	19%	5%	6%	3%
South Island	34%	32%	14%	6%	8%	5%
Total	28%	37%	20%	7%	5%	3%
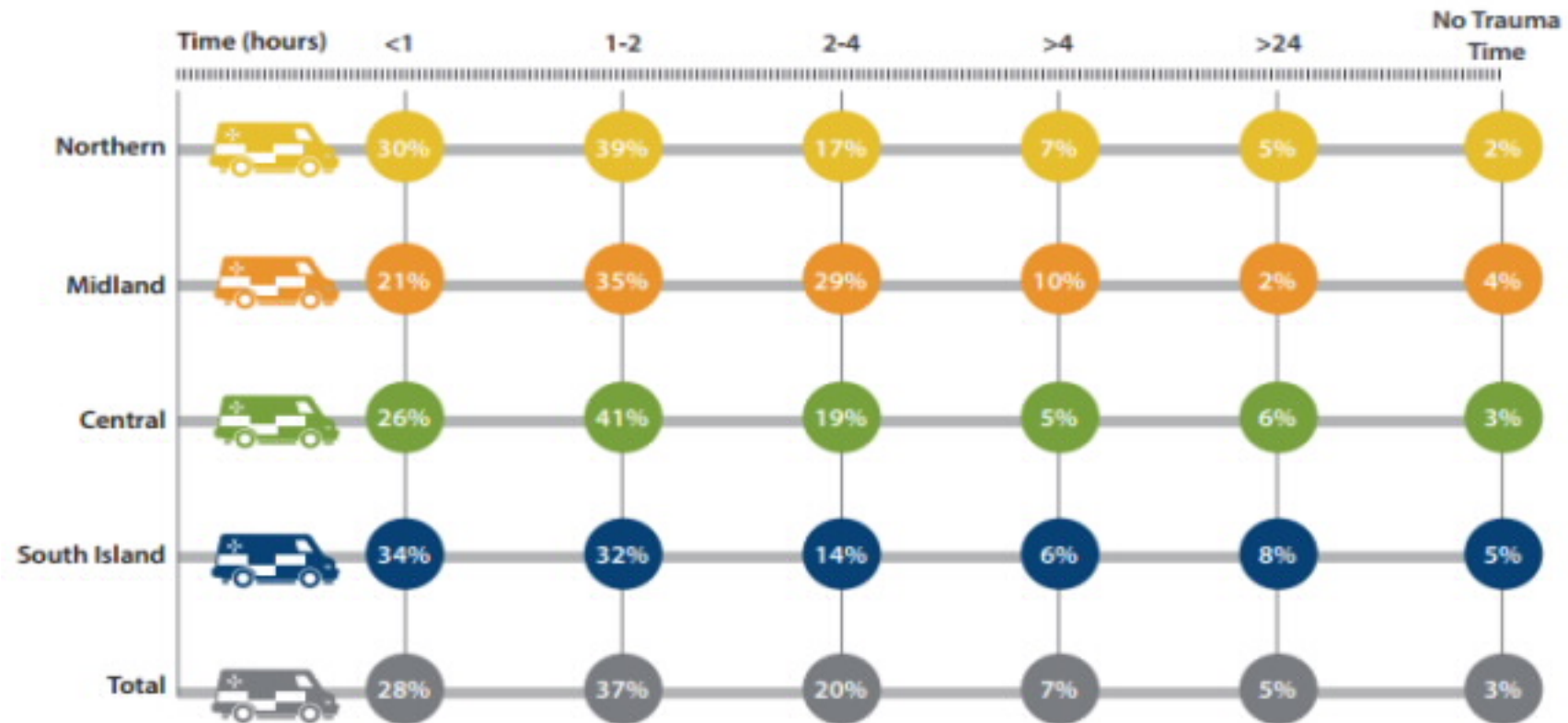
* Major Trauma Network Estimates

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Overall situation

The total time from the crash to final treatment hospital can be very variable

- Plenty of potential for NZTA, other RCAs and Road Policing to work together with Emergency Services to reduce it.

