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Research paper

Emergency care status, priorities and standards for the Pacific region: A multiphase survey and consensus process across 17 different Pacific Island Countries and Territories[☆]

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ABSTRACT

Background: Effective emergency care (EC) reduces mortality, aids disaster and outbreak response, and is necessary for universal health coverage. Surge events frequently challenge Pacific Island Countries and Territories (PICTs), where robust routine EC is required for resilient health systems. We aimed to describe the current status, determine priority actions and set minimum standards for EC systems development across the Pacific region.

Methods: We used a prospective, multiphase, expert consensus process to collect data from PICT EC stakeholders using focus groups, electronic surveys and panel review between August 2018 and April 2019. Data were analysed using descriptive statistics, consensus agreement and graphic interpretation. We structured the research according to the World Health Organisation EC Systems and building block framework adapted for the Pacific context.

Findings: Over 200 participants from 17 PICTs engaged in at least one component of the multiphase process. Gaps in functional capacity exist in most PICTs for both facility-based and pre-hospital care. EC is a low priority across the Pacific and integrated poorly with disaster plans. Participants emphasised human resource support and government recognition of EC as priority actions, and generated 24 facility-based and 22 pre-hospital Pacific EC standards across all building blocks.

Interpretation: PICT stakeholders now have baseline indicators and a comprehensive roadmap for EC development within a globally recognised health systems framework. This study generates practical, context-appropriate tools to trigger further research, conduct evidence-based advocacy, drive future improvements and measure progress towards achieving universal health access for Pacific peoples.

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Research in Context

Evidence before this study

The 2019 World Health Assembly (WHA) Resolution 72.16 explicitly places emergency care (EC) as central within a health system in order to achieve universal coverage and provide timely care to the acutely ill and injured. As the front-line service between the community and health facilities, a weak EC system increases vulnerability to surge events and limits effective public health and clinical care interventions. Pacific Island Countries and Territories (PICTs) share a substantial burden of environmental, climatic and communicable disease threats and can work collaboratively to address regional health priorities that are locally identified, evidence-based and Pacific context-relevant. We searched PubMed, Google Scholar, WHO resources, Pacific and grey literature using search terms; 'Pacific Islands / region', 'emergency care', 'emergency care systems and/or status', 'emergency care assessment', 'emergency care priorities / standards' and found a paucity of information about EC systems in the Pacific region. There are few studies from individual PICTs highlighting specific components of clinical EC, a narrow focus on emergency capacity in disasters without linkage to everyday system resilience, and no previously identified EC priorities or standards specifically for the Pacific region. Examples of PICT collaboration and models of regional engagement exist to produce standards for peri-operative practice and measure surgical indicators. Work from Africa describes a facility-based assessment tool and a multiphase consensus methodology for generating context-appropriate EC quality indicators. The WHO health system building blocks underpin tools specifically for EC, including a system assessment framework designed for national use, and which has been adapted for a proposed pre-hospital system assessment tool. We identified substantial evidence gaps about EC status, capacity and systems development in the Pacific region, but an opportunity for collaboration using the health systems framework and consensus approach.

Added value of this study

We engaged over 200 stakeholders from 17 different PICTs to generate 24 facility-based and 22 pre-hospital standards, matched with immediate and longer-term priority actions for EC development across all system building blocks. For the first time, we describe the status and basic functional capacity of EC systems across the Pacific region, gaining insight into the ability of PICTs to meet surge demands during the current COVID-19 global pandemic. We adapted the WHO health systems building blocks for the Pacific EC context, and applied this framework throughout a multiphase, iterative, consensus process involving both quantitative and qualitative methods, thereby modelling a collaborative approach to relevant data collection and interpretation. By analysing data both regionally and for each PICT, we have shown overall patterns and highlighted gaps where system components are least developed within individual countries. The Human Resources and Training building block is central to building effective EC systems in PICTs, with minimum regional standards set for training, staffing models, employment structures and legal protection. Regional recognition of EC as essential within the health system is a required standard, in order to drive specific priority actions and meet other standards for Infrastructure and Equipment, Leadership and Governance, Process, and Data building blocks.

Implications of all the available evidence

The Pacific region has limited capacity to provide safe and effective EC with low resilience to increase function at times of surge demand. PICT health leaders can see their EC system strengths and gaps, and now have a clear set of locally generated, context relevant priority actions and minimum regional standards that provide a roadmap for pre-hospital and facility-based systems development both within

each PICT and across the Pacific region as a whole. By conforming to a globally recognised health systems framework, these tools align with the WHA Resolution 72.16 call to action and can be used for policy and planning, research, monitoring and future evaluation of individual PICT and regional progress. The research process has generated momentum for a Pacific EC community of practice, modelled a collaborative methodology and suite of tools that can be adapted for other regional contexts, and created advocacy aids to enhance PICT understanding about the role and importance of EC within the health system. This work enables PICT and Pacific regional health leaders to take positive steps that will build resilience and capacity within their health systems for future surge events and universal access for all Pacific peoples who need emergency health care.

Introduction

All people may experience acute illness or injury in their life-course that requires time-critical intervention to prevent deterioration, disability or death, regardless of whether urgent care is available or not. [1] The provision of safe, effective and timely emergency care (EC) is essential to a health system in order to achieve universal access [2] and meet Sustainable Development Goal (SDG) targets for communicable and non-communicable disease, maternal and child health, mental illness, addictions and injuries. [3] As the horizontal interface between the community and healthcare systems, EC is often the first or only contact with health services by patients and their carers. It is therefore essential to public health initiatives, [4] human rights [5] and effective outbreak, disaster and other surge responses. [6] Indeed, robust pre-hospital [7] and facility-based services [8] are critical to the health system response in the current COVID-19 pandemic.

The World Health Organisation (WHO) describes EC within a Systems Framework (ECSF) [9] (Fig. 1); dividing care between the scene of illness or injury, during transport (pre-hospital) and at a facility, underpinned by essential and intersecting building blocks. [10] The burden of mortality and morbidity from conditions amenable to EC falls disproportionately on low- and middle-income countries (LMICs), [11] yet these countries are where access to safe, effective and reliable EC is often most limited. [12] By passing Resolution 72.16 in May 2019, the World Health Assembly (WHA) now recognises the urgency of building EC systems and calls on all countries to strengthen the provision of EC as part of universal health coverage to ensure timely and life-saving care to the acutely ill and injured. [2] Member states are urged to assess and build their capacity within the WHO framework and across all EC system building blocks.

As the greatest proportion of lives saved globally can occur in LMICs with safe and reliable EC, [13,14] guidance on how to prioritise action and set achievable standards of system development are essential. Delphi and expert consensus methods have been used to define key areas and priorities for EC development in LMICs, [15] and specify functional EC requirements at different facility levels in sub-Saharan Africa. [16] The WHO has recently developed a survey-based tool for national governments to assess status, identify gaps and prioritise actions for EC systems development using a structured framework; the Emergency Care Systems Assessment (ECSA) tool. [6] Using an accepted health systems approach to create EC standards enables global consistency, [17] but should be adapted to specific contexts to improve relevance and applicability. [18]

Pacific Island Countries and Territories (PICTs) are largely LMICs connected as a region through shared political, institutional, socio-cultural and language links, despite substantial variance in popu-

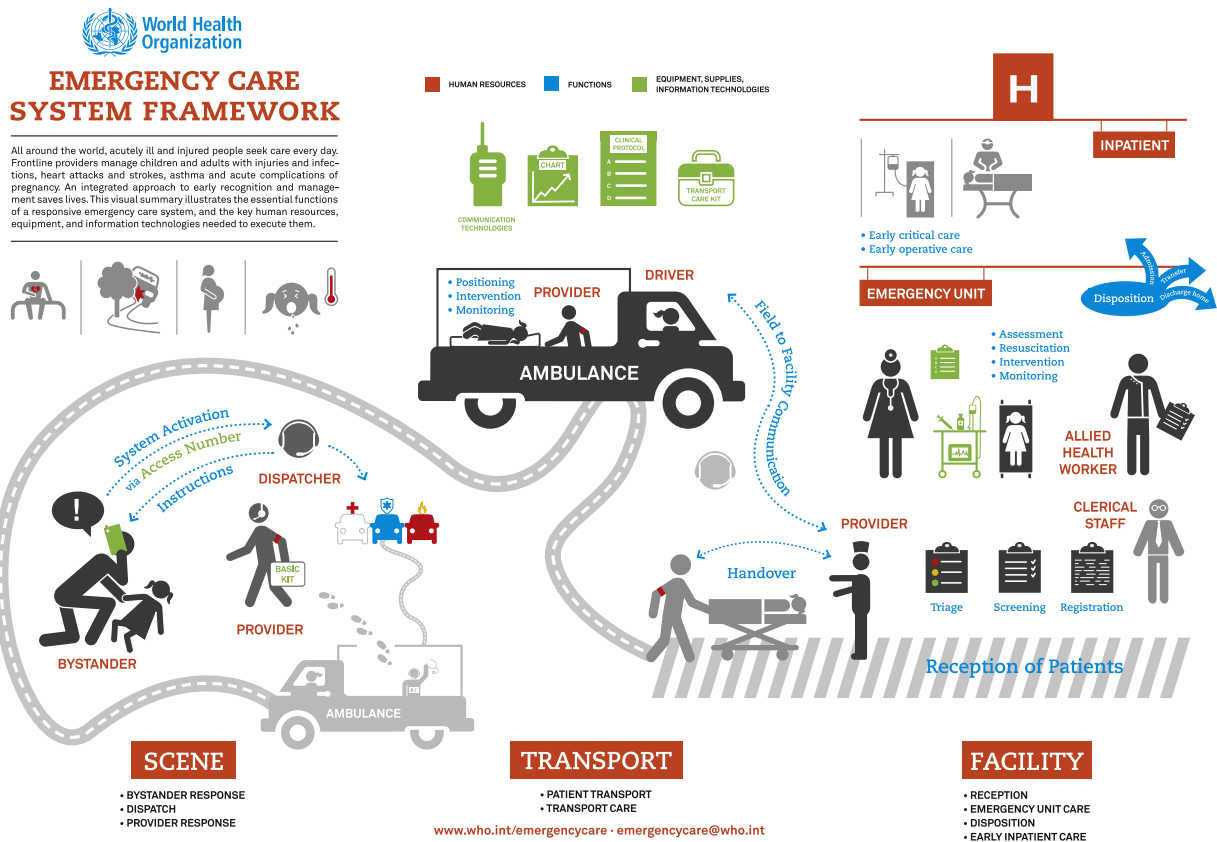


Fig. 1. WHO emergency care systems framework.

