Learning from experience: Emergency response in schools

Karlene Tipler[a*], Ruth Tarrant[b], Keith Tuffin[b] and David Johnston[a]

Abstract

In an emergency, schools are responsible for the safety of students until they can be reunited with their families. This study explored emergencies (i.e., bomb threat, a flood, and an earthquake) in three case study schools in New Zealand. Within each case, a selection of stakeholders (i.e., school leaders, staff, and parents) shared their experiences of responding to emergency events in the school. Lessons from participants' experiences established factors before, during, and after an emergency that contribute to an effective response. Foremost amongst those factors was the importance of prior preparation. The study also identified recurring response activities, irrespective of emergency type, which enabled the development of a six stage model of an effective school-based emergency response. The stages are: (1) Alerts; (2) Safety behaviours; (3) Response actions; (4) Student release / Family reunification; (5) Temporary school closure; and (6) Business as usual. The present study contributes to our understanding of research investigating how schools respond to emergencies and thereby seeks to enhance school safety efforts.

Key words: Schools, emergency, response, lessons, experience, New Zealand

1 Introduction

Children are identified as being among the most vulnerable populations during a disaster (GADRRRES 2015). The decade to 2016 has seen researchers focusing on school-based experiences of a range of disasters and emergency events. Examples include: large-scale disasters like Hurricanes Rita and Katrina (e.g., Clettenberg, Gentry, Held and Mock 2011) and the Japanese earthquake, tsunami, and nuclear crisis of 2011 (Shiwaku, Ueda, Oikawa, and Shaw 2016); regional events (e.g., floods, storms, influenza outbreaks) that have required temporary school closures (Awofisayo, Ibbotson, Smith, Janmohamed, Mohamed and Olowokure 2013; Convery, Carroll and Balogh 2014; Stuart, Patterson, Johnston and Peace 2013); and more frequently occurring, smaller emergencies that have affected individual schools (Crepeau-Hobson and Summers 2011; Tarrant 2011).

A well-coordinated response can mitigate a certain amount of stress, injury, and damage and may assist schools, families, and communities in returning to normality after a disaster. However, the literature generally pays little attention to how students are kept safe *during* the response to

emergency events. Previous studies include little discussion, if any, around safety behaviours, evacuation procedures, student supervision, or the requirements associated with family reunification. Instead, studies tend to focus on what was involved in helping students and staff cope once they have returned to school after the emergency (e.g., Convery et al. 2014), which may be several weeks or months later, as was the case for many schools in Christchurch, New Zealand, after the February 2011 earthquake (Education Review Office 2013).

The present study characterises response as the immediate reactions to an emergency to save lives and keep students safe, the requirements of which may be anticipated and prepared for. Hence, it can be argued that in a school-based emergency, the response phase is the period from when the emergency begins through to when the physical threat presented by the emergency has ended. This 'end' may be when students are safely able to return to class or, if necessary, are reunited with their families. Therefore, what many studies (e.g., Clettenberg et al. 2011; Convery et al. 2014) describe as the response phase of an emergency is in fact the early stage of recovery. Furthermore, by not recognising, at the very least, the steps undertaken to ensure the physical safety of students *during* an emergency response, researchers are missing opportunities to identify lessons that can improve school preparedness and response efforts. Having established the boundaries of what constitutes the response phase of an emergency, it becomes much easier to distinguish which activities to consider when investigating how schools respond to emergency events.

Research into school responses to emergency events is somewhat limited with much of the focus on large-scale community disasters. However, smaller events, near misses, or negative events may also provide learning experiences (Borum, Cornell, Modzeleski and Jimerson 2010; Labib and Read 2013). Borum et al. (2010) in their review of shootings in US schools suggested that lessons from smaller emergencies are better able to be generalised across all schools, because these types of minor emergencies are relatively common. Furthermore, policy advice from the American Academy of Pediatrics (2008) suggests when schools have planned for small-scale emergencies they are more likely to be prepared for larger, more complex community emergencies.

The scarcity of research exploring smaller events may be due to an assumption that because no one was injured and 'everything turned out okay', the response was a success and that there was nothing to learn from the experience. Another possibility is that school leaders may be reluctant to discuss mistakes or failures. Cornell and Sheras (1998) examined several school-based emergency events, indicating that by analysing and learning from mistakes, schools can be better prepared to respond to future emergencies. Therefore, schools should be encouraged to evaluate their response experiences (both positive and negative) without fear of reprisal (e.g., censure, lawsuits), the latter having been identified as a barrier to learning lessons across a range of organisations and sectors within the USA (Labib and Read 2013). In New Zealand, school boards of trustees (school governing bodies) are responsible for the health and safety of staff, students,

and visitors, and can be prosecuted and face penalties (fines and/or imprisonment) if they are found to have not undertaken all 'reasonably practicable' steps to limit risks, including those presented by natural hazards (Ministry of Education 2016). It can be assumed that 'reasonably practicable' steps include the evaluation of emergency response activities to assess how to improve future safety efforts because of the potential risk to students.

In acknowledgement of the limited research available in this area, the present study aimed to explore the lessons that can be learned from schools' experiences of smaller, relatively frequent occurring emergencies to: identify the factors that contribute to an effective emergency response; and establish the stages involved in an emergency response. By considering how schools respond in emergencies, it was expected the study would offer insights into what could be considered key preparedness and response practices that could inform school-based emergency management efforts.

2 Research Design

The present study is the final stage of a larger research project that investigated how New Zealand schools prepare for and respond to emergencies. The project consisted of three separate but linked studies: (1) emergency preparedness in schools (Tipler, Tarrant, Johnston and Tuffin 2016; Tipler, Tarrant, Johnston and Tuffin 2017a); (2) emergency management requirements and expectations of schools (Tipler, Tarrant, Tuffin and Johnston 2017b); and (3) emergency response in schools (the present study). The project employed a multiphase mixed methods research design, in which pragmatism provided the research philosophy underpinning the project.

