Attempt CPR—language matters inside our hospitals

Tammy Pegg, Alex Psirides, Niamh Berry-Kilgour, Jane Goodwin, Joshua Lakin, Kate Grundy

ABSTRACT

The terms cardiopulmonary resuscitation (CPR) and resuscitation have been used non-specifically and interchangeably. To provide clarity and transparency to clinicians and patients when facilitating conversations about what treatments are warranted and wanted if clinical deterioration occurs in the hospital, CPR must be reframed as its original, official definition in New Zealand: chest compressions and rescue breaths.

Key messages

- CPR has become shorthand for resuscitation, with the terms used interchangeably. Resuscitation measures to preserve life and organ function are far broader than CPR.
- Separation of CPR from other resuscitative measures will result in better clinician–patient conversations and more precise treatment decisions tailored to preventing deterioration and, thus, cardiac arrest.
- In-hospital progressive deterioration leading to natural dying is different from sudden cardiac arrest.

Cardiopulmonary resuscitation (CPR) was initially defined as chest compressions and rescue breaths to manually empty the heart, offering a degree of cerebral perfusion while the cause of cardiac arrest is reversed.[1] In the United Kingdom (UK), this original definition has been replaced. CPR now includes high-voltage electric shocks, ventilation and injection of drugs,[1] and decisions documented in the ReSPECT (Recommended Summary Plan for Emergency Care and Treatment) process.[2] Most other international resuscitation councils, including the New Zealand Resuscitation Council, retain the original definition of chest compressions and rescue breaths (Table 1). Despite this, almost all healthcare practitioners in New Zealand include broader resuscitation measures in their understanding of the term CPR when talking with each other and patients.[3]

This international variance in terminology means that "CPR" and "resuscitation" are used interchangeably and non-specifically.[3] This is particularly significant when considering cardiac arrest in hospitals. CPR is not a definitive treatment. It is part of the broader range of measures that constitute resuscitation, and in a patient with an easily reversible cause of cardiac arrest, bridges a patient to those measures.

In the hospital, most cardiac arrests are not sudden or shockable and follow a period of clinical deterioration. CPR, therefore, has questionable utility, particularly after attempting other resuscitative measures during the peri-arrest state. We will argue that CPR has little value here and withholding it (do-not-attempt-CPR) can cause harm in terms of limiting access to other treatments. Returning to the original definition allows patients access to other resuscitative measures to prevent further deterioration into cardiac arrest while protecting them from harmful interventions at the end of life.

Cardiac arrest is different in hospital

Cardiac arrest in hospitals has poor survival in most locations.[4] Patients are already being treated for medical or surgical conditions, are located in general wards, are mostly unmonitored and have low rates of shockable arrhythmias.[5] Cardiac arrest incidence in hospitals peaks at 48 hours[1] and follows a period of deterioration heralded by a change in patient vital signs in 60% of cases.[6] Such conditions are in marked contrast to cardiac arrest that occurs out-of-hospital, or in-hospital in operating theatres and coronary care units; here cardiac arrest is sudden, and CPR is a vital bridge to defibrillation or other treatment for reversible causes.[4]

It is time to be more explicit about the difference between *sudden* cardiac arrest, when CPR may be an effective first aid intervention, and *subacute* deterioration. For the latter, cessation of cardiac

Table 1: Definition of CPR, language, documentation and decision-making framework from five countries' national cardiac arrest databases compared with New Zealand.

Country	CPR definition	Phraseology	Form	Decision-making framework
US	Chest compressions and rescue breaths as intermediary measures sufficient to maintain cerebral perfusion while definitive treatment is being sought.	Cardiopulmonary resuscitation and resuscitation	Medical Order for Life-Sustaining Treatment (MOLST form)	Patient/family consent required—state-led legislature
UK	Chest compressions, defibrillation, artificial ventilation, drugs	DNACPR	DNACPR forms, advance directives or Recommended Summary Plan for Emergency Care and Treatment (ReSPECT form)	Clinician-led within a shared decision-making framework
Japan	Chest compressions and rescue breaths as intermediary measures sufficient to maintain cerebral perfusion while definitive treatment is being sought.	DNAR	Code confirmation or advance directive	Clinician-led within a shared decision-making framework
Denmark	Chest compressions and rescue breaths	Do-not-resuscitate, do-not-intubate		Clinician-led within a shared decision-making framework
New Zealand	Chest compressions and rescue breaths	DNACPR	Shared goals of care form	Clinician-led within a shared decision-making framework