lation size and geographies. [19] The Pacific region also shares an epidemic of non-communicable disease (NCDs) [20] coupled with the ongoing burden of communicable disease, maternal and child mortality, mental ill-health, gendered violence and road traffic injuries, plus the existential threat from an increasingly unstable climate and surge events. [21] Individual PICTs have particular burdens of fatal emergency conditions [11,14] such as obstetric complications (haemorrhage, sepsis, obstruction) in Papua New Guinea (PNG), childhood diarrhoeal and respiratory infections in Kiribati, and acute ischaemic events in Fiji. [22,23] All of these conditions require effective EC systems to address acute manifestations of disease or injury, yet robust systems for pre-hospital and facility-based EC in PICTs are lacking. As exemplified by their strong response to the NCD crisis, [24] PICT governments can accelerate regional progress to achieve health targets. Similarly, PICT clinicians have collaborated regionally to measure surgical indicators [25] and develop Pacific Island standards for perioperative practice. [26] In the context of the urgent need to assess and build safe, accessible and resilient EC systems in all PICTs, we aimed to describe the current status of EC, and define relevant standards and priority actions for EC development across the Pacific region using the WHO ECSF and health system building blocks adapted to the Pacific context.

Methods

We conducted a prospective, three-phase, expert consensus process [27] over nine months from August 2018 to April 2019 to determine the current EC status, development priorities and regional standards for EC in the Pacific. We adopted a collaborative, participatory and strengths-based approach [28] and used a logical framework [29] to document inputs, activities, outputs, expected outcomes and anticipated impact (Fig. 2) across the three iterative,

stepped phases of the project. The first phase was a regional face-to-face workshop held in Tonga in August 2018 involving key PICT stakeholders, followed by iterative feedback from participants. By introducing the WHO ECSF and brainstorming regional priorities for EC development at facilities and in the pre-hospital setting, this process enabled PICT participants to frame EC within the health system and provided content that informed the subsequent survey and workshop phases of the project.

The second phase consisted of two cross-sectional on-line surveys (pre-hospital and facility-based, Appendix pp 1–32) with three sections each, exploring current EC status, priorities for EC development and standards for regional EC systems. Following the surveys we held another face-to-face workshop in Fiji in December 2018 where survey results were analysed, discussed, and consensus agreements ratified. The final project phase included feedback by PICT participants, ultimate analysis and interpretation of results, and presentation to the regional Pacific Heads of Health meeting in Fiji in April 2019. Each activity informed subsequent activities through a continuous, iterative and consultative process.

Survey tool development

We adapted the WHO health system building blocks for the Pacific EC context to emphasise the importance of facility infrastructure and EC processes such as triage (Fig. 3). Within the WHO ECSF, these Pacific EC system building blocks became the architecture for all data collection and analysis: Human Resources and Training, Infrastructure and Equipment, Data (information and research), Processes, Leadership and Governance. The first section of the facility-based survey contained ten questions that explored systems capacity and function from the national referral hospital to a district or provincial hospital level. Most questions required a graded response from five options ranging from no capacity or function,

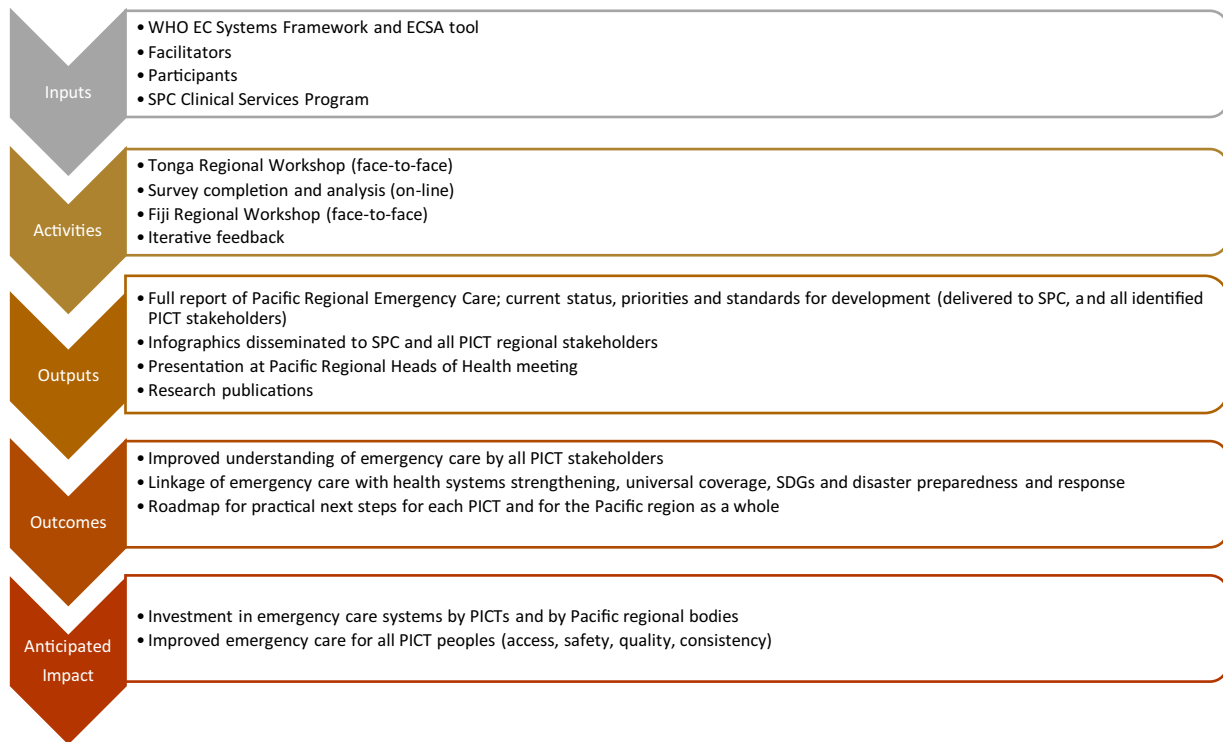


Fig. 2. Logical framework for the Pacific Regional Emergency Care project.

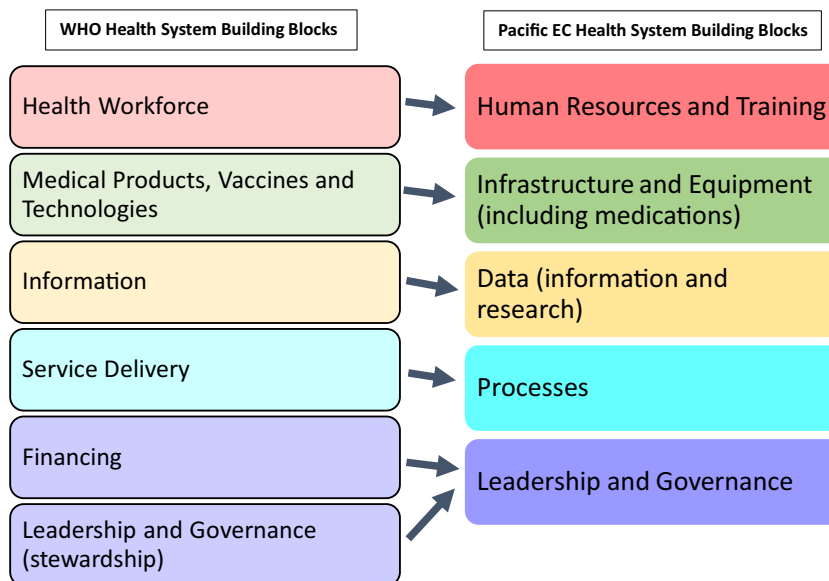


Fig. 3. WHO and Pacific emergency care health system building blocks.

through to a high level of development across the entire country. Three questions about pre-hospital EC explored capacity for care at the scene of illness or injury, care during transport and the level of systems development overall. The second and third sections of both the facility-based and pre-hospital surveys explored regional priorities for EC development and minimum standards of EC that could apply across all PICTs. All EC functions and activities link to each building block, which are depicted as separate entities but are interdependent within a complex system. [30]

In order for survey participants to rank priority development actions, we provided a table of EC inputs and functions across

each building block, following a patient journey through the pre-hospital and facility system (Appendix pp 9–10, 25). Participants were asked to think regionally, and rank urgency of action as an immediate priority, something to be achieved within 5 years, or as a long-term goal; reflecting the real-life time frame of many development activities in the Pacific. Participants also provided an overall priority ranking of the Pacific EC system building blocks. To determine regional EC standards, participants were asked to select any (or all) of 5 options of potential EC standards applicable to all PICTs across each of the building blocks, apart from Human Resources and Training, which had additional questions specifically

for training standards and requirements. Clinicians who did not work in PICTs but were familiar with resource-limited contexts piloted the surveys.

