

Field exercises are useful for improving public health emergency responses

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Problem: Emergencies resulting from disease outbreaks and extreme environmental events present significant challenges for health services.

Context: Preparing to effectively manage emergencies is a core activity in public health units. Field exercises support consolidation of biopreparedness by testing plans, identifying weaknesses, providing training opportunities and developing surge capacity.

Action: An extended field exercise to test response to a novel influenza strain was conducted in New South Wales, Australia in September 2008, eight months before the influenza A(H1N1) 2009 pandemic emerged. Lasting four days and involving over 300 participants, the exercise was set in the early response phase with the staggered presentation of 41 cases to 36 emergency departments in the health area. An additional 150 contacts were written into a complex scenario to test the public health response.

Outcome: The subsequent pandemic emergence in mid-2009 offered a unique opportunity to assess the field exercise format for disaster preparedness. Most roles were adequately tested with recognized benefit during the actual pandemic response. However, the exercise did not adequately challenge the public health planning team that synthesizes surveillance data and forecasts risk, nor did it identify planning issues that became evident during the subsequent pandemic.

Discussion: Field exercises offer the opportunity to rigorously test public health emergency preparedness but can be expensive and labour-intensive. Our exercise provided effective and timely preparation for the influenza A(H1N1) 2009 pandemic but showed that more emphasis needs to be placed on the role and training of the public health planning team.

PROBLEM

Health emergencies such as large communicable disease outbreaks and severe environmental events often require lengthy responses and a sustained work effort across the health sector. Maintaining a heightened response over weeks or months presents a major challenge for which many health services are ill prepared. One likely scenario is the emergence of a novel disease agent, for example an antigenic shift that results in a pandemic influenza strain. This occurs on average every 20–30 years, placing a major burden on health services and society due to the increased morbidity and mortality.¹

Early in a pandemic, public health activities aim to delay transmission using various containment measures including: identifying and isolating cases and contacts; encouraging household infection control; adopting social

distancing measures; providing health advice; and using antiviral medication.

CONTEXT

The Commonwealth government provides overarching policy and direction to the eight Australian states and territories; at the state/territory level there is further subdivision into regional health services that are responsible for community response and individual care. Like many federated countries, Australia's three layers of governance potentially complicate communications during health emergencies.² Australia has invested in pandemic planning and exercises at a national and state level to test border control, inter- and intra-government decision-making, deployment of the National Medical Stockpile, national health emergency response and public communications,^{3,4} but extended exercises at a regional level are uncommon.

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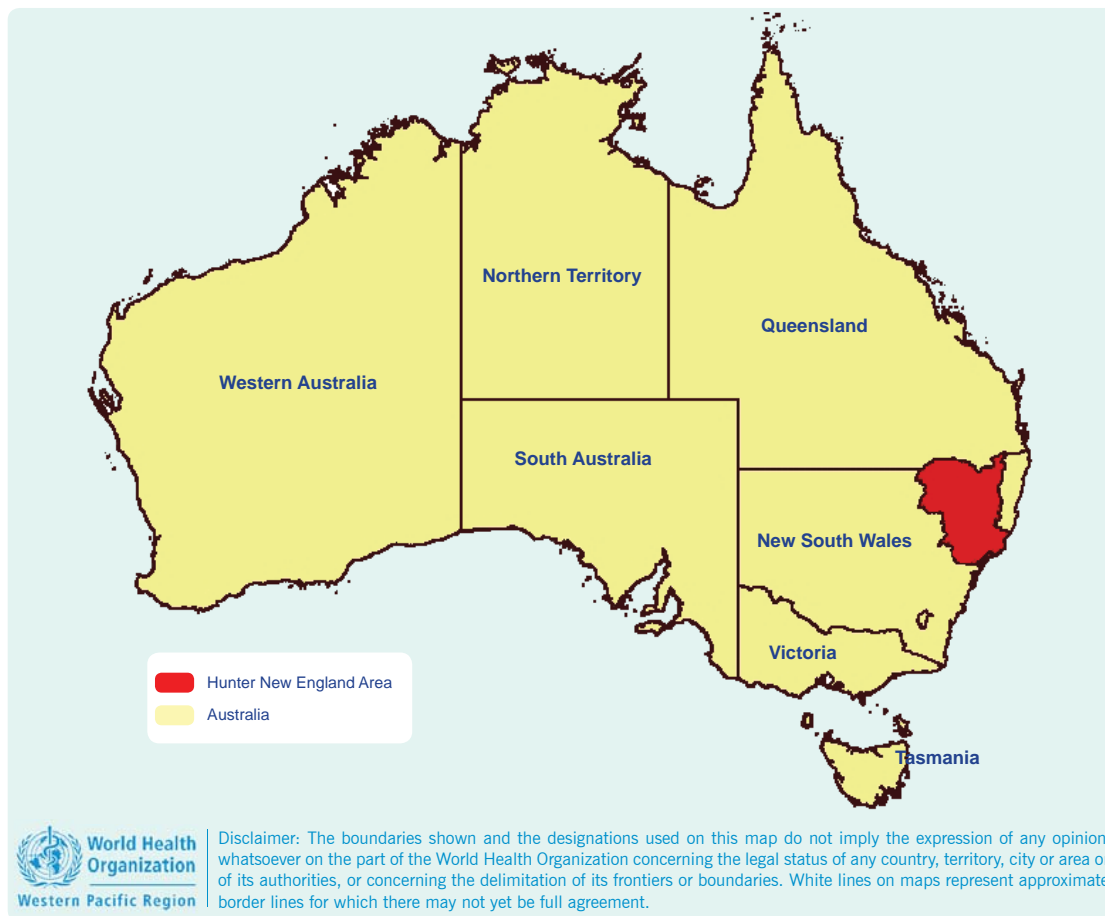
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Figure 1. The Hunter New England Health Area of New South Wales, Australia