Mixed methods research focuses on what is required to answer the research question(s), rather than on a specific philosophical approach, with some research questions requiring a combination of methods to answer them (Ihuah and Eaton 2013). Pragmatism can be defined as, "a philosophy…that evaluates assertions solely by their practical consequences and bearing on human interests" (Ormerod 2006, p. 894). It is this workable approach to problem-solving that Morgan (2014) believes complements a mixed methods research design. Mixed methods advocates believe pragmatism provides an underlying philosophical framework that is suited to a mixed method approach (Tashakkori and Teddlie 2003), as it offers a useful middle position both philosophically and methodologically (Johnson and Onwuegbuzie 2004), by allowing for "multiple methods, different worldviews, and different assumptions, as well as different forms of data collection and analysis" (Creswell 2003, p. 12).

The multiphase mixed methods design chosen allowed for multiple studies within the same project to build upon what was learnt in previous phases (Creswell and Plano Clark 2011). Within the broader project, Study 1 utilised a survey that combined both qualitative (Tipler et al. 2016) and quantitative (Tipler et al. 2017a) questions to establish a picture of what New Zealand schools were currently doing to prepare for emergencies. Study 2 (Tipler et al. 2017b) employed expert

interviews and a document review to establish the legislative requirements and practitioner expectations of New Zealand school preparedness efforts. However, there remained a need to investigate the link between preparing for and responding to emergencies by investigating how New Zealand schools responded to real emergency events, which is the focus of the qualitative case studies in the present study.

A full ethics application was submitted for approval to the Massey University Human Ethics Committee as recalling experiences of an emergency event may cause upset to participants, and also due to the study being conducted in a school setting (although no children/students participated in the study). The research followed the basic principles of ethical research (e.g., Patton, 2002; Simons, 2009) in which participants: were under no obligation to take part in the study; could decline to answer any particular question; could ask for the recorder to be turned off at any time during the interview; could withdraw from the study up to 14 days after having received the interview transcript; could ask any questions about the study at any time during participation; would be given access to a summary of the study findings when it is concluded; and would have their responses remain confidential to the research team.

2.1 Case Studies

A qualitative case study research method naturally lends itself to the investigation of emergency events, as it provides an "approach to teach others through the illustration of one detailed event" (Crepeau-Hobson and Summers 2011, p. 283). In particular, the effectiveness of an emergency response can be addressed by asking: what went well; what could be improved; and what should be done differently next time? In the present study, a multiple-case study approach (Yin 2003) was used to examine responses to different emergency events in three schools, allowing for similarities and differences within and between the cases to be explored. By comparing the experiences of multiple interviewees (Miles and Huberman 1994) within each school, it was possible to build a narrative of how the emergency events unfolded, while also enabling participants to identify the strengths and weaknesses of the emergency response from their perspective.

In order to meet the expectations of professional and academically sound research design requirements, a degree of structure was needed within the case study research process. It was therefore necessary to determine what the 'case' would be, and to place boundaries on the case(s) selected (Simons 2009). As comparisons would also be made between cases, it was important that each case be chosen and analysed carefully, allowing for the potential that findings may be generalised (Miles and Huberman 1994). The emergency events being investigated in the present study each represent a discrete unit which could be defined and set within a specific context (i.e., the three schools).

2.2 Settings, Participants, and Emergency Types

The three schools were located within the Wellington region of New Zealand. The region has a complex hazardscape, with several hazard types having a high (i.e., flood, tsunami, pandemic, landslide) or very high (i.e., earthquake) risk of occurring (Wellington Region Emergency Management Office 2014). Although many of these hazards occur frequently, in most cases, the impacts are limited. However, these and other emergency events provide opportunities to explore how schools respond to minor emergencies.

Purposive sampling was employed to achieve both representativeness and comparability across the cases (Teddlie and Yu 2007). Criteria used for case study selection ensured participating schools demonstrated: a selection of emergency types experienced; a combination of school types (primary and secondary); and a range of school deciles[1]. Schools that met the selection criteria were approached, through the principal, and invited to take part in the study. Table 1 provides an overview of the schools, participants, and emergency types examined. Once the school's participation was confirmed, the principal was asked to identify staff and parents that may be willing to be interviewed about their experiences of the emergency being investigated. Potential participants were then approached by the researcher. Twelve individuals with different roles, across the three schools, agreed to be interviewed. By including a selection of stakeholders (i.e., school leaders, staff, parents) within each school, aspects of the emergency event could be described from different perspectives depending on the role of the participant during the emergency.

Table 1 Overview of Case Study Schools, Participants, and Emergency Types Examined

School Demographics	**Case Study 1**	**Case Study 2**	**Case Study 3**
Emergency Types	Bomb threats	Flood	Earthquake
School Type	Secondary (Years 9-15)	Contributing Primary (Years 1-6)	Full Primary (Years 1-8)
Decile	9	3	10
Number of Students	1,200	143	450
Age of Students	13-18 Years	5-10 Years	5-12 Years
Interviewees	Receptionist Technology Teacher Science Teacher Parent	Principal Administrator Teacher (Year 6) Teacher (Year 4/5) Parent	Principal Office Manager Teacher (Year 2)

[1] School decile ratings reflect the socio-economic status (SES) of the surrounding community, and influence government funding to the school. In decile one schools a higher proportion of the students come from low SES backgrounds, while decile 10 schools have a lower proportion (Ministry of Education n.d.).

The case studies specifically investigated bomb threats, a flood, and an earthquake. Study participants also discussed their experiences of any other emergencies in their schools (e.g., lockdowns, fire).

2.3 Interviews

"The fundamental principle of qualitative interviews is to provide a framework within which the respondent can express their own understandings in their own terms" (Patton 2002, p. 348), and as a result, are able to provide lengthy, and in-depth explanations. Such an approach was ideal when exploring participants' perceptions of their experiences of emergency events, as the semi-structured interviews allowed the interviewer a degree of control to guide the interview, and also enabled the interviewee to expand their account from a single event to include any relevant emergencies experienced at the school.

However, interviews as a data collection method can present challenges for researchers (Patton 2002). For example, interviews can be time intensive in nature and, as such, appropriate timeframes need to be scheduled into an interview-based study to allow for interviews to be conducted, transcribed, and analysed. In addition, there is also potential for recall bias, resulting in the possibility that more information is collected from some participants than others. As the case studies combined multiple perspectives to depict each emergency event, recall bias was not identified as a major threat to the validity of the present study.