Setting, participants, sampling

Together with Australia, New Zealand, France and the United States of America (USA), the 22 PICTs of the Pacific region own and govern the Secretariat of the Pacific Community (SPC), which is the principal regional scientific, technical and international development organisation. [31] The Clinical Services Program (CSP) within the SPC Public Health Division aims to provide regional governance, support research and implement regional approaches to improve clinical service delivery. In partnership with the CSP, we sought to engage EC stakeholders from 16 different PICTs, excluding the French collectivities (New Caledonia, French Polynesia, Wallis and Futuna), the USA commonwealth territories (Guam, Commonwealth of the Northern Mariana Islands, American Samoa) and the British Overseas Territory (Pitcairn Island), and including Timor-Leste, a small Pacific country with strong socio-cultural links to the SPC PICTs.

Sampling for this project was purposive, opportunistic and enhanced through snowball methods. Participation throughout the process was open to any PICT stakeholder with an interest in EC: clinicians; administrators; policy-makers, without exclusion criteria. Workshop participants were mostly EC clinicians (doctors and nurses) nominated by their national governments or representative bodies, but highly dependant on individual availability and access to external funding. The Fiji workshop coincided with a regional EC conference, thereby enabling wider PICT engagement. Remote participation using real-time communications technology was not available at either workshop. Surveys were sent by email using researcher networks and SPC regional contacts. We deliberately targeted known EC leaders and other senior clinicians across PICTs in order to engender rapid stakeholder engagement and encourage survey snowball recruitment through internal networks within countries. As approximately 50 doctors with EC qualifications (Diploma or Masters degree) worked in ten of the target PICTs, and assuming an average of three nurse EC stakeholders per country, our estimated baseline denominator for survey response was 98 participants. Although survey response was voluntary and anonymous, participants had the opportunity to provide their contact details, receive feedback, provide further input and receive acknowledgement in all outcome documents.

Data collection, analysis and interpretation

Facility-based and pre-hospital surveys used a secure platform (SurveyMonkey Inc. San Mateo, California, USA. 2019) to collect data over six weeks from 1st November – 15th December 2018. Survey data was exported in to Microsoft Excel (Microsoft Corporation, 2016) for management and analysis. For the first section of both surveys (current status), we generated summary statistics of demographic details and question responses for the region as a whole and for each PICT individually. Proportions of the total regional responses for each graded level were summarised using percentages and are presented in tables separated in to pre-hospital and facility EC. Data on triage systems in use around the Pacific region were analysed using geographical mapping.

We compared results for each PICT against the EC standards determined through consensus in the associated components of this project. Where greater than 50% of the responses for each question met or exceeded the set standard, then we determined that this component of the EC system was at an acceptable level. A simple majority cut-off was used in this instance in the absence of equal representative sampling, or the ability to follow up directly

with the anonymous participants from each PICT. At the request of SPC, tables were constructed to enable comparison between PICTs and to identify which EC system components were least developed across the region.

We conducted preliminary analyses for survey sections two and three immediately prior to the face-to-face workshop held on 5th December 2018 in Fiji, and presented this data to the workshop participants. For both development priority and regional standard statements, participants accepted a 70% survey agreement benchmark for adoption of each statement. Statements that received between 65 and 70% survey agreement were also open for discussion and adoption through consensus. The 70% benchmark was chosen to enable stratification of priorities and standards, and avoid either everything becoming a priority (unfeasible) or nothing identified for action (untenable). All priority and standard statements were open for re-wording, refinement and adaptation according to group consensus. Meticulous workshop minutes documented the discussion and agreed outcomes. Willing participants provided contact details and were able to provide subsequent feedback through both the survey tools and directly by email to the researchers. At all phases of the project, participants could provide written or verbal free-text responses to add or highlight any component of EC for consideration. All identified participants received draft versions of the consensus priorities and standards for comment prior to finalisation and presentation to regional health leaders.

For practical use, we grouped EC development priorities in to 'immediate', and 'longer term', thereby combining the survey categories 'should achieve in 5 years' with 'long term goal' in our data analysis. Priority and standard statements that met the 70% benchmark, or agreement through discussion, were ratified through group consensus as an adopted statement and not subject to further analysis. Both priority and standard data are presented as descriptive lists within each building block.

The Australasian College for Emergency Medicine (ACEM) collaborated to produce infographics using summary data of all survey component results for both pre-hospital and facility-based EC. These documents accompanied an infographic explaining what EC is and why it is important for PICTs, for wide dissemination and advocacy around the Pacific region (Appendix pp 33–35).

Role of the funding source

The Pacific Community CSP initiated and supported this project through funding and providing logistical support for regional delegates (including PA-E and PT) to attend and participate in face-to-face workshops. The CSP also facilitated on-line regional engagement, funded two researchers to perform specific tasks (GP and AC), participated as co-researchers (BK) and explicitly granted approval for publication of research outcomes. The corresponding author (GP) has not received payments to write this article, and had full access to all the data in the study. The corresponding author takes final responsibility for the submission of this paper for publication.

The Monash University (Australia) Human Research and Ethics Committee also approved all components of this research project (Project ID: 17220).

Results

Fifteen participants from seven different PICTs attended the Tonga workshop and 50 stakeholders representing nine different PICTs participated in the Fiji workshop. The survey email links were sent to 112 stakeholders in 16 different PICTs and by 4th December 2018 for the preliminary analysis, there were 156 facility-based and 119 pre-hospital survey responses from 17 different PICTs. At completion, the facility-based survey had 174 participants

Table 1
Country, role and facility-type of participants.

	Tonga Workshop: Number	Facility Survey: Number by 4th Dec.2018	Facility Survey: Total Number (%)	Pre-Hospital Survey: Number by 4th Dec.2018	Pre-Hospital Survey: Total Number (%)	Fiji Workshop: Number
Country (initial survey number (112))	Total 15	Total 152	Total 170	Total 117	Total 127	Total 50
American Samoa (0)	..	1	1 (0.6)	1	1 (0.8)	..
Cook Islands (6)	1	10	10 (5.9)	7	7 (5.5)	1
Federated States of Micronesia (7)	..	2	2 (1.2)	2	2 (1.6)	..
Fiji (26)	5	29	37 (21.7)	21	25 (19.7)	37
Kiribati (7)	1	8	8 (4.7)	3	3 (2.4)	..
Marshall Islands (4)	..	24	24 (14.1)	15	15 (11.8)	..
Nauru (2)	..	1	1 (0.6)	1	1 (0.8)	..
Niue (2)	..	3	3 (1.8)	1	1 (0.8)	..
Palau (2)	..	4	4 (2.3)	4	4 (3.1)	..
Papua New Guinea (14)	..	23	26 (15.3)	18	18 (14.2)	3
Samoa (4)	3	9	11 (6.5)	17	19 (14.9)	2
Solomon Islands (14)	2	15	16 (9.4)	8	9 (7.1)	2
Timor-Leste (1)	..	2	2 (1.2)	3	3 (2.4)	1
Tokelau (1)	..	1	1 (0.6)	1	1 (0.8)	..
Tonga (6)	2	8	9 (5.3)	4	5 (3.9)	1
Tuvalu (5)	..	3	5 (2.9)	4	6 (4.7)	1
Vanuatu (11)	1	9	10 (5.9)	7	7 (5.5)	2
Role	Total 15	Total 153	Total 171	Total 117	Total 127	Total 50
Doctor	7	111	123 (71.9)	80	88 (69.3)	32
Nurse	5	20	25 (14.6)	18	20 (15.7)	17
Hospital administrator	..	1	1 (0.6)	3	3 (2.4)	..
Medical superintendent	1	7	7 (4.1)	3	3 (2.4)	..
Director of nursing	1	6	7 (4.1)	5	5 (3.9)	..
Ministry of Health staff	..	3	3 (1.7)	1	1 (0.8)	..
Pre-Hospital	..	2	2 (1.2)	6	6 (4.7)	..
Allied Health	..	2	2 (1.2)	1	1 (0.8)	..
Academic	1	1	1 (0.6)	0	0 (0.0)	1
Facility-type		Total 150	Total 168	Total 117	Total 128	
National referral hospital	..	92	100 (59.5)	68	76 (59.4)	..
Provincial / Divisional hospital	..	30	40 (23.8)	20	21 (16.4)	..
District / Sub-divisional hospital	..	7	7 (4.2)	9	10 (7.8)	..
Small health facility / Health Centre / Private facility	..	17	17 (10.1)	12	13 (10.2)	..
Nursing station	..	1	1 (0.6)	0	0 (0.0)	..
Pre-Hospital service	..	1	1 (0.6)	6	6 (4.7)	..
Non-Clinical (office, university, Ministry of Health)	..	2	2 (1.2)	2	2 (1.5)	..

and pre-hospital survey 130 participants from 17 different PICTs, thereby exceeding our baseline response estimate. Although not included in the initial recruitment, a response was received from American Samoa, which was included in the analysis for breadth of regional representation. Table 1 shows details of PICT, role and facility-type of participants, including the initial number of surveys sent to each PICT. Not all respondents answered all demographic questions, and not all questions were completed by every participant. Survey completeness ranged from 84 – 94% in section one, and 70 – 85% for sections two and three.

For both facility-based and pre-hospital EC, participants ranked the Human Resources and Training building block, followed by; Infrastructure and Equipment; Leadership and Governance; Processes, and lastly Data as the overall order of priority for EC systems development activities in the Pacific region. At the final workshop, participants agreed to review all consensus priorities and standards after five years.