CPR = cardiopulmonary resuscitation; DNACPR = do-not-attempt cardiopulmonary resuscitation; UK = United Kingdom; US = United States of America.

activity occurs at the point of death despite other attempts at treatment, and often resuscitation.

The latter process is better referred to as natural dying, and in a hospital it can sometimes be a rapid process. Clinicians and patients should appreciate natural dying and its distinction from sudden cardiac arrest. Natural dying occurs when illness or injury exceeds the person's ability to recover, often despite intensive treatments, leading to the secondary cessation of circulation. In the latter situation, where CPR is deployed as the final resuscitation manoeuvre before attempts are halted, CPR serves no medical purpose. It may also be contrary to patient-defined preferences or treatment goals.

Reframing CPR as chest compressions and rescue breaths will provide transparency to clinicians and patients about what treatments are warranted and wanted if clinical deterioration occurs in the hospital. It also affords clinicians clarity in situations where communication and decision-making are complex and emotionally

charged. It offers an individualised plan in the event of deterioration, with nuanced resuscitative measures, like drugs, intravenous fluids, intensive care treatment or defibrillation for monitored arrhythmias. Most importantly, it can incorporate a focus on comfort care without intrusive interventions for dying patients.

CPR benefits only a specific minority of hospitalised patients (mechanism of deterioration)

For out-of-hospital cardiac arrest, the time to initiation of CPR is a key determinant of the outcome, but in hospitals, the relationships are more complex. Favourable outcomes are more strongly linked to the aetiology of cardiac arrest (Table 2) and patient type/location (Figure 1) rather than treatment delay (adjusted odds ratio [OR] for 30-day survival 2.81 for monitored wards [95% CI 2.63–3.01] vs 0.55 for delay in calling [95% CI 0.50–0.61]).[4]

The 1-year survival for in-hospital cardiac arrest for cardiac patients is 39.3% versus 10.7% for non-cardiac patients.[7] Causes of in-hospital cardiac arrest with good outcomes are those that are highly reversible, such as general anaesthesia, intoxication and hypothermia, with survival rates of around 50%.[8]

Conversely, CPR adds little value when cardiac arrest has occurred due to catastrophic diseases such as aortic dissection/rupture or intracerebral haemorrhage (Table 3),[8] or when the cause cannot be treated within the timeframe of cardiac arrest, such as exsanguination or aortic stenosis.[8,9]

Table 2: Cause of cardiac arrest as determinant of outcome.

	Year	N	Study population	Condition	Outcome measure	Outcome
Nolan[1]	2014	23,554	IHCA >16 years	VT/VF	Survival to discharge (%)	49.0%
				PEA		11.4%
				Asystole		8.7%
Tian[10]	2010	49,656	First CPA in ICU	VT/VF	Survival to hospital discharge (%)	30.7/34.2%
				PEA		10.9%
				Asystole		11.1%
Bergum[11]	2015	302	IHCA >18 years of age receiving CPR +/- defibrillation	Cardiac cause	Survival to discharge (%)	30%
				Hypoxic cause		37%
				Thrombosis/PE		27%
				Cardiac tamponade		7%
				PEA		13%
				Asystole		17%
				VF		54%
				VT		53%
Wallmuller[8]	2012	1,041	IHCA in ED	Acute STEMI/NSTEMI	6-month survival + CPC 1–2 (%)	49/46%
				Adverse drug reaction/ intoxication		60%

Table 2 (continued): Cause of cardiac arrest as determinant of outcome.

				Accidental hypothermia		44%
				Metabolic		35%
				Pulmonary		