The use of an interview guide (described in Patton 2002) allowed for a systematic approach to data collection from each participant, but also provided flexibility to follow the narrative wherever the interviewee took it. The design for the interview guides were shaped by a review of the literature (e.g., Crepeau-Hobson and Summers 2011; Stuart et al. 2013; Tarrant 2011) and the preparedness themes identified in Studies 1 and 2 of the research project. Interview questions were related to five main topics: knowledge of the school's emergency plans and procedures; details recalled about the specific emergency event being investigated; details recalled from any other emergency events experienced at the school; lessons learned from emergency events experienced; and advice to counterparts in other schools about responding to emergency events.

The semi-structured individual interviews lasted between 25-55 minutes, and were conducted at the case study school or in participants' home, as chosen by the interviewee.

2.4 Analysis

The interviews were transcribed verbatim, checked twice against the recorded interview, and returned to participants for checking, editing, and accuracy. Respondent validation through member checking of transcripts enhanced the credibility of the information provided by participants (Creswell and Miller 2000). Thematic analysis was used to organise the interview data. Thematic analysis is a foundational method for qualitative analysis due to its flexibility and thematic freedoms

and has the potential to, “provide a rich and detailed, yet complex account of data” (Braun and Clarke 2006, p. 5), making it compatible with a mixed methods research design and pragmatic philosophical approach.

Each transcript was coded manually, and mapped individually, thereby doing justice to each participant’s experience, and adding to the credibility of the overall findings, as recommended by Patton (2002). Each ‘map’ was then collated with those of others from the same case to identify themes, sub-themes, and relationships within the data. Cross-case analysis provided an opportunity to identify commonalities and differences in response experiences, thereby enabling a degree of generalisation (Simons 2009). Two overarching themes were revealed within the data: response procedures related to the sequences of events of the emergency; and other lessons generally related to preparedness and managing the response. These themes and their related sub-themes are detailed in the Findings and Discussion section.

Triangulation is a common feature in mixed methods research (e.g., Patton 2002). The use of triangulation assists in overcoming potential bias as it facilitates validation through cross verification by combining multiple philosophies, methods, data sources, and/or investigators (Denzin 1973) to study a phenomenon, entity, or event. Within the broader research project triangulation of data collection methods (i.e., a survey, expert interviews, and case studies) and data sources (i.e., interviews, document reviews) occurred across and within the studies. In the case of the present study, multiple participants were interviewed within each case study setting. Triangulating the data sources strengthened the study by allowing for the comparison of perspectives and cross-checking the consistency of information, therefore contributing to the verification and validation of the qualitative analysis (Patton 2002).

3 Findings and Discussion

While schools care for their students’ daily welfare, it is unclear how aware school leaders are about the requirements to keep their students safe during emergencies. The following findings and discussion establish a picture of school-based emergency response efforts. The findings are discussed under two main themes: Factors contributing to an effective response; and Stages of an emergency response.

3.1 Factors contributing to an effective response

This section discusses the factors identified by study participants that contribute to an effective school response, irrespective of emergency type, and summarised in Fig.1. The factors are discussed in three phases: before; during; and after emergencies.

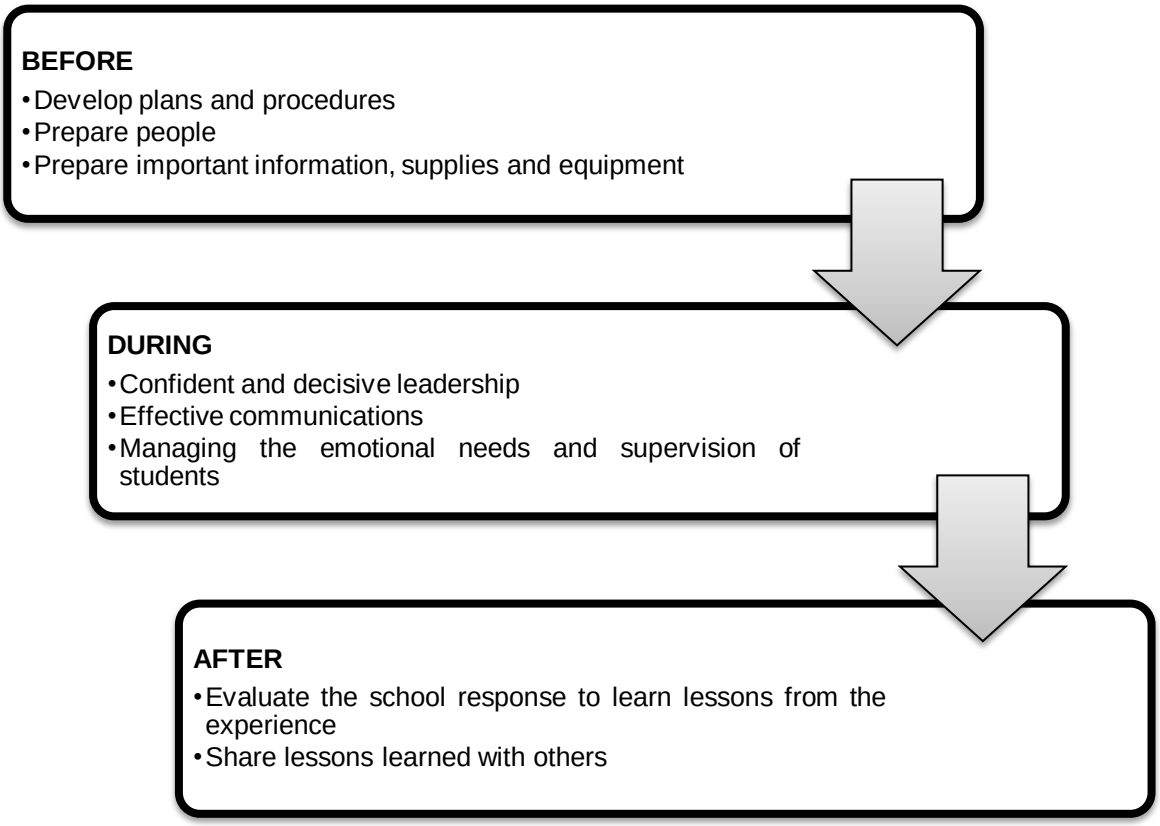


Fig. 1 An overview of factors that contribute to an effective school emergency response

3.1.1 Before

The overarching lesson recognised by the participants in all three case studies was that preparation was the foundation of an effective response. Three broad aspects of emergency preparedness are discussed in this sub-section. These are the need to: develop plans and procedures; prepare people; and prepare important information, supplies and equipment.