Facility

Current status

Across the Pacific, participants report a low level of training for EC, limited areas and incomplete equipment for care provision, complicated by care delivery in overcrowded and unsafe areas. Table 2 provides details of regional responses to questions about the capacity and function at EC facilities according to each building block. Participants report inconsistent triage and multiple triage systems in use around the region, with some countries using up to four different systems. Fig. 4 depicts a regional map il-

lustrating the triage systems currently used in each PICT with the response numbers from each country included. Use of standardised clinical guidelines and collection of useful EC data is inconsistent across the region.

Leadership and Governance was explored through the lens of disaster planning integrated with EC, and recognition and prioritisation of EC at the national level. Only 15 (10.1%) participants reported that EC staff were involved in planning, training and surge response drills for disasters at all hospital levels, integrated with local and national plans. One hundred (68.0%) participants reported that EC was either not a priority in their country or no action had been taken to plan for EC development.

Table 3 illustrates how each PICT is rated across each of the EC building block components according to the consensus standard determined by the PICT stakeholders.

Development priorities

We present the agreed priority inputs and functions per building block for regional facility-based EC development in Table 4, divided in to immediate and longer-term priorities. Training staff, providing essential equipment and standardising triage and clinical guidelines are building block components that neared or exceeded the 70% benchmark for urgent action and were adopted unequivocally by consensus. Although not initially reaching the benchmark, workshop participants agreed through discussion to adopt highly ranked components incorporating clinical leadership, government recognition and information systems for basic data collection as immediate priority actions.

Table 2
Status of facility-based EC building block components across the Pacific region.

	Number	Percentage %
Level of EC training, skills and staff continuity across the Pacific	Total 148	
ED staff have no specific EC training and rotate around the hospital	8	5.4
National hospital ED staff have some short course training, but are not permanent	44	29.7
Most national hospital and some provincial hospital ED staff have short course training, and there are some permanent ED nurses at the national hospital	39	26.4
At least one doctor at the national hospital has a post-graduate EC qualification and permanent nurses have short course EC skills. Some ED staff have short course training at the provincial level hospitals	26	17.6
Permanent doctors and nurses with post-graduate EC qualifications staff the national hospital ED, and most ED staff at provincial level hospitals have at least short course training	31	20.9
Level of infrastructure for EC across the Pacific	Total 148	
No purpose built EDs and no areas for resuscitation in any facility in the country	6	4.1
National hospital has an ED with a resuscitation area but limited areas for other EC (assessment, treatment, monitoring, observation), no other facility has an ED or a resuscitation area	39	26.3
National hospital and at least one provincial level hospital has an ED with a resuscitation area, and limited areas for other EC	38	25.7
National hospital has a good resuscitation area and adequate areas for other EC. Some EDs in provincial level hospitals have resuscitation areas and limited areas for other EC	43	29.0
National hospital and most provincial level hospitals have good resuscitation areas and adequate areas for other EC. Smaller hospitals have basic areas designated for EC	22	14.9
Access block and overcrowding in the ED	Total 148	
No overcrowding in any EDs and admitted patient move quickly to the wards	26	17.6
Some admitted patients stay in the ED up to 12 hours, but only in the national hospital. This never happens in any other hospital in the country	25	16.9
Admitted patients regularly stay in the ED for 12-24 hours waiting for ward transfer. ED often overcrowded with patients in corridors, but only at the national hospital.	27	18.2
Admitted patients regularly stay in the ED for 12-24 hours or longer. ED usually overcrowded with patients regularly in corridors and other unsafe areas. This happens at the national hospital and sometimes at provincial hospitals.	34	23.0
Admitted patients regularly stay for 24 hrs or even days in our ED waiting for ward transfer. ED usually overcrowded with patients regularly seen in corridors and other unsafe areas. This happens at the national hospital and many other hospitals in the country.	36	24.3
Effective EC equipment distribution across the Pacific	Total 147	
No effective equipment for EC at any facility	3	2.1
Incomplete basic resuscitation equipment at the national hospital and no effective equipment at any other facility	24	16.3
Complete basic resuscitation equipment at the national hospital only and incomplete resuscitation equipment at provincial level hospitals	44	29.9
Complete basic resuscitation and advanced life support, trauma and cardiac equipment at the national hospital only. At least one provincial level hospital has complete basic resuscitation equipment.	50	34.0
Complete basic resuscitation and advanced life support, trauma and cardiac equipment at the national hospital only. Most provincial level hospitals have basic resuscitation and cardiac EC equipment.	26	17.7
Triage use across the Pacific region	Total 148	
No system exists	10	6.8
Inconsistent use of triage at the national hospital, and no triage training. No triage system use at any other facility	48	32.4
Consistent triage with patient registration and triage training at the national hospital only. No system use at any other facility	33	22.3
Consistent triage with patient registration and triage training at the national hospital. At least one other provincial level hospital consistently uses a triage system	30	20.3
Reliable and consistent use of a recognised triage system with patient registration across all hospitals in the country	27	18.2
Use of clinical guidelines across the Pacific region	Total 147	
No clinical guidelines for EC are used in the country	17	11.6
Standardised resuscitation guideline used only at the national hospital. No guidelines in use at any other hospital	25	17.0
Standardised resuscitation guideline and inconsistent use of other international guidelines for common EC diseases at the national hospital. No guidelines used at other hospitals	26	17.7

Table 2
Continued

Standardised resuscitation, international and some local EC guidelines consistently used at the national hospital. Some inconsistent use of guidelines at provincial hospitals	56	38.1
Widespread and consistent use of resuscitation and other appropriate guidelines at the national and most other hospitals in the country	23	15.6
Data management for EC across the Pacific	Total 146	
No system of data collection in any ED across the country	4	2.7
Limited log-book data collection by nurses at the national hospital, and inconsistently elsewhere	35	24.0
Nurses collect log-book and paper-based data, including ED diagnosis at the national and some provincial level hospitals. Data is not linked to past records.	56	38.4
Clerical staff collect data including ED diagnosis and some EC time-points on paper or computer at the national hospital. Nurses use log-books at provincial level hospitals	38	26.0
Clerical staff collecting demographic, diagnostic, treatment and EC time-point data on computer system consistently at the national hospital and most other hospitals in the country	13	8.9
Disaster plans and integration with EC across the Pacific region	Total 148	
No local or national plan for a surge response in the event of a disaster	25	16.9
National hospital disaster plan exists, but EC staff have not been involved in creating the plan, or received any information or training in its use	21	14.2
There is a national hospital disaster plan with roles and responsibilities for the ED staff but there has not been any training or surge response drills involving EC staff.	46	31.1
There is a national hospital disaster plan that involves the ED. Senior EC doctors and nurses have clear roles and responsibilities, and are involved in training and surge response drills.	41	27.7
There are individual hospital disaster plans at the national hospital and most other hospitals, which link to regional and national plans. Senior EC doctors and nurses are involved in training and surge response drills across the country.	15	10.1
Recognition and prioritisation of EC in the Pacific region	Total 147	
Emergency Care not considered important and is not a priority for the local Ministry of Health	10	6.8
Local Ministry of Health acknowledges that EC needs to improve, but has not prioritised any EC developments in planning or budgeting	48	32.6
EC is an identified priority area for improvement, but there is no current planning for EC development	42	28.6
Local Ministry of Health has identified EC as a priority area at the national hospital, and has plans and a budget to make some improvements at this level only	32	21.8
Local Ministry of Health has identified EC as a priority area for the whole country and is planning for EC improvement across all levels of pre-hospital and facility-based care.	15	10.2

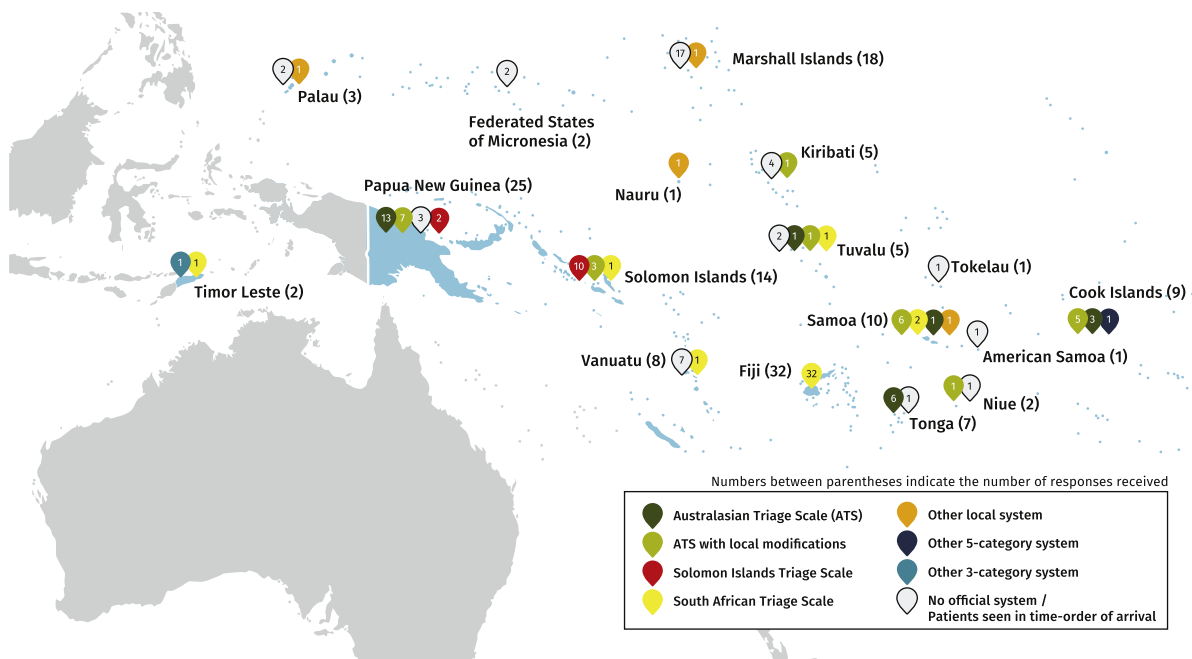


Fig. 4. Map of triage systems in use across the Pacific region.