- Reducing it will save lives and reduce the consequences of injury

- How to reduce it? Ask the Stakeholders/Emergency Service managers/ Frontline workers
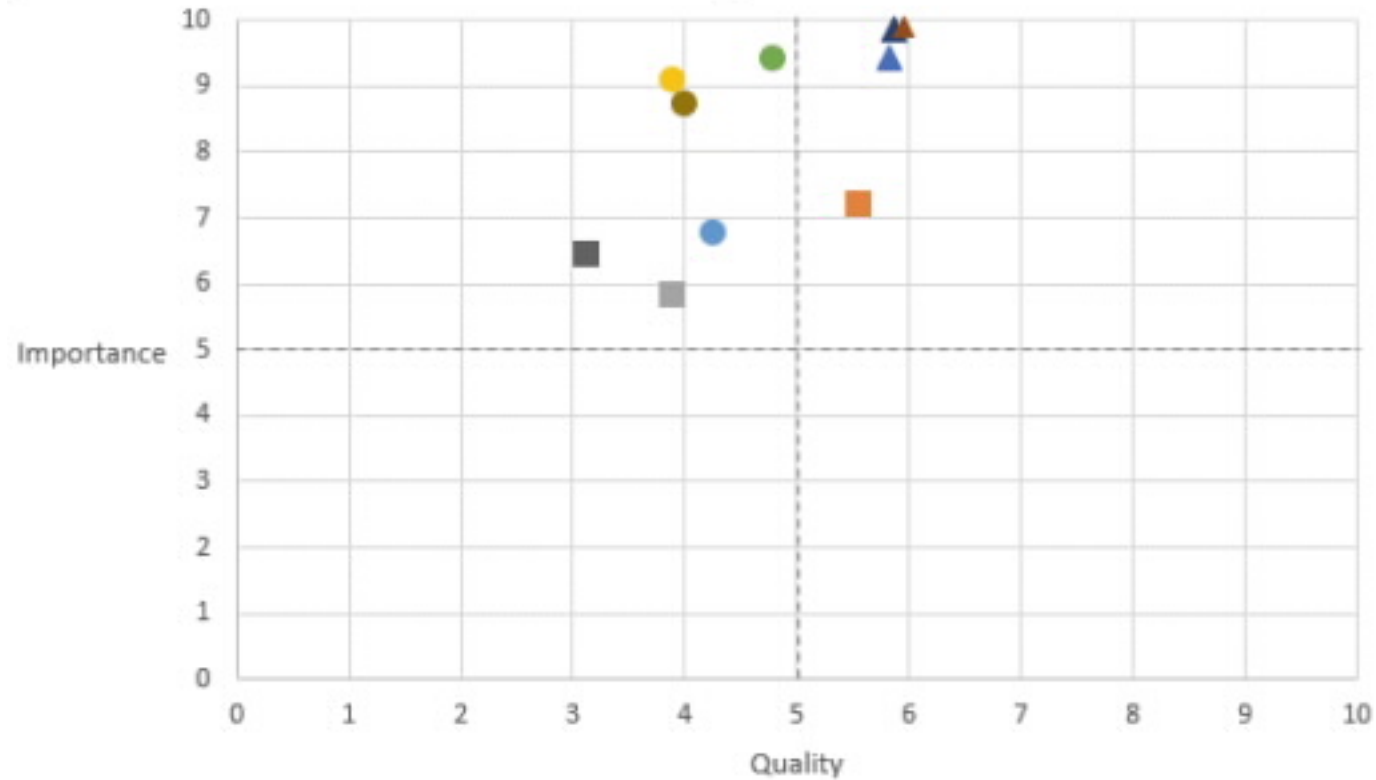
Post Crash Care Stakeholder/Manager Workshop

Service areas and service quality categories considered by the workshop

| Broad service areas	Service Qualities (with some examples)
Timely, accurate notification	Time to crash identification
	Ability to notify (network coverage/technology)
	Information accuracy (location, severity, patient access issues)
Fast, safe travel	Information needs (route planning tools/information to public/digital rescue data)
	Emergency vehicle prioritisation (prioritised lanes/signals "green wave"/access for helipad locations)
	Traffic management (Police and Road Controlling Authorities/Technology/Smart motorways)
Working together	Post-crash care in road safety strategies and plans
	Coordination between organisations (policy alignment/data sharing)
	Communications (tools/equipment/internal processes)
	Training/Education (agency/public)

Members considered importance and existing service quality using an 11 point Likert scale

Priority matrix for indicating importance and quality of existing services (from the workshop)