On 7 May 2009, just eight months after the conclusion of our field exercise, the first case of pandemic influenza was detected in Australia.⁵ The Commonwealth government instituted aggressive containment measures to reduce disease transmission according to the national plan.⁶ Cases and contacts were requested to stay in home isolation/quarantine for up to seven days and take antiviral medication, as had been practised during the exercise. This placed us in a unique situation to assess the effectiveness of our field exercise in preparing for an actual pandemic event.

ACTION

A regional New South Wales (NSW) health service conducted a four-day field exercise to simulate the range, complexity and work intensity during the early response to a large disease outbreak. Many exercises use virtual or desktop formats, but given the relatively large geographic area with a dispersed population, 36 Emergency Departments (EDs) and the varied resource capacity across the area, a field exercise was chosen to ensure participants and plans were suitably challenged. Public health staff and surge staff completed

activities in exactly the same way expected of them in a true health emergency. The exercise control team regulated the 'injects' but allowed the scenario to flow naturally using actors trained to provide plausible input. Independent facilitators ensured the exercise was kept within pre-determined guidelines and avoided risk to players and the public.

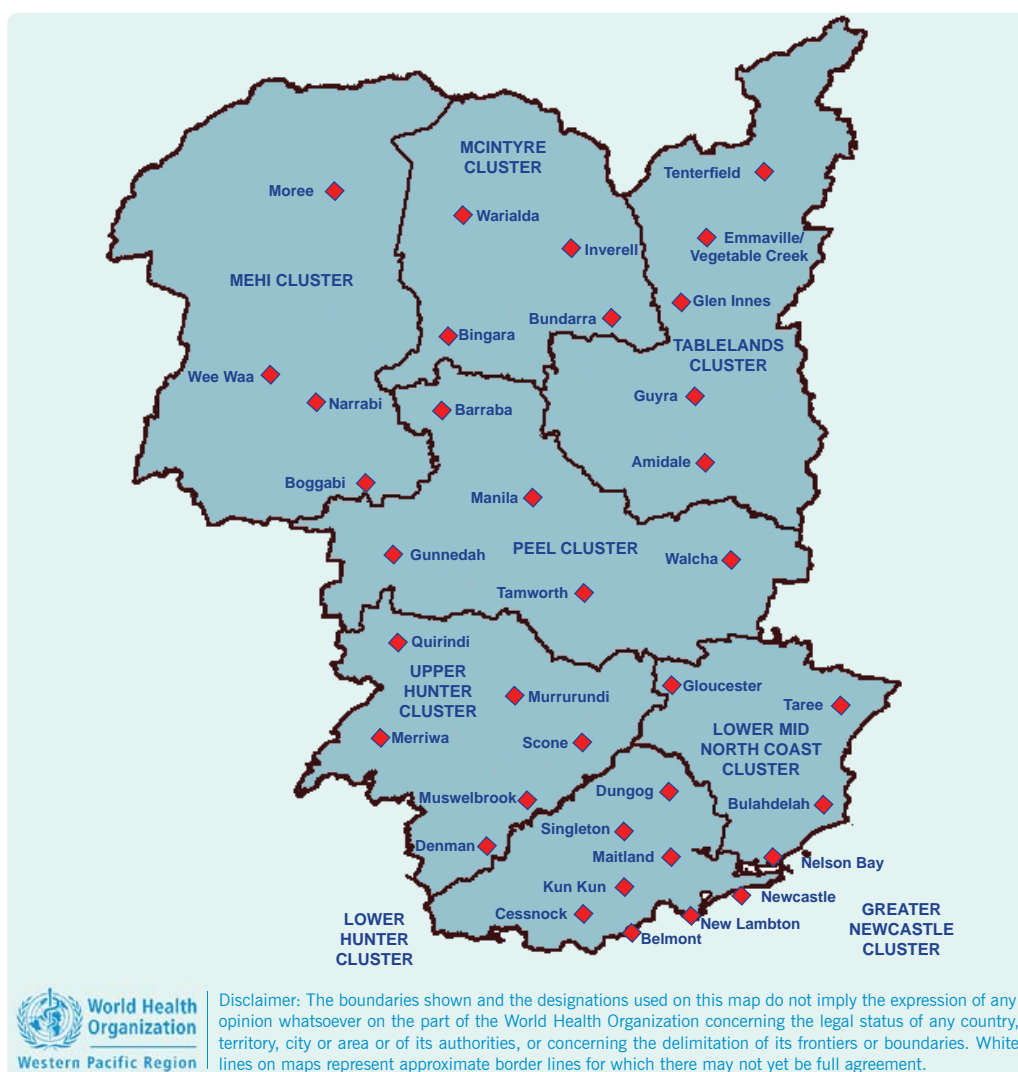
The Hunter New England Health Research Ethics and Governance Unit did not require ethics approval since the study was regarded as a training exercise.