Table 3
Comparison of facility-based EC between PICTs across the region.

Country	HR/training		Infrastructure / Equipment						Processes				Data		Leadership / Governance			
	EC staff and training (answers 4+5 >50%)		Infrastructure (answers 4 + 5 > 50%)		Overcrowding (answers 3+4+5 >50%) NB: 'no' is the benchmark here		Equipment (answers 4 + 5 > 50%)		Triage use (answer 5 >50%)		Clinical guidelines (answer 5 > 50%)		Data (answer 5 > 50%)		Disaster plans & training (answer 5 >50%)		Govt. prioritisation of EC (answer 5 > 50%)	
N	Status	N	Status	N	Status	N	Status	N	Status	N	Status	N	Status	N	Status	N	Status	
American Samoa	1	yes	1	no	1	yes	1	no	1	yes	1	no	1	yes	1	no	1	no
Cook Islands	9	no	9	yes	9	no	9	yes	9	yes	9	yes	7	yes	9	yes	9	no
FSM*	2	Yes/no	2	no	2	no	2	no	2	no	2	no	2	no	2	no	2	no
Fiji	33	yes	33	yes	33	yes	33	yes	33	no	33	no	32	no	33	no	32	no
Kiribati	5	yes	5	no	5	yes	5	no	5	no	5	no	5	no	5	no	5	no
Marshall Islands	18	no	18	no	18	no	18	yes	18	no	17	no	18	no	18	no	18	no
Nauru	1	no	1	no	1	no	1	no	1	no	1	no	1	no	1	no	1	no
Niue	2	no	2	yes	2	no	2	Yes/no	2	Yes/no	2	no	2	Yes/no	2	no	2	Yes/no
Palau	3	no	3	no	3	no	3	yes	3	yes	3	no	3	no	3	no	3	yes
Papua New Guinea	25	Yes/no	25	Yes/no	25	yes	24	yes	25	no	25	no	25	no	24	no	25	no
Samoa	10	yes	10	no	10	yes	10	yes	10	no	10	no	10	no	10	no	10	no
Solomon Islands	14	Yes/no	14	no	15	yes	14	no	14	no	14	no	15	no	15	no	15	no
Timor-Leste	2	no	2	no	2	yes	2	no	2	no	2	no	2	no	2	no	2	no
Tokelau	1	no	1	no	1	no	1	no	1	no	1	no	1	no	1	no	1	no
Tonga	7	no	7	no	7	no	7	no	7	no	7	no	7	no	7	no	7	no
Tuvalu	5	no	5	no	5	no	5	no	5	no	5	no	5	no	5	no	5	no
Vanuatu	8	no	8	no	7	no	8	no	8	no	8	no	8	no	8	no	7	no
TOTAL	146 ^c		146		146		145		146		145		144		146		145	

Table 3. Comparison of facility-based EC between PICTs across the region

*Federated States of Micronesia

^c146 (144/145) responses of total 148 (146/147) here, as two respondents did not identify their country but did answer these questions. (see Table 2)

■ = meeting an acceptable standard ■ = mixed response; standard irregularly met ■ = not meeting an acceptable standard

Consensus standards

Minimum Pacific regional standards for facility-based EC are presented by building block in Table 5. Ten of the 24 standards generated pertain to Human Resources and Training. Training standards were amended during workshop discussion to be more prescriptive (eg. 'at least two doctors' and 'at least one nurse per shift' with specialised EC training) yet allow for the substantial variation between PICT populations and resources. Specific EC short course training standards differed for providers working at the national hospital from those working in provincial or district level facilities. Infrastructure and Equipment standards regarding space, equipment and medications for resuscitation met the 70% benchmark and were adopted, along with a fourth standard concerning regional ED design guidelines that was approved after discussion. All Leadership and Governance standards exceeded the benchmark and were strongly endorsed by the workshop participants. The Process standard regarding consistent use of a recognised triage system exceeded the benchmark, along with amended standards to enable specific adaptation and use of clinical guidelines within each PICT context. Data standards that enshrined collection of core EC information, including triage category, reached or approximated the benchmark and were adopted through consensus.

Through free comments in the survey and key discussion items during the workshops, participants clarified that the consensus outcomes should apply to both public and private facilities in PICTs, and that flexibility to adapt all EC components to the local context was inherent in the priorities and standards generated.

Pre-Hospital

Current status

Table 6 provides details of responses exploring the level of EC currently available across the Pacific at the scene of illness or injury, and during transport of the patient to or between facilities.

Very few respondents reported access to trained first responder care and expert advice in most parts of their country. Most commonly, participants reported a limited and unreliable transport system providing basic EC care, and less than 5% reported an overall pre-hospital system with high quality and reliable care in most parts of their country.

Table 7 illustrates whether each PICT meets an acceptable standard for pre-hospital care (care at scene, during transport and overall system development).

Development priorities

Table 4 also provides the immediate and longer-term priority inputs and functions for pre-hospital EC systems development. Overall, there are very few longer-term priorities for pre-hospital EC. Workshop participants agreed that all components of provider training required immediate priority status, despite none of them reaching the initial 70% benchmark. After discussion, immediate priority actions were also adopted supporting government leadership, protective legislation, medical oversight and basic data collection. All three of the priority areas for Infrastructure and Equipment met or exceeded the 70% survey benchmark, as with all Process priority actions covering communication, clinical guidelines and standard procedures during disaster events.

Consensus standards

Table 8 presents the 22 minimum standards for Pacific regional pre-hospital EC. All Human Resources and Training standards were adopted after discussion. Basic life support and trauma care training for pre-hospital providers were highly endorsed, along with equipment and safety standards for ambulances and Process components covering clinical and operational protocols to standardise care. Workshop participants made minor amendments to incorporate non-road transport and adaption of guidelines for PICT context. Data standards regarding logging and recording of clinical

Table 4
Priority inputs and functions for facility-based and pre-hospital EC systems development.

EC Building Block	Immediate priorities		Longer term priorities	
	Facility-based EC	Pre-hospital EC	Facility-based EC	Pre-Hospital EC
Human Resources and Training	<ul style="list-style-type: none"> Trained professional providers for resuscitation, assessment and treatment Trained professional providers for triage, registration and data collection 	<ul style="list-style-type: none"> Training of call takers and dispatchers Training of lay responders Certified provider training and career pathway Separate trained staff for inter-facility transfers Driver separate from care providers 	<ul style="list-style-type: none"> Standardised staff training Permanent 24hr staff with certification, recognition and career pathways 	
Infrastructure and Equipment	<ul style="list-style-type: none"> Triage area and triage assessment kits Standardised equipment for EC for adults and children Amenities, infection control, safety, IT 	<ul style="list-style-type: none"> Standardised ambulances with equipment kits Personal protective equipment and infection control Ambulance maintenance standards 	<ul style="list-style-type: none"> ED designed with resuscitation, assessment, treatment and observation space 	<ul style="list-style-type: none"> Enough ambulances for urban and rural areas
Leadership and Governance	<ul style="list-style-type: none"> Clinical leadership and governance, accountability for quality and safety Universal access and recognition of EC as essential in the health system 	<ul style="list-style-type: none"> Clinical and Govt leadership in pre-hospital development Laws to regulate ambulances and protect staff Medical oversight and medical director 	<ul style="list-style-type: none"> SOPs for multi-agency collaboration in disasters 	<ul style="list-style-type: none"> Laws to protect bystanders ('Good Samaritan' laws)
Processes	<ul style="list-style-type: none"> Clinical care, resuscitation and team care guidelines Standardised triage system and surveillance protocols ED observation, referral and transfer guidelines, and access block protocols 	<ul style="list-style-type: none"> Phone number to access pre-hospital care Communications between dispatch, pre-hospital care provider and facility Clinical practice guidelines (CPGs) Standard Operating Procedures (SOPs) for roles / responsibilities at the scene in disasters 	<ul style="list-style-type: none"> Incident, audit and morbidity / mortality review, systems for reviewing performance 	
Data	<ul style="list-style-type: none"> Information system for patient registration, chief complaint and patient tracking Information system for ED processes measurement, quality metrics, ED diagnosis and disposition 	<ul style="list-style-type: none"> Recorded call and dispatch times Patient care records with standardised clinical dataset 	<ul style="list-style-type: none"> Quality and safety metrics developed for Pacific context 	<ul style="list-style-type: none"> Vehicle tracking

cal cases reached 70% survey agreement and were adopted. Participants strongly endorsed all Leadership and Governance standards, which included government and clinical leadership, practice certification and protective and safety legislation.

During the workshop and in free-text survey responses, participants emphasised the importance of pre-hospital EC coordinating with other services during disasters and surge events, according to the specific context within each PICT.

Table 5
Pacific regional minimum standards for facility-based emergency care (EC).