Perceived gap between importance and existing quality of delivery (from workshop)
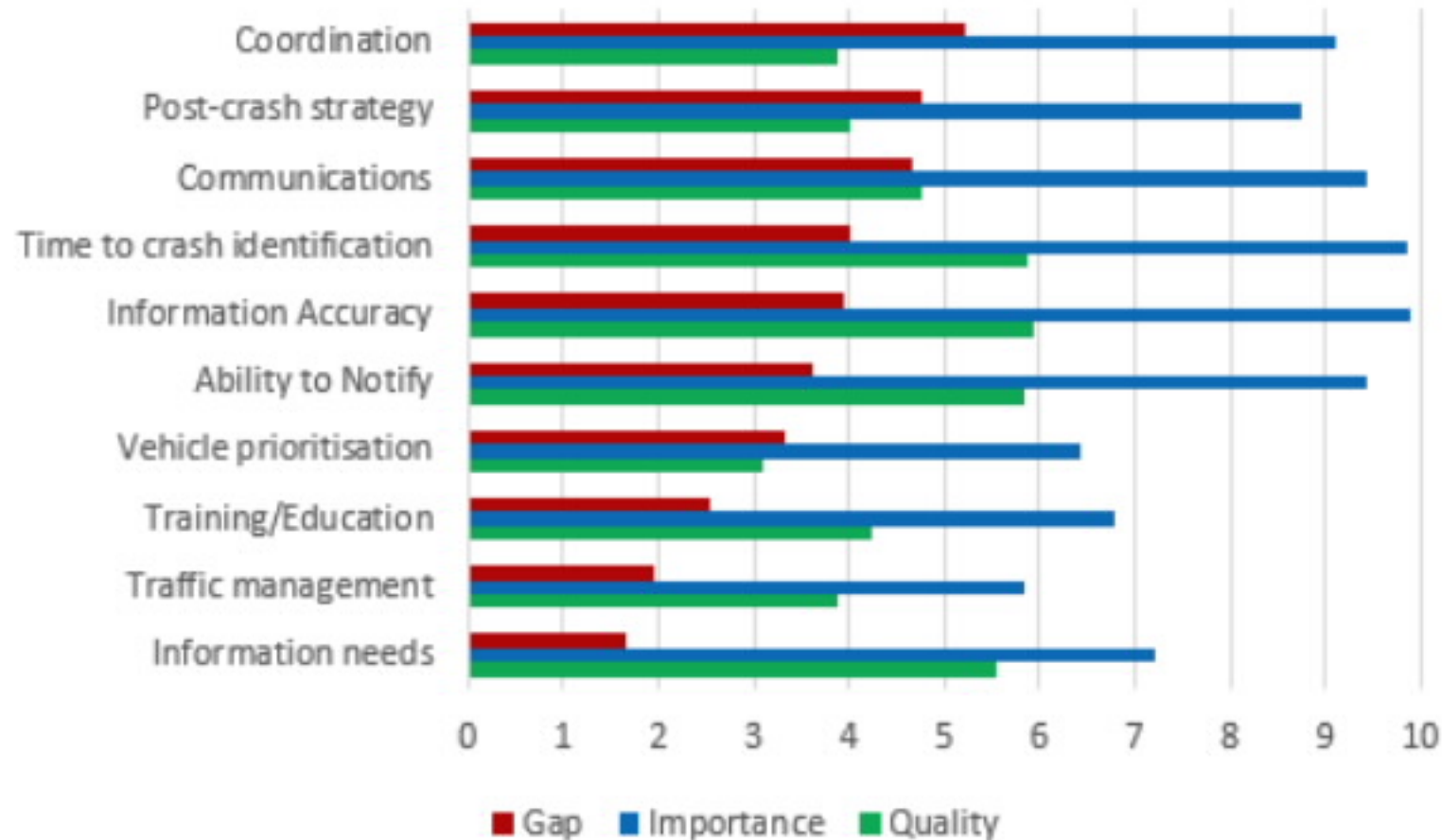
On-line survey of Frontline Emergency Workers

- Staff of St John, Fire and Emergency NZ and Road Policing were surveyed using internal mailing lists.

- Asked ranking questions about the service areas and an open ended question for raising specific concerns (e.g. Possible shock risk from crashed electric vehicles)

- 433 useable responses 46% Police, 36% St John and 18% FENZ

Learnings from workshop and surveys

- Overall, all service areas were consistently rated as important by both the stakeholder/manager group and the front-line staff

- There was agreement that Timely, Accurate Information was a key area to focus improvements

- Both groups placed high value on Working Together (including communications and data sharing)

- Three of the top four factors were consistent across the different organisational levels, indicating strong buy-in and desire for actions and interventions

- In terms of coordinating organisations to improve post-crash care, these would-be areas to prioritise.

Relative rank of service areas by operational and leadership groups

Rank	Operational Group Ability to reduce harm/death (if improved)	Leadership Group Importance in saving lives[a]
1	Information accuracy	Information Accuracy
2	Ability to notify there has been a crash	Time until a crash is identified
3	Cross-agency working together	Ability to notify there has been a crash
4	Emergency vehicle prioritisation	Cross-agency working together
5	Traffic management	Post-crash care in road safety action plans
6	Training for responders	Information needs
7	Time until a crash is identified	Training/Education
8	Information needs	Emergency vehicle prioritisation
9	Post-crash care in road safety action plans	Traffic management

Recommendations relate to:

Road Safety Strategies and action plans

• Working together

Coordinated communications systems

Cellular networks

Crash information

• Emergency Vehicle Prioritisation

• Inclusion of innovative emerging vehicle-related systems to facilitate rescue in ANCAP

• Electric Vehicle Post-Crash Electric Shock Risk

They are being considered by NZTA and its partners

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Thank you to the NZ Transport Agency for funding this work