Field exercise setting

The exercise was conducted from 21 to 24 September 2008 in the Hunter New England Health Area, a region covering 130 000 km² (Figure 1).

The population of approximately 865 000 is concentrated on the eastern coastline, with public health offices located in Newcastle, Tamworth and Taree (Figure 2). The area also includes large inland towns and remote outback Aboriginal communities as far as 500 km from the coast.⁷

Figure 2. Map of the Hunter New England Area Health Service showing the location of emergency departments involved in the exercise



EXERCISE TEAM AND SCENARIO

The scenario was designed by an independent team over a period of six months with the support of a part time project officer. Twenty external facilitators and umpires provided input through teleconferences held before the exercise. Surge staff, actors and public health personnel provided their time without charge against the exercise cost centre.

The exercise included:

- regular changes to case and contact definitions as anticipated in the early stages of a disease outbreak;
- visits to each ED by at least one actor (41 in total) with an influenza-compatible history for assessment against current case definitions and management according to accepted infection

control practices and public health protocols (ED staff were required to provide initial case notification to the public health unit [PHU]);

- 150 exposed people (contacts) who were identified during interview with the cases;
- two ambulance transfers to test infection control and transport logistics;
- the exercise team monitoring and adapting the scenario in real time to maintain pressure and authenticity;
- media interviews, community concerns and political injects; and
- trained staff using detailed scripts to build the 'epidemiological story' (information from many sources to provide insights into transmission pathways).

Exercise Response Structure

A full Incident Command System (ICS) hierarchy was activated from the emergency operations centre. ICS staff included an incident controller and operations, planning, logistics and finance teams. Surge staff were recruited before the exercise, including 60 operations personnel. The operations team consisted of five separately located units of four people (an experienced team leader and three new nurses in each shift). Daily situation reports were prepared by the public health planning team and distributed to response personnel.

There were other significant exercise features.

- A local call centre was used to manage approximately 120 public enquiries per day and was supported onsite by an experienced public health nurse to provide technical assistance.
- Fourteen days before the exercise started, training was provided for surge staff through eight online modules. Orientation and additional training was offered at the beginning of each shift, with on-the-job support provided by experienced team leaders.
- An emergency operations centre was established in Newcastle and operational teams were located at the three public health campuses.
- Operations staff traced contacts, provided information and requested that they comply with current Australian containment protocols, including home quarantine, household infection control and antiviral prophylaxis.⁶
- An online database (NetEpi),⁸ administered by the State, was used to maintain records of cases and contacts.
- Adequate data were provided for the public health planning team to conduct epidemiological analyses, prepare daily situation updates, support operational planning and forecast resource requirements.