HUMAN RESOURCES and TRAINING
<ul style="list-style-type: none"> All providers who work in emergency departments (EDs) should undertake basic training with certification and credentialing in recognition of their training level Emergency Care (medicine and nursing) should be a recognised speciality with appropriate employment structures and career pathways Training for EC (medical and nursing) should be consistent around the Pacific region with standardised certification and recognition between all Pacific Island Countries (PICs) All EDs at the National Referral and Provincial / Divisional Hospital level should have sufficient provider numbers to ensure 24 hour service and safe rostered working hours
HUMAN RESOURCES and TRAINING: Staff training level
<ul style="list-style-type: none"> All providers at the National Referral Hospital level should have core short course skills in adult and paediatric emergency and trauma care All providers at the Provincial / District / Divisional Hospital level should have core short course skills in adult and paediatric emergency and trauma care At least two doctors at the National Referral Hospital level should have post-graduate specialty training (Diploma to Masters in EM) At least one nurse per shift at the National Referral Hospital level should have post-graduate specialty training (Certificate to Diploma)
HUMAN RESOURCES and TRAINING: Staff Short Course Requirements*
<ul style="list-style-type: none"> At the National Hospital level, short course requirements are: BLS; PTC; ELS/SIREN; ACLS; APLS/APEM; ATLS/EMST; MIMMS* At the Provincial / District / Divisional Hospital level, short course requirements are: BLS; PTC; ELS/SIREN (Serious Illness in Remote Environments)
INFRASTRUCTURE and EQUIPMENT
<ul style="list-style-type: none"> There should be Pacific regional ED design guidelines that describe core and optional standards for the layout, spatial and functional requirements of National Referral Hospital EDs that can apply to every PIC At the National Referral Hospital and Provincial / Divisional Hospital level, there should be standardised requirements for a resuscitation room / area that includes design and core ABC equipment standards that can apply to every PIC There should be Pacific regional EC equipment standards describing what is the core required equipment for resuscitation, assessment, treatment, monitoring and observation in the ED across all Facility levels that can apply to every PIC There should be a Pacific regional EC drug list which outlines the basic standard requirements for EC drugs that should be available in EC Facilities across different levels that can apply to every PIC
LEADERSHIP and GOVERNANCE
<ul style="list-style-type: none"> Emergency Care should be included as an essential component of the health care system and recognised as a speciality discipline in all PICs There should be a Pacific regional EC body that can provide advocacy and expert advice to individual PICs and regional organisations for the development of EC across the whole Pacific region All PICs should have employment structures, career pathways and supportive training opportunities for providers working in EDs There should be laws protecting both patients and providers (that cover privacy, medico-legal, malpractice, and mandatory reporting) in EC facilities across all levels There should be standardised operating procedures governing the relationship between EC facilities and other relevant agencies during disasters and surge events that can apply across all PICs
PROCESSES
<ul style="list-style-type: none"> All EDs across all facility levels in the Pacific region should use a recognised triage system to determine urgency of medical assessment Clinical guidelines for the assessment and treatment of common ED presentations in PICs should be developed and used consistently within each country All EDs should adapt and use internationally recognised guidelines for patient resuscitation and treatment of common life-threatening EC conditions
DATA
<ul style="list-style-type: none"> All patients presenting for care at EDs across all facility levels should be registered and their basic demographic, triage category and 'Presenting Complaint' recorded There should be a computer-based ED data management system and trained staff for data entry, that can record patient arrival, disposition and ED diagnosis information for all patients attending at the National Referral Hospital level

*BLS = Basic Life Support, PTC = Primary Trauma Care (www.primarytraumacare.org), ELS/SIREN = Emergency Life Support (www.elscourse.com.au), ACLS = Advanced Cardiac Life Support, APLS/APEM = Advanced Paediatric Life Support (www.apls.org.au) / Advanced Paediatric Emergency Medicine (<https://www.apemaustralia.com.au/>), ATLS = Advanced Trauma Life Support / EMST = Early Management of Severe Trauma (<https://www.surgeons.org/education/skills-training-courses/early-management-of-severe-trauma-emst>), MIMMS = Major Incident Medical Management and Support (www.mimms.org.au)

Discussion

We present the first Pacific-wide description of EC status, development priorities and regional standards structured within a health systems framework. Overwhelmingly, the Human Resources

and Training building block received the highest priority rating and number of regional standards to achieve across both facility-based and pre-hospital EC. This reflects important current workforce gaps highlighted by limited formal post-graduate training for EC and lack of permanent staff in EC facilities, which hinders

Table 6
Status of pre-hospital EC across the Pacific region.


	Number	Percentage%
System for access to EC and first aid from trained first responders	Total 122	
No system exists	17	13.9
Some groups are trained in first aid, but without any standard training or coordination	25	20.5
There are some formally trained first responders but no system for the public to access them	36	29.5
There are organised, trained first responder services that the public can access in some parts of the country	33	27.1
There is access to trained first responder care and advice from the ambulance / central facility service in most parts of the country	11	9.0
System to provide EC during transport between scene and facility, or between facilities	Total 122	
No system exists	17	13.9
A transport system exists but access to it is limited and unreliable	16	13.1
A transport system with basic emergency care provision exists but access is limited and unreliable	49	40.2
A transport system exists and access is reliable in most parts of the country, but providers do not provide emergency care during transport	20	16.4
A transport system exists and access to transport and emergency care during transport is reliable in most parts of the country	20	16.4
System to access EC from trained first responders and the scene and urgent transport to a health facility (overall system of pre-hospital care)	Total 121	
No system exists	23	19.0
Some parts of the system exist but access to care is not reliable	35	28.9
Most parts of the system exist, but access to care is not reliable in all parts of the country	34	28.1
Most parts of the system exist and access to care is reliable in most parts of the country, but not of high quality	24	19.9
Most parts of the system exist and access to care is reliable and of high quality in most parts of the country	5	4.1


Table 7
Comparison of pre-hospital EC between PICTs across the region.


	Overall System		Care at Scene		Care during transport	
	System level (answer 5 >50%)		Scene care (answer 5 > 50%)		Transport and care (answer 5 >50%)	
Country	N	Status	N	Status	N	Status
American Samoa	1	no	1	no	1	yes
Cook Islands	7	no	7	no	7	yes
FSM*	2	no	2	no	2	no
Fiji	22	no	23	no	23	no
Kiribati	2	no	2	no	2	no
Marshall Islands	14	no	14	no	14	no
Nauru	1	no	1	no	1	no
Niue	1	no	1	yes	1	yes
Palau	4	no	4	no	4	Yes/no
Papua New Guinea	17	no	17	no	17	no
Samoa	19	no	19	no	19	no
Solomon Islands	9	no	9	no	9	no
Timor-Leste	3	no	3	no	3	no
Tokelau	1	no	1	no	1	no
Tonga	4	no	4	no	4	no
Tuvalu	5	no	5	no	5	no
Vanuatu	7	no	7	no	7	no
TOTAL	119 ⁺		120		120	

* Federated States of Micronesia

⁺119 (120) responses of 121 (122) here, as two respondents did not identify their country but did answer these questions.

 = meeting an acceptable standard

 = mixed response; standard irregularly met

 = not meeting an acceptable standard

health worker performance through lack of skill, knowledge and motivation. [32] Pacific stakeholders emphasised the importance of building and nurturing staff capacity; in the regional context where populations are isolated or small, higher education opportunities can be restricted, and professional development may be limited. PICT participants clearly desire standardised and certified EC

training for providers at the pre-hospital, district and national hospital level and have articulated the types of skills required at each level by identifying particular short course requirements. Short courses (typically 2–3 days) may not lead to sustained skill and knowledge retention and have uncertain impacts on patient outcomes, [33] but by specifying standards for the region, PICTs now

Table 8
Pacific regional minimum standards for pre-hospital emergency care (EC).

HUMAN RESOURCES and TRAINING
<ul style="list-style-type: none"> All pre-hospital care providers should undertake a basic training course with certification A career pathway should exist for pre-hospital drivers and providers, which is separate to that of ED facility staff The staffing model should consist of a separate driver and care provider There should be standardised retrieval training for emergency care practitioners based in remote locations There should be basic training in emergency care for emergency services personnel (fire, police) and community volunteers
HUMAN RESOURCES and TRAINING: Staff training level*
<ul style="list-style-type: none"> All pre-hospital provider short course training requirements are: BLS, PTC
INFRASTRUCTURE and EQUIPMENT
<ul style="list-style-type: none"> Ambulances in all PICs should carry a standard set of equipment for emergency care (including oxygen, fluids, emergency drug kit and injury care) Ambulances in all PICs should be equipped with devices including radios to enable communication with the dispatch centre and health care facilities Ambulances in all PICs should be fitted with a stretcher or trolley that can be safely secured Ambulances (of all types; road, sea, air) in all PICs should undergo regular maintenance checks and be certified as safe and fit for purpose Ambulances in all PICs should carry a monitor (with BP, pulse and SpO₂) and Automated defibrillator (AED)
LEADERSHIP and GOVERNANCE
<ul style="list-style-type: none"> All PICs should have “Good Samaritan” laws that protect people who provide emergency care In all PICs, ambulances must be licenced, comply with maintenance and equipment standards and pre-hospital care staff must be certified to practice There should be legislation governing pre-hospital care services and a nominated Ministry lead in every PIC All PICs should have a nominated pre-hospital care clinical lead who is officially recognised by government
PROCESSES
<ul style="list-style-type: none"> All PICs should use a process to dispatch ambulances according to clinical priority Clinical Practice Guidelines for the pre-hospital management of common emergencies in PICs should be developed and used consistently within each country All PICs should have standard operating procedures that guide the actions of ambulance personnel and those from other emergency services at the scene of an accident All PICs should use a process whereby the facility is notified of a critically ill or injured patient prior to their arrival by ambulance All PICs should have a processes to ensure that patients are transported to facilities that can provide for their needs (e.g. major trauma or burns) - either directly from the scene or through inter-facility transfer
DATA
<ul style="list-style-type: none"> All calls to ambulance services must be logged and the time from call to dispatch of ambulance must be recorded Pre-hospital care providers should complete a patient care record for every case which contains standardised clinical information

*BLS = Basic Life Support, PTC = Primary Trauma Care (www.primarytraumacare.org)

have a clear framework for ensuring donor-driven teaching activities conform to the needs and requirements of local clinicians and are consistent across the region.