Develop plans and procedures. The importance of having developed plans and procedures in preparation for future emergencies is echoed throughout the school preparedness literature (e.g., American Academy of Pediatrics 2008; Johnston et al. 2016; Rebmann, Elliott, Artman, VanNatta and Wakefield 2015). In addition to reinforcing the need for many of the planning and preparation activities cited in the literature (e.g., identifying roles and responsibilities, having communications plans, conducting frequent drills), participants in the present study acknowledged the importance of considering how an emergency response would be managed if students were on their way to or from school, an idea also recommended by Boon, Brown and Pagliano (2014). Two of the emergency events discussed in the case studies had occurred at the beginning, and end of the school day. In the first example, a small fire was detected just before school was due to start. While preventing people entering the school grounds during the response to the fire, it was also necessary to account for everyone already on-site and those possibly on their way to school. In the

second example, a M_w 6.6 magnitude earthquake occurred approximately half an hour before the end of the school day, and because the primary (elementary) school suffered only minimal damage (e.g., items falling off shelves), some students were released to walk home alone as normal at 3 o'clock. However, in hindsight it was recognised that this may have not been the best option.

> [We] didn't ask the question…"If you usually walk home, who is home when you get home? […] And we didn't say, "If nobody is at home, come back". (Office Manager)

When an emergency occurs near the end of the school day, even when the school itself has not sustained damage, consideration needs to be given to implementing the school's reunification procedures, as damage may be more extensive elsewhere in the community, potentially preventing parents from being able to get home, as well as putting student safety at risk.

Prepare people. School leaders, staff (including part-time and relief staff), and parents have a vested interest in ensuring an effective response to any emergencies at school or in the environs. Therefore, it is vital that these stakeholders are involved in planning, preparing, and practising for emergencies (Chung, Danielson and Shannon 2009).

In the majority of school-based emergencies, the principal will lead the response. However, it is essential that schools have other staff trained to manage an emergency response if the principal is unavailable, off-site or incapacitated (Kano and Bourque 2007). Moreover, school staff would benefit from opportunities to train in different emergency roles to broaden their own understanding of the school's emergency procedures, to enable the principal (or response coordinator) to delegate tasks during an emergency response, and to allow staff to 'step-up' into alternative roles when people are absent or unavailable.

School leaders have a responsibility to ensure that all stakeholders are aware of the school's emergency plans and procedures. By providing frequent updates and ensuring details of plans and procedures are readily accessible (e.g., on the school website, in newsletters, via social media), stakeholders can be encouraged to familiarise themselves with how the school will respond in an emergency, and also raise awareness of what may be required of them in a response. In particular, keeping parents informed of the school's emergency plans and procedures can help reduce the likelihood that parents will behave in a way that is detrimental to the response actions being undertaken by staff during an emergency (American Academy of Pediatrics 2008). The requirement that schools keep parents informed only goes so far, as parents also have a shared responsibility to keep themselves up-to-date with the school's plans and procedures affecting their child (Phinney, Brill and Ferraro 2004). However, this can be challenging as not all parents are willing to engage with the school about emergency preparedness.

In addition to sharing school plans and procedures, staff, students, and parents need to be provided with opportunities to practise response plans in frequent drills that test various emergency

scenarios. The importance and benefit of having participated in emergency drills was also highlighted by several participants. For example:

> I feel comfortable in myself [and] I know that because we've had so many drills…we are all prepared and we know exactly what our role is, and that helps. If I was somewhere where it was all very higgledy-piggledy…I wouldn't feel that safe – but I feel safe here. (Receptionist)

Frequent emergency drills were acknowledged as being particularly beneficial in preparing students for emergencies.

> [Drills] make sure that everybody knows what to do and it's just routine – because if it's routine, children don't tend to panic when it's real. (Principal)

A teacher also encouraged the use of 'micro drills', outside of the school's normal emergency drill programme.

> Generally, you have one [drill] a term – but it's actually quite good to do them more than that. The kids become much more confident…they [know] exactly what to do because we [have] done lots of practices – whether it was school-wide or within class. (Year 2 Teacher)

In order for students to know how to respond appropriately in an emergency situation, they need to participate in well planned drills. This ensures they are not experiencing unnecessary upset, such as can occur in lockdown simulations (Zhe and Nickerson 2007), for example, if appropriate explanations and reassurances are not given to students before the drill. It is also important to include students with disabilities or special needs in drills to help prepare them to respond in actual emergencies (Clarke, Embury, Jones and Yssel 2014). This enables staff and students to know how to assist those with disabilities, and anyone new to the school. Additionally, it is beneficial for students (and staff) to be provided with opportunities to participate in drills that vary the scenarios they normally practice. For example:

> Sometimes we would put in a different route that children can't go…[or vary] the time of day…[or] have it on a Thursday when we have a lot of part-time teachers in. So we try and alternate when [drills] happen…where it happens, and how it happens, so that it's not always consistent – because in a real emergency it's not going to be. (Principal)

One of the primary criticisms of response drills has been their tendency to be a compulsory box ticking exercise holding little real benefit (Ramirez, Kubicek, Peek-Asa and Wong 2009), rather than a medium in which participants learn safety skills that could be adapted for use in a range of scenarios. By using drills as opportunities to test alternative actions, such as those described in the example above, students and staff can extrapolate what they have learnt into new or unfamiliar situations (Johnson, Johnston, Ronan and Peace 2014).

Through the promotion of home-based preparedness, school staff, students and parents can be encouraged to develop emergency plans at home that support school-based preparedness and

response efforts. In the case of staff, having their own family plans will ensure they know their family members are safe if staff need to remain at school to supervise students (Mutch 2015). Staff family plans may include collecting their own children and then returning to school to help supervise students. Furthermore, by urging students and their families to develop plans at home, schools can encourage discussions around what will happen if an emergency occurs when students are at school, including who will collect them (Education Review Office 2013).