Debriefings and evaluation

The umpires and facilitators used a structured evaluation sheet to record their observations. They received training before the exercise began and provided comments on four areas: team-work, communications, documents/materials and decision-making.⁹ At the conclusion

of each day's activities, structured debriefings were conducted with all players, to record aspects that worked well and identify weaknesses in plans and operations.¹⁰

OUTCOME

Key findings identified during the field exercise

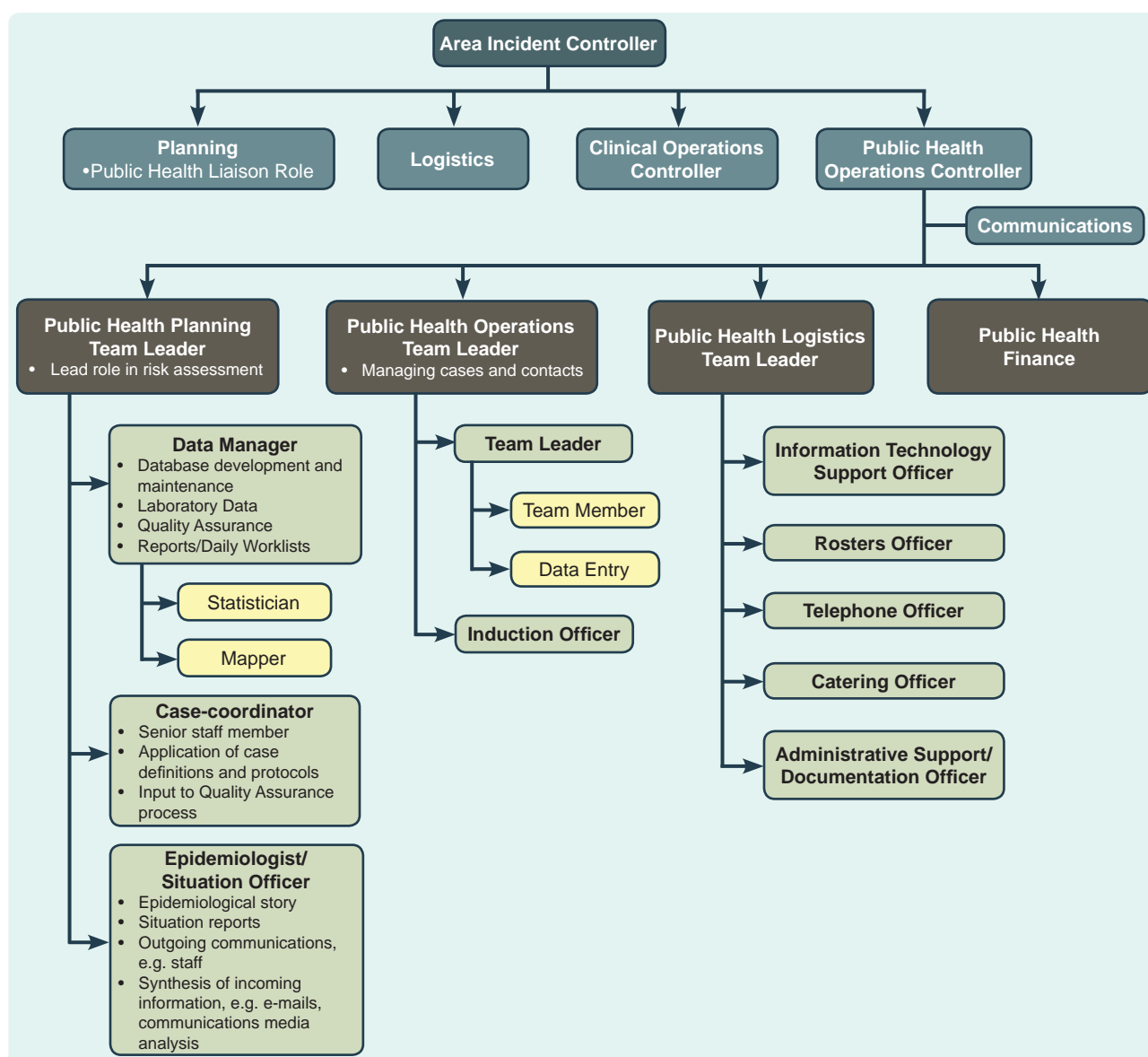
The following shortcomings were identified during the exercise evaluation with most being addressed in a revised disaster plan before emergence of the 2009 influenza pandemic.