At the national hospital level, every PICT should have doctors and nurses with specialist post-graduate training in EC. This standard presents challenges to many PICTs because training is costly and limited to few sites, thereby necessitating clinicians to study away from home for years at a time. A supportive model that enables PICTs to continue clinical service provision through regional provider accreditation enabling workforce mobility is desirable, [34] but requires recognition of EC as an essential speciality discipline and substantial commitment by national governments. Aspiring to prevent known burnout risks for sole clinician leaders (a common issue in the Pacific region), [35] PICT stakeholders deliberately specified minimum numbers, recognition and protection of trained staff through employment structures, career pathways and safe working hours.

Many facilities where EC is delivered are not fit for purpose. Most participants reported a resuscitation area at their national hospital, but areas for other essential components of EC, such as triage, assessment, intervention and monitoring were often lack-

ing. Some PICTs meet an acceptable standard for EC equipment, which may reflect a popular focus on tangible products as a symbol of EC investment, but can also perpetuate a common myth that EC is expensive and requires high technology. [36] Cardiac monitors and defibrillators are rarely found outside of the national hospital (82% of responses), despite rapidly increasing non-communicable disease across the region. [20] The inability to correctly diagnose and rapidly intervene in acute myocardial infarction or serious dysrhythmia can result in preventable loss of life.

Many of the Infrastructure and Equipment building block standards require further collaborative work to articulate the core ED design, equipment and medication features that can apply to all PICTs. External donors to the Pacific commonly provide large infrastructure items, such as hospitals and ambulances, and design these for models of care not practiced in the region. By creating Pacific guidelines that outline core layout, spatial, functional and equipment requirements of EDs, resuscitation rooms and ambulances, PICT EC stakeholders can ensure that new infrastructure acquisitions meet their needs, are consistent across the region, and fit yet adaptable for local context purpose.

ED overcrowding is a global, hospital-wide problem that adversely affects patient outcomes and increases mortality. [37] Considering resource limitations in PICTs, we agreed on a 12-hour benchmark as the acceptable maximum time a patient should spend in the ED between arrival and disposition. Several PICTs reported serious overcrowding and care delivery in unsafe areas, likely because of poor infrastructure, limited human resources, high burden of EC disease and immature processes such as triage and patient flow management. Daily ED overcrowding is likely to negatively impact patient experience and care outcome, and has substantial implications for the ability of hospitals to safely manage an influx of patients during surge events such as the current COVID-19 pandemic. [38]

We elevated the importance of Processes as a key manifestation of service delivery in EC by defining this as an EC system building block. PICT stakeholders endorsed this approach by consistently rating proposed Process priorities and standards highly across pre-hospital and facility-based data collection. Triage systems are used inconsistently in the region, with multiple system use likely reflecting lack of consensus within a country. Mapping enables patterns to emerge, including the general lack of recognised triage system use in the northern Pacific, spread of the LMIC-context South African Triage Scale out from Fiji and adoption of the Solomon Islands Triage Scale [39] in PNG. Triage systems now should be recognised and standardised at all facilities across PICTs and incorporated in to ED infrastructure priorities.

Most EC stakeholders reported using a standardised resuscitation guideline at their national hospital, but agreed that further guideline development with widespread and consistent implementation was a priority. Examples of evidence-based, context appropriate clinical guidelines to improve EC exist for trauma care in Fiji [40] and acute asthma in PNG, [41] as well as a framework for developing and sharing locally adapted clinical EC guidelines. [42] The need for pre-hospital clinical practice guidelines is highlighted in Timor-Leste, [43] as one component of many essential Process priorities and standards required to build an effective pre-hospital system.

Data received less attention as a priority building block in this study, perhaps reflecting the high proportion of clinician participants who are often consumed with service delivery at the expense of clinical audit and research. The burden of EC disease in the Pacific region is largely unknown, and data collection extremely limited. Achieving standards for computer-based collection of basic demographic and clinical information will enable PICT leaders to understand the acute health needs of their populations and better plan for universal access to safe and effective care. PICT stakeholders nominated 'Presenting Complaint' as a feasible descriptor of EC disease, but a globally or regionally accepted lexicon that would enable consistent data collection and comparison between PICTs is difficult to obtain, [44] yet highly desirable.

Pre-hospital EC is profoundly underdeveloped across the entire Pacific region, with none of the 17 PICTs surveyed reporting an adequate level of pre-hospital system development in their countries. Based on our pre-existing knowledge, we chose not to use the building block framework to gather data on pre-hospital capacity; instead focusing on three core functional components (care at scene, during transfer, and overall system). Rather than document overwhelming deficit, the consensus priorities and standards now outline how a pre-hospital system may be built in the Pacific region across all building block components.

Recognition of EC as a speciality discipline and critical component of the health care system is an urgent Leadership and Governance priority and a standard for all PICTs to meet. Currently EC is not a priority in most countries and not well integrated with disaster planning, yet central to an effective health system response as

highlighted by the recent COVID-19 pandemic. As predominantly clinicians, our PICT stakeholders understood the pivotal influence of government support underpinning all other building block components; particularly staff support, quality and safety oversight and surge response integration at both facility and pre-hospital levels. In entirety, these priorities and standards provide PICT leaders with a roadmap for comprehensive and consistent EC systems development across the region, including measurable indicators for progress evaluation over time. This work also provides a Pacific EC research agenda, and critical advocacy tools to inspire individual PICT and regional government action.

Our model of iterative consultation, extensive engagement and intellectual collaboration illustrates a respectful research approach recommended for the Pacific, [45] and addresses a call for regional partnership to meet the WHA Resolution 72.16. [46] Regional facility and service mapping exercises can shed some light on access to EC, [47] but often over-estimate capacity to deliver care if detailed functional assessments are not available. [48] Our approach attempts to both map availability and describe some functional capacity across the Pacific region, therefore enabling identification of gaps in core components of effective EC service delivery. With deliberate engagement of Pacific EC clinical leaders, we have generated practical outcomes of integrity, that can be implemented through local ownership. Unmeasured project benefits include improved regional cooperation and unanimity towards the establishment of a Pacific regional society for EC.

Because of resource differences, we did not include EC stakeholders from all 22 PICTs, thereby limiting total regional applicability of our consensus data and confining it to the English-speaking Pacific. Furthermore, participants were unequally represented by role, facility or country, and heavily weighted towards clinicians who may be unaware of national health priorities and policy planning within their countries, yet are at the frontline of EC provision. Engaging participants through personal relationships and professional networks around the region resulted in extremely high participation rates that are unlikely to have occurred with probability sampling methods. While this may compromise the robustness of the numerical estimates, it should not undermine the validity of the conclusions drawn around EC system components in the Pacific. Not every PICT that responded to the surveys was represented in the final consensus workshop, thereby risking bias in agreed priorities and standards. Workshop participants were cognisant of their regional roles in representing EC stakeholders from the large (PNG), small island (Tuvalu), middle income (Fiji) and least developed (Solomon Islands) PICTs, and contributed to the consensus outcomes accordingly.

In order to provide universal health coverage, EC systems must be prioritised in the global health agenda. [2] The Pacific region urgently requires robust EC systems to respond to routine, climatic and disease outbreak health emergencies, yet substantial gaps in functional capacity exist in most PICTs within all of the building blocks of facility-based and pre-hospital EC. For the first time, PICT EC stakeholders have collaborated regionally to document current status, and produce priority actions and minimum standards for EC development that conform to a globally recognised health systems framework. These consensus outcomes provide both individual PICT and regional health leaders with a key resource to commence the critical work towards improving EC for all peoples of the Pacific.

Contributors

GP conducted both project workshops, conceived, developed and disseminated the surveys, performed all data analyses and interpretation, wrote the manuscript and was the overall project

lead. AC assisted with survey development, Fiji workshop facilitation and data analysis and interpretation. PT and PAE provided survey and workshop input, recruited participants and provided expert advice and support throughout the project. BK conceived the project, assisted with data interpretation and provided expert advice and logistic support throughout the project. GOR and PC provided scientific oversight to the project. All authors had access to the data, reviewed the manuscript for critical content and approved the paper for publication.

Declaration of Competing Interest

GP and AC report personal fees and non-financial support, and PAE and PT report non-financial support from The Pacific Community (SPC) Clinical Services Program, during the conduct of the study. GP and AC are visiting emergency medicine specialists at the Fiji National University. GP is also a visiting emergency medicine specialist at the University of Papua New Guinea and is a Trustee of the Primary Trauma Care (PTC) Foundation, a non-profit, non-government UK charity that oversees global PTC courses. All other authors declare no other competing interests.

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Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.lanwpc.2020.100002.