Schools would benefit from engaging with external stakeholders (e.g., CDEM agencies, emergency services) to enhance school preparedness efforts and response capabilities (Johnston et al. 2016). For example, school leaders should, wherever possible, take opportunities to invite external stakeholders into the school. Not only is this a great opportunity to complement the curriculum by allowing students to ask questions and build positive relationships with these agencies, but by extending a visit into an after-school meeting, staff are able to get advice on planning for and responding to emergencies in the school and in their own homes. However, research in New Zealand (Renwick 2012) and internationally (US Government Accountability Office 2007) recognises that interactions between schools and external stakeholders can be challenging given time constraints, often resulting in low levels of engagement, which needs to be addressed. A useful first step to increase engagement may be for principals to invite external stakeholders into schools to observe and provide feedback on emergency response drills (Johnston, Tarrant, Tipler, Coomer, Pedersen and Garside 2011).

Prepare important information, supplies and equipment. In an emergency, important information must be up-to-date, accessible, and portable. Maintaining up-to-date contact details for students can be a challenge for some schools and requires an ongoing effort. Parents need to be reminded frequently of the importance of the school being able to contact them if their child is injured, or if there is some other type of emergency. For example:

> [Make] sure you've got really up to date emergency contact information for every child in the school, because that changes quite frequently. You've got a lot of custody issues as well with separated families nowadays. And it's really important that you don't let children go home with parents that don't have custody rights and on occasions like [an emergency], it would be so easy for that to happen. (Parent[2])

In addition, it is essential that important information about students (e.g., emergency contacts, allergies) is available in an emergency. Consideration should be given to having hard copies of information should electronic systems be inaccessible (Education Review Office 2013). Also, where possible, information needs to be portable, especially if a building evacuation or relocation to an alternative site is required.

[2] This parent had previous experience as a principal in another school, and as such, was more aware of the need for up-to-date contact details than other parents may be.

Schools would benefit from investing in emergency equipment and supplies, which are routinely checked to ensure they are in good condition and within their expiry dates (Kano, Ramirez, Ybarra, Frias and Bourque 2007). If funds are limited, schools may choose to gradually build up their equipment and supplies over time. Schools can also establish memorandums of understanding with local businesses (e.g., supermarkets) to provide supplies in an emergency (Coomer, Johnston, Edmonson, Monks, Pedersen and Rodger 2008), or seek donations of supplies and equipment from their community. Furthermore, it is useful for each classroom to have a grab bag or get away kit (Chung et al. 2009), containing basic supplies that may be needed in an emergency (e.g., class lists, first aid kit, essential medication, copies of emergency procedures, etc.) that can be taken with the class if they need to evacuate or relocate. Grab bags can also be taken on class trips or any other activities where the students are away from their classroom. The time and resources allocated to preparedness efforts can be a reflection of how high a priority emergency management is given in the school (RiskRED 2009).

3.1.2 During

When an emergency occurs, prompt action is required to keep students and staff safe. Three factors that can assist during the response are: confident and decisive leadership; effective communications; and managing the emotional needs and supervision of students.

Confident and decisive leadership. Emergency events are unpredictable and challenging, with leaders often required to make decisions using incomplete information, in an uncertain and changing environment (Tarrant 2011). Therefore, it is necessary that leaders display confidence and measured decisiveness when managing an emergency response. Such characteristics can provide reassurance to staff, parents, and students during an emergency (Stuart et al. 2013). However, school leaders may have limited experience of emergencies to develop these skills. For that reason, it is beneficial for principals and other senior staff to have access to training in leadership and crisis management (MacNeil and Topping 2009; Momani and Salmi 2012).

In an emergency, principals (or response coordinators) are generally guided by the school's emergency plans, but also need to respond to the particular circumstances of the event, which may require flexibility (Stuart et al. 2013). For example,

> I work on the principle that you have your procedures in place which are…really important. But I do believe any systems and procedures are only as good as the people…So I say to the teachers, "You're in charge of the class, you're professional, you have to use your common sense – if the systems and procedures don't apply in this particular context then don't religiously follow them – do what you think is best to keep those children and yourself safe." (Principal)

In one of the schools, the principal was off-site during the emergency. Therefore, another member of the senior management team took the lead role in managing the response. Having pre-identified

people ready to step-up into leadership roles is essential, as the principal cannot always be counted on to be available to manage an emergency response. Response drills provide an excellent opportunity to train backup leaders by enabling them to manage the drill, while also being able to seek advice or support where necessary.

Effective communications. Communications can be the foundation of an effective response, but they are also the component most likely to fail (Chung et al. 2009), due in part to limited or inaccurate information sharing and the uncertainties of an emergency event. Potential communication failures during an emergency response can be reduced by ensuring information is accurate (Mazer et al. 2015) and shared using multiple methods (American Academy of Pediatrics 2008). A lack of information to staff, students, and parents during an emergency can cause unnecessary anxiety, as can the dissemination of misinformation. Managing the flow of information is vital (Tarrant 2011), and this is especially important with the role social media (e.g., Facebook, Twitter) now plays in information sharing during emergencies and disasters (Mazer et al. 2015). Therefore, it is important that school leaders proactively plan how they will manage all aspects of their emergency communications efforts. Schools also need to have internal communications methods that allow them to keep staff and students informed about what is happening, especially in situations where it may not be possible to speak to staff and students directly.

In a school-based emergency, the concern of parents is the safety of their child. Therefore, any communications to parents need to reassure them that the school leadership has the situation under control, that the appropriate emergency services are on site, and that all students are safe, provided this is in fact the case. Calls to the school from parents should be expected in an emergency. When parents make contact with the school, it is vital that the information communicated is accurate and appropriate (Ronan and Johnston 2005), and that staff remain calm (Mutch 2014). A parent described how she was reassured by the initial response when she phoned the school:

> It was the fact that [the administrator] wasn't panicked…so I knew that, in general, that would go across the board…that was the best response for me as a parent…they were in control. (Parent)

Another aspect of emergency communications concerns the messages sent from students to their parents during an emergency. Students' messages may reassure parents that they are safe, describe the emergency event, or display concern for themselves or others (Mazer et al. 2015), and can add to parental anxiety. Furthermore, the sharing of incorrect or misinformation is a distinct possibility if students are communicating with their parents with only limited information. One possible way to limit confusion and inaccurate information is to keep students informed during an emergency, and also, where appropriate, include students in communications sent out from the school (e.g., texts, emails, social media posts). Such an approach would help to ensure consistency of messaging and also potentially reduce parent and student distress.