- (1) Emergency Departments: minor infection control irregularities.
- (2) Public Health Staff: counsellors to support those affected by stress; staff to provide orientation; surge staff engagement during the intra-pandemic period.
- (3) Public Health Operations Team: delays in rapidly disseminating key event information and new policy directions (e.g. weblogs); strategies to assist staff with personal and family-related concerns.
- (4) Public Health Planning Team: inadequate 'epidemiological story' development and data management; poor use of incident action plans. A planning workshop was recommended following evaluators' observations that the focus was on short-term response rather than using data to forecast future resource requirements and deployment.
- (5) Public Health Logistics Team: inability of the telephone system to cope with large numbers of enquiries, lack of a rostering officer and integrated staff roster system.

Implementing the revised response plan during the 2009 influenza pandemic

During the early response to the 2009 pandemic (the Containment Phase), the disaster response team was activated using our updated regional disaster plan and revised ICS public health staffing structure. The operations and logistics teams principally comprised public health and surge staff who had been involved in the field exercise. The efficiency of emergency operations centre telecommunications, videoconferencing and information technology services and the functions of the

Figure 3. The updated Incident Command System



operations team were considerably enhanced by prior exercising.¹¹

In contrast, it soon became evident that the public health planning team was under-resourced and unable to adequately meet requests from the operations team. Additional statistical assistance, not previously identified during the exercise, was needed to prepare a range of reports (worklists and quality checks) from the NetEpi database to assist the operations team with their duties.

Post-pandemic debriefs identified the need for the planning team to monitor the 'epidemiological story' by conducting a more systematic review of information collected during interviews, media reports and traditional

surveillance data. The ICS framework was revised to include all planning functions within the structure (Figure 3).

DISCUSSION

Responding to a large infectious disease outbreak differs markedly from the management of disasters like an aeroplane crash which usually have an acute presentation but rapid resolution.¹² A large disease outbreak involves a protracted response and warrants extensive preparation. Our field exercise provided an excellent training opportunity for the 2009 influenza pandemic and allowed prior testing and revision of local plans. It was particularly valuable in identifying and preparing surge operational staff.

Identifying surge capacity may be problematic for some health services. We employed clinical nurse consultants from non-acute areas such as the sexual health unit and stomal therapy and found them to have excellent skills. Data managers and statisticians were seconded from the area's performance planning unit and readily adapted to their roles. Three Master of Applied Epidemiology graduates (from the Commonwealth's field epidemiology training programme) and a National Centre of Epidemiology and Population Health lecturer were principal contributors to the exercise and other graduates were involved to a lesser extent. This programme provides surge response to public health emergencies in Australia and the Region but is currently under threat of closure.

There are few detailed published reports of pandemic exercises, although parallels can be drawn from bioterrorism drills.^{12,13} It appears that field exercises are only rarely deployed due to cost and resource implications,¹² but they often identify fundamental issues that are unlikely to be recognized using desktop exercises.^{4,14,15}

Lessons for planning

The pandemic response highlighted unresolved planning issues that had either not been identified during the exercise, or were inadequately addressed.

Our observations suggest that the full range of public health planning duties is poorly understood and this is likely to be reflected in preparedness, an observation recognized by others.¹⁴ We interpret this role to include the following:

- providing assistance to the operations team to fulfil their duties through developing task lists and monitoring database quality assurance;
- mapping cases, contacts and transmission pathways;
- collating data to extract the 'epidemiological story' so that resources can be targeted towards effective public health interventions;
- performing regular risk analysis to ensure the response covers all contingencies;
- forecasting needs through workload trends and resource usage; and
- preparing incident action plans and situation reports.

Many of these priorities did not fully emerge during the field exercise possibly because the case-load and relatively short period of four days were insufficient to reveal these deficiencies. It was only during the extended pandemic response and when the database became larger and more complex that these became evident. Thus, while the field exercise provided an adequate opportunity for testing case and contact management it did not go far enough in meeting planning team needs. This could have been addressed through providing more hypothetical cases and contacts in the exercise database, or possibly telescoping the pandemic scenario's time-frame. Investment in testing the role of planning is important and may be best achieved through realistic desktop exercising, perhaps nested within a field exercise.

CONCLUSION

An extended and realistic pandemic field exercise provided major benefits in preparing for the actual 2009 pandemic response and for generic public health disaster planning. It was particularly suited for the operations team in testing surge capacity. The principal exercise weakness was that it failed to adequately challenge the public health planning team. Our experiences indicate the importance of clarifying the scope of planning in disaster response, identifying the expertise required for the team and providing them appropriate exercise and training opportunities.

Conflicts of interest:

None declared.

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