References

- [1] Kobusingye OC, Hyder AA, Bishai D, Hicks ER, Mock C, Joshipura M. Emergency medical systems in low-and middle-income countries: recommendations for action. *Bull World Health Organ* 2005;83:626–31.
- [2] World Health Assembly. Resolution 72.16. Emergency care systems for universal health coverage: ensuring timely care for the acutely ill and injured. Geneva: world Health Organisation, 2019. https://apps.who.int/gb/ebwha/pdf_files/WHA72/A72_R16-en.pdf?ua=1 (Accessed 3 April 2020).
- [3] Shanahan T, Risko N, Razzak J, Bhutta Z. Aligning emergency care with global health priorities. *Int J Emerg Med* 2018;11:52. doi:10.1186/s12245-018-0213-8.
- [4] Anderson P, Petrino R, Halpern P, Tintinalli J. The globalization of emergency medicine and its importance for public health. *Bull World Health Organ* 2006;84:835–9.
- [5] Burkholder TW, Hill K, Hynes EJC. Developing emergency care systems: a human rights-based approach. *Bull World Health Organ* 2019;97:612–19.
- [6] Reynolds TA, Sawe H, Rubiano AM, Shin SD, Wallis L, Mock CN, et al. Strengthening health systems to provide emergency care. In: Jamison D, Gelband H, Horton S, et al., editors. *Disease control priorities, 9*. Washington DC: The World Bank; 2017. p. 247–65. Improving Health and Reducing Poverty.
- [7] Spina S, Marrazzo F, Migliari M, Stucchi R, Sforza A, Fumagalli R. The response of Milan's emergency medical system to the COVID-19 outbreak in Italy. *Lancet* 2020;395:e49–50.
- [8] Baker T, Schell CO, Petersen DB, et al. Essential care of critical illness must not be forgotten in the COVID-19 pandemic. *Lancet* 2020;395:1253–4.
- [9] World Health Organisation. *Emergency Care Systems Framework* 2019. https://www.who.int/emergencycare/emergencycare_infographic/en/ (Accessed 20 March 2020).
- [10] World Health Organisation. *Health systems. Everybody's business: strengthening health systems to improve health outcome. WHO's framework for action: world Health Organisation; 2007*. <https://www.who.int/healthsystems/strategy/en/> (Accessed 20 March 2020).
- [11] Chang CY, Abujaber S, Reynolds TA, Camargo CA, Obermeyer Z. Burden of emergency conditions and emergency care usage: new estimates from 40 countries. *Emerg Med J* 2016;33:794–800.
- [12] Obermeyer Z, Abujaber S, Makar M, et al. Emergency care in 59 low-and middle-income countries: a systematic review. *Bull World Health Organ* 2015;93:577–86.
- [13] Thind A, Hsia R, Mabweijano J, Romero Hicks E, Zakariah A, Mock C. Pre-hospital and emergency care. In: Debas HT, Donkor P, Gawande A, Jamison DT, Kruk ME, Mock CN, editors. *Essential surgery, 1*. Washington DC: The World Bank; 2015. p. 245–62.
- [14] Razzak J, Farooq Usmani M, Bhutta ZA. Global, regional and national burden of emergency medical diseases using specific emergency disease indicators: analysis of the 2015 global burden of disease study. *BMJ Glob Health* 2019;4:e000733. doi:10.1136/bmjgh-2018-000733.
- [15] Hodgkinson PW, Wallis LA. Emergency medicine in the developing world: a Delphi study. *Acad Emerg Med* 2010;17:765–74.
- [16] Calvello EJ, Tenner AG, Broccoli MC, et al. Operationalising emergency care delivery in sub-Saharan Africa: consensus-based recommendations for healthcare facilities. *Emerg Med J* 2016;33:573–80.
- [17] Mehmood A, Rowther AA, Kobusingye O, Hyder AA. Assessment of pre-hospital emergency medical services in low-income settings using a health systems approach. *Int J Emerg Med* 2018;11:53. doi:10.1186/s12245-018-0207-6.
- [18] Mounier-Jack S, Griffiths UK, Closser S, Burchett H, Marchal B. Measuring the health systems impact of disease control programmes: a critical reflection on the WHO building blocks framework. *BMC Public Health* 2014;14:278. doi:10.1186/1471-2458-14-278.
- [19] Pacific Islands Forum Leaders. *The framework for Pacific regionalism. Pacific Islands forum secretariat; Suva, Fiji: 2014*. <https://www.forumsec.org/wp-content/uploads/2017/09/Framework-for-Pacific-Regionalism.pdf> (Accessed 13 March 2020).
- [20] Tuitama LT, Young-soo S, Clark H, Tukuitonga C, Beaglehole R. Acting on the Pacific crisis in non-communicable diseases. *Lancet* 2014;384:1823–4.
- [21] Editorial Saving the Pacific islands from extinction. *Lancet* 2019;394:359.
- [22] World health statistics 2019: monitoring health for the SDGs, sustainable development goals. Geneva: World Health Organization; 2019 https://www.who.int/gho/publications/world_health_statistics/2019/en/.
- [23] Institute for health metrics and evaluation (IHME). *Country profiles*. Seattle, WA: IHME, University of Washington, 2018. <http://www.healthdata.org/results/country-profiles> (Accessed 22 June 2020).
- [24] Piukala S, Clark H, Tukuitonga C, Vivili P, Beaglehole R. Turning the tide on non-communicable diseases in the Pacific region. *Lancet Glob Health* 2016;4:e899–900.
- [25] Guest GD, McLeod E, Perry WR, et al. Collecting data for global surgical indicators: a collaborative approach in the Pacific Region. *BMJ Glob Health* 2017;2:e000376. doi:10.1136/bmjgh-2017-000376.
- [26] Davies M, Sutherland-Fraser S, Hazelman Taoui M, Williams C. Developing standards in Pacific Island countries: the Pacific perioperative practice bundle. *ACORN J* 2016;29:42–7.
- [27] Broccoli MC, Moresky R, Dixon J, et al. Defining quality indicators for emergency care delivery: findings of an expert consensus process by emergency care practitioners in Africa. *BMJ Glob Health* 2018;3:e000479. doi:10.1136/bmjgh-2017-000479.
- [28] Bushe G. Appreciative inquiry Theory and critique. In: Boje D, Burnes B, Hasard J, editors. *The Routledge companion to organizational change*. 1st ed. London, UK: Routledge; 2012. p. 87–103. doi:10.4324/9780203810279.
- [29] Sartorius RH. *The logical framework approach to project design and management*. *Eval Pract* 1991;12:139–47.
- [30] Moresky RT, Razzak J, Reynolds T, et al. Advancing research on emergency care systems in low-income and middle-income countries: ensuring high-quality care delivery systems. *BMJ Glob Health* 2019;4:e001265. doi:10.1136/bmjgh-2018-001265.
- [31] Secretariat of the Pacific community. <http://www.spc.int/> (Accessed 13 March 2020).
- [32] Rowe AK, Rowe SY, Peters DH, Holloway KA, Chalker J, Ross-Degnan D. Effectiveness of strategies to improve health-care provider practices in low-income and middle-income countries: a systematic review. *Lancet Glob Health* 2018;6:e1163–e175.
- [33] Meaney PA, Topjian AA, Chandler HK, et al. Resuscitation training in developing countries: a systematic review. *Resuscitation* 2010;81:1462–72.
- [34] McKimm J, Newton PM, de Silva A, et al. Accreditation of healthcare professionals' education in Pacific Island Countries: evidence and options. *UNSW Human Res Health Knowl Hub* 2013. https://sphcm.med.unsw.edu.au/sites/default/files/sphcm/Centres_and_Units/SL_Accreditation_Report.pdf.
- [35] Phillips G, Lee D, Shailin S, O'Reilly G, Cameron P. The Pacific emergency medicine mentoring program: a model for medical mentoring in the Pacific region. *Emerg Med Australas* 2019;31:1092–100.
- [36] Hirshon JM, Risko N, Calvello EJ, et al. Health systems and services: the role of acute care. *Bull World Health Organ* 2013;91:386–8.
- [37] Richardson DB. Increase in patient mortality at 10 days associated with emergency department overcrowding. *Med J Aust* 2006;184:213–16.
- [38] Phillips G., Cox M. COVID-19 and emergency care in the Pacific. Canberra, Australia: development policy centre, Australian National University. 2020 <https://devpolicy.org/covid-19-and-emergency-care-in-the-pacific-20200428/> (Accessed 7 May 2020).
- [39] Wanefalea LE, Mitchell R, Sale T, Sanau E, Phillips GA. Effective triage in the Pacific region: the development and implementation of the Solomon Islands Triage Scale. *Emerg Med Australas* 2019;31:451–8.
- [40] Raj LK, Creaton A, Phillips G. Improving emergency department trauma care in Fiji: implementing and assessing the trauma call system. *Emerg Med Australas* 2019;31:654–8.
- [41] Heath R, Tomaszewski P, Kuri M, Atua V, Phillips G. Message in a bottle: how evidence-based medicine and a programme change model improved asthma

- management in a low-income emergency department in Papua New Guinea. *Emerg Med Australas* 2019;31:97–104.
- [42] Therapeutic Guidelines Foundation, Australia, Fiji and Solomon Islands Guideline Host Apps. 2019. <https://tgfl.org.au/news/new-guidelines-fiji-solomon-islands-apps-february-2019/> (Accessed 3 April 2020).
- [43] Moores J, de Jesus GA. Management of post-partum haemorrhage in the Timor Leste national ambulance service. *Emerg Med Australas* 2018;30:814–19.
- [44] Rice BT, Bisanzo M, Maling S, Joseph R, Mowafi H. Global Emergency Care Investigators Group. Derivation and validation of a chief complaint shortlist for unscheduled acute and emergency care in Uganda. *BMJ Open* 2018;8:e020188. doi:10.1136/bmjopen-2017-020188.
- [45] Ekeroma A. Collaboration as a tool for building research capacity in the Pacific Islands. *Ann Hum Biol* 2018;45:295–6.
- [46] Mitchell R, Phillips G, O'Reilly G, Creaton A, Cameron P. World health assembly resolution 72.16: what are the implications for the Australasian College for Emergency Medicine and emergency care development in the Indo-Pacific? *Emerg Med Australas* 2019;31:696–9.
- [47] Ouma PO, Maina J, Thurairira PN, et al. Access to emergency hospital care provided by the public sector in sub-Saharan Africa in 2015: a geocoded inventory and spatial analysis. *Lancet Glob Health* 2018;6:e342–ee50.
- [48] Geduld H, Hynes EJC, Wallis LA, Reynolds T. Hospital proximity does not guarantee access to emergency care. *Lancet Glob Health* 2018;6:e731.