Managing the emotional needs and supervision of students. Students' responses to an emergency will vary. Therefore, as well as the physical safety of students, consideration needs to be given to providing students with emotional support (Heath, Ryan, Dean and Bingham 2007). Children look to significant adults to guide how they will respond during and after an emergency (Lazarus, Jimerson and Brock 2003). Consequently, it is important that staff appear calm (Smith, Kress, Fenstemaker, Ballard and Hyder 2001), and that teachers maintain contact with students to offer reassurance that there are adults to care for and support them until they are collected by their parents (Johnston et al. 2011). In addition, having staff members trained in psychological first aid or other forms of crisis counselling (Chung et al. 2009) can help identify the types of support students may need, and trained staff can also provide actual support in an emergency (Elangovan and Kasi 2015; Trethowan and Nursey 2015). Actions such as considering how students are seated in the assembly area may be a useful first step. For example:

> We used to sit in lines [but] …we felt that [children could only talk to] the person next to them…now each class sits in a circle…[and] you can easily see which class is missing. […] We take the roll in the circle and…the kids…can see all their friends – so you're feeling like a community. (Year 2 Teacher)

As expected, some students get more upset than others in an emergency situation. A novel way of supporting upset students in one school was to give them a role in the response:

> If we have a child that perhaps is not coping very well…we put them in a [child-size hi-viz vest]…and give them a little task to do and we can all just keep an eye on that [child]. (Office Manager)

A similar idea was suggested by Johnston et al. (2011), who encourage staff to actively involve students in emergency drills as both a means of enhancing students' understanding of the ramifications of emergencies and also so that students may develop the skills to support one-another in an actual emergency.

Teachers and other staff are expected to remain at school to care for and supervise students after an emergency until they can be reunited with their families, and in a school-based emergency, staff are required to prioritise the needs of their students over those of their own families. A teacher with children reflected on how his role impacts his own family in an emergency:

> My priority is the kids here, and then [my own] kids…because I'm responsible for the kids here… and hopefully the teachers at the schools that they're at will also be responsible for them. (Science Teacher)

Often much of the focus is on teachers being familiar with the emergency plans in the school where they work. But, consideration must also be given to ensuring that teachers are aware of the emergency plans in their own children's schools, as all parents should be. Trusting the plans in place in their children's schools allows teachers to remain at their own workplace and look after other people's children in an emergency.

In a further example, a parent, who had previously been a principal at another school, described how she had made her children aware from a young age what her responsibilities would have to be in an emergency:

> My children have always [known] that they will be the last person at their school if there was an earthquake because […] I can't leave until the last kid at my school has gone – so they'll be the last kid at their school too. (Parent)

However, once a response is underway staff appreciate when school leaders acknowledge their personal needs, especially those with children of their own or other family commitments:

> [The principal] was really understanding about people's own situations. […] She just said, "Don't worry about it, I've got it here…go home to your families". That was definitely a good thing. (Administrator)

3.1.3 After

Once the emergency event has been resolved and schools have returned to business as usual, an opportunity exists to review the school's performance during the emergency to: evaluate the school response to learn lessons from the experience; and share lessons learned with others.

Evaluate the school response to learn lessons from the experience. The importance of evaluating the effectiveness of emergency preparedness and response efforts, to fine tune plans and procedures, is evident in the literature (Crepeau-Hobson and Summers 2011; Johnston et al. 2016; Stuart et al. 2013). Two useful examples of evaluation of school response efforts were provided by study participants. The first illustrates what to consider when evaluating emergency preparedness and response procedures, and the second shows how beneficial evaluation can be.

> We have done a lot of review of our evacuation plans…they are always evolving and improving. Every time we have an evacuation…we ask, "What could we have done better? Who was slow? Who didn't close their doors?...Which class ran?…Was there a problem with the direction that you went down to the evacuation area on the field?…Or what about the children that weren't in your class at that time?"... We are also open to suggestions – always open to listening and improving things. (Principal)

The second example of beneficial evaluation was demonstrated when one of the case study schools was required to respond to two bomb threats within a month After the first bomb threat, the school's emergency response procedures were clarified in a staff meeting. Experiencing two similar events allowed the school to improve their response plans after the first bomb threat and then test the effectiveness of those plans in the second bomb threat. By reviewing and learning lessons from recurring events, schools are able to benefit from what Mutch (2014 p. 7) refers to as "cumulative learning". For example, principals from Canterbury (New Zealand) schools reported being better prepared for the February 2011 Christchurch earthquake due to lessons they had learned from the September 2010 Canterbury earthquake, including having developed alternative

methods for communicating (e.g., social media), reunifying families, and accessing information when computers were inaccessible or unusable (Education Review Office 2013).

Share lessons learned with others. It is not always possible to learn lessons first hand as the frequency of actual emergencies may be limited; nor is it necessary as lessons can be learned from others' experiences (Stuart et al. 2013). When asked, school representatives are generally willing to share their experiences (Tipler et al. 2016), knowing that the information they provide will be beneficial in helping to make other schools better prepared. Many of the case study participants indicated that they had sought advice or shared experiences with staff in other schools. For example, one principal referred to having learned lessons from others' experiences of the 2010-2012 Canterbury (New Zealand) earthquakes:

> The Principals Association…brought principals from Christchurch [to] talk at different conferences, and tell us about their experiences. […] It was the communication with parents that [principals] found the most challenging. (Principal)

Crichton, Ramsay and Kelly (2009) consider not learning from others' experiences as lost opportunities to improve preparedness efforts. Such efforts to share lessons should be applauded, and an important first step would be to encourage researchers to direct their attention to telling schools' emergency response stories.

3.2 Stages of an emergency response

Every emergency event is different due to the specific circumstances of the incident, and the individual characteristics of the school. However, Labib and Read (2013) assert that generic lessons can be derived from experiences of emergencies to identify recurring themes across incidents. By comparing the emergency events in the three schools, the factors contributing to an effective response, and the school emergency management literature (International Finance Corporation 2010; Johnston et al. 2011; US Department of Education 2013), it was possible to identify components common to emergency responses, irrespective of emergency type. This resulted in the development of a six stage model of a school-based emergency response, presented in Fig. 2. The stages of the model are: (1) Alerts; (2) Safety behaviours; (3) Response actions; (4) Student release / Family reunification; (5) Temporary school closure; and (6) Business as usual. While not every emergency event will include all the stages, it is recommended that school-based preparation and planning efforts consider all six.

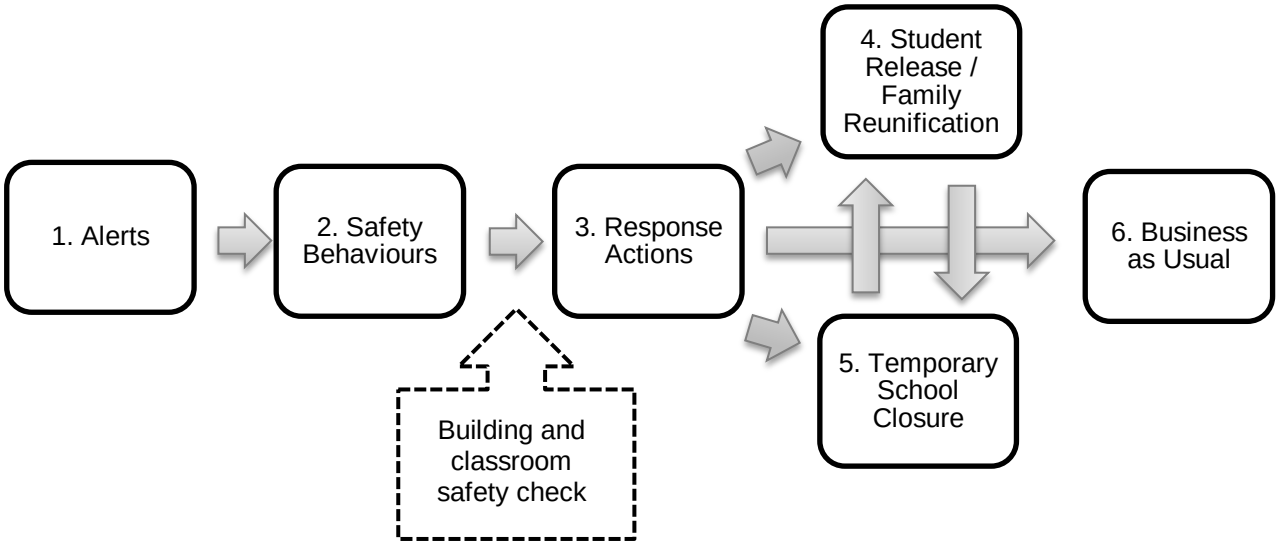


Fig. 2 Six stage model of a school-based emergency response

3.2.1 Stage 1: Alerts

An emergency response begins with some form of alert, such as an alarm (e.g., fire), official warning (e.g., flood), or a natural sign (e.g., shaking in an earthquake). Alert systems require regular testing to ensure: they are in working order; they can be heard throughout the school; and that students and staff, especially those new to the school, are familiar with the appropriate response when they hear the alert (Tipler et al. 2016). For example: a continuous bell may indicate an evacuation, and five short bells a lockdown. The type of alert may also be a signal to adopt a specific type of learned safety behaviour.

3.2.2 Stage 2: Safety behaviours

In some types of emergencies, it may be necessary to adopt safety behaviours or protective actions. For example, when the shaking of an earthquake is felt, it is appropriate to either 'drop, cover, hold', or adopt the 'turtle'[3]. Therefore, students and staff must be aware of what safety behaviours or protective actions they can use to keep themselves safe before an emergency occurs. Emergency drills are an excellent way to allow students to practise safety behaviours so they are familiar with their use in an emergency, and can respond without the need for prompting. By practising safety behaviours inside and outside the classroom, students that may be alone or out of class are able to keep themselves safe until they can return to their classmates and teachers.

[3] The "turtle" is a safety behaviour in which the individual crouches down on the ground and covers his or her head and neck with their arms, like a turtle (New Zealand ShakeOut, n.d.).

In certain emergencies (e.g., earthquake), a visual inspection of buildings and classrooms can be undertaken, once it is safe to do so, to identify any ongoing threats to students and indicate what response actions are required.

3.2.3 Stage 3: Response actions

Best practice advice (American Academy of Pediatrics 2008; GADRRRES 2017; International Finance Corporation 2010) identifies four response actions as being central to any school-based emergency response efforts: shelter-in-place; lockdown; building evacuation; and relocation. As such, these four response actions should be the focus of school emergency planning and preparation efforts. The thinking behind this approach is that when implemented in conjunction with emergency appropriate safety behaviours, the four response actions will cover the majority of response requirements making it unnecessary to develop individual plans for every conceivable type of emergency or hazard.

Shelter-in-place. Students may be required to shelter-in-place when there is an emergency in the vicinity of the school, but their safety is not directly threatened, or when an evacuation is not necessary (International Finance Corporation 2010). Two of the case study schools had used the shelter-in-place response action during emergencies: in an earthquake, and in a minor flood. There is little information within the literature about sheltering-in-place. This may be due to a perception that it is really just a safety precaution rather than an actual emergency response action. However, a shelter-in-place response still requires: some form of alert to be issued; communication with students and staff about the situation necessitating the shelter-in-place response; students be accounted for (especially if the emergency occurred during a break); and parents be informed, either at the time or in a note sent home with students.

Lockdown. In contrast to sheltering-in-place, lockdowns get more attention, both in schools and within the literature (Graham, Shirm, Liggin, Aitken and Dick 2006; Zhe and Nickerson 2007). A lockdown requires that students and staff secure themselves in classrooms and offices to avoid the attention of a threat within the school (e.g., armed intruder). An emergency necessitating a lockdown may occur at any time, in any school, with the events precipitating the lockdown having the potential to result in injury or death to students and staff. Therefore, it is essential that all schools have planned and practised for lockdown incidents. One of the case study schools had experienced three incidents requiring lockdowns, and as a result, the principal encouraged leaders in other schools to conduct regular lockdown drills in preparation for actual events.

> I would definitely say…all schools should be doing lockdown practices. Because you don't want to go into lockdown and…have no idea and…have panicking children. (Principal)

As well as acknowledging the importance of practice, the principal reinforced the challenges in communicating with staff during a lockdown, especially when the incident promoting the lockdown

occurred on the school site. The difficulties of communicating both internally (within the school) and externally (e.g., with emergency services) during lockdowns are acknowledged by Chung et al. (2009), who suggest the use of mobile phones and signs placed in windows to help communication.

Building evacuation. In some cases (e.g., fire, earthquake damage), a building evacuation may be required. Students and staff need to be familiar with the location of emergency exits and have multiple evacuation routes available including those suitable for students (or staff) with disabilities or special needs (American Academy of Pediatrics 2008). In one of the schools, a building evacuation was required in response to a bomb threat, and the buildings were cleared using the school's fire and earthquake evacuation procedures.

> We all meet in our designated areas and then…we go down to the field. But we wait till we're told because [surrounding streets have] got all those bus cables, so someone has to check that they haven't fallen on the road. (Technology Teacher)

This illustrates the need to ensure evacuation routes do not place students (and staff) in additional danger, and that such environmental checks should also extend to the safety of the assembly area (Johnston et al. 2011). Once at the assembly area, everyone must be accounted for, including non-teaching staff, visitors, and any classes off-site. Furthermore, response planning needs to consider how students will be supervised and supported in the assembly area.

Relocation. If the school site is no longer deemed safe (e.g., located in a tsunami inundation zone), relocation to an alternate site may be required, using pre-identified evacuation routes. It is also essential that parents are informed of where students will be taken if relocation is necessary (Chung et al. 2009). The first priority of parents in an emergency is getting to their child (Johnston et al. 2016), and if they are not aware of where to collect children, parents may put themselves at unnecessary risk by going to the school rather than to the alternate site (Johnson et al. 2014).

3.2.4 Stage 4: Student release / Family reunification

As part of an emergency response, it may be necessary to release students from school early and/or reunify families. Reunification is identified as having the potential to be one of the most problematic areas of an emergency response (RiskRED 2009), and for this reason it is important that schools have detailed, and well-established plans for reunifying families after emergencies (International Finance Corporation 2010). Because of potential or ongoing risks related to the emergency, students should be released to a legal guardian (Graham et al. 2006). However, parents are not always able to get to the school quickly after an emergency and therefore it would be beneficial for parents to provide one or more alternative, locally-based adults (e.g., extended family member, neighbour) who can collect their child from school in an emergency (Education Review Office 2013). Having a sign-out system in place ensures students are released only to someone who is authorised to take them.

> We've got quite a strict procedure in place…because parents will always say, "Oh I'll just take so and so as well". But that's not who the parents have nominated. […] So we will stick to [people]…who have been nominated. (Principal)

Furthermore, in an emergency event, emotions and the concern parents have for their child may override their willingness to follow school procedures, even when they are aware of what those procedures are. Keeping parents informed and up-to-date with the school's plans and procedures can help reduce unnecessary anxiety and limit disruption of response efforts by parents unfamiliar with or lacking confidence in the school's response capabilities (American Academy of Pediatrics 2008; RiskRED 2009). Regularly reviewing the school's student release and family reunification procedures and, where possible, practising those procedures, even with a small number of parents, can help encourage staff and parents to be cognisant of the school's plans, thereby increasing the likelihood of an effective emergency reunification response.

3.2.5 Stage 5: Temporary school closure

Where the school has sustained damage or is unsafe it may be necessary to temporarily close the school. Therefore, plans need to consider what is required when closing the school in an emergency (Stuart et al. 2013), including: how closure information will be communicated to parents; how students will be supervised and supported until they are able to be collected by their parents; what challenges may delay or prevent parents from arriving promptly to collect their children; the personal situations of staff members (e.g., with dependent children or dependent parents); and what legislative and/or administrative requirements must be met (e.g., Ministry of Education authorisation for temporary closure).

3.2.6 Stage 6: Business as usual

Once the emergency is over and no additional emergency response action is required, then the school will be able to return to 'business as usual'. In some cases, it may be necessary for the school to re-open with limited operational capacity (e.g., reduced hours or use of only selected parts of the school). School preparedness literature (e.g., International Finance Corporation 2010) indicates that when students' access to education is interrupted for extended periods, it can have a detrimental impact, especially if this results in students dropping out of school. In contrast, enabling students to return to school after a large emergency or disaster, assists in restoring routines, and facilitates family recovery (Peek 2008). Therefore, identifying what may be required for schools to return to operations after an emergency, even if at a reduced capacity, needs to be a central aspect of any schools' education continuity planning efforts (Tipler et al. 2017b).

The development of the model for the present study extends our understanding by directly linking the school emergency management activities recommended throughout the literature with the activities undertaken by schools during an emergency response.

4 Conclusions

The response to an emergency event is when prior planning is put to the test (American Academy of Pediatrics 2008). The aim of any school emergency response effort is to ensure the physical and emotional safety of students until they can be reunited with their families. Research exploring how schools respond in emergencies is necessary to enable the identification of strengths, weaknesses and gaps in existing emergency preparedness and response practices. Even small-scale emergency events can provide opportunities to improve future planning and response efforts (Borum et al. 2010).

By exploring a range of emergencies in three case studies, the present study was able to contribute to our understanding of how New Zealand schools respond in emergency events. The study provided empirical evidence to support the assumption that prior preparation is essential for an effective emergency response, and reinforced the importance of emergency response drills. In addition, by using first hand experiences of participants, the study was also able to identify factors that contribute to an effective emergency response, including activities undertaken before, during, and after an emergency. Furthermore, the identification of recurring response activities across a selection of emergency types, informed the development of the six stage model of a school-based emergency response.

The present study explores schools' experiences of emergency events, and includes the perspectives of school leaders, staff, and parents. Having identified key elements common to emergency responses, the authors anticipate that the present study will promote discussion among researchers and practitioners regarding best practice response to emergency events in schools. Importantly, the study suggests considerations for how schools can be supported in their future emergency preparedness and response efforts.

4.1 Limitations and future research

Two limitations have been identified in the study, both related to study participants. Participants varied between the case study schools. While an attempt was made to include principals, teachers, administrators, and parents from each school, this was not possible in every case. Selection of study participants was at the discretion of the principal, and this meant it was necessary to proceed without the full range of participants at times. However, the experiences of the twelve people interviewed, allowed for multiple perspectives across the three case studies. A second limitation is that even though it is acknowledged that children can add a valuable perspective to disaster risk reduction practices (Peek 2008; Ronan et al. 2016), students were not invited to participate, the reason being that this investigation was focused at an operational level. Future research could investigate children's perspectives of emergencies to assist in understanding the psychosocial impacts on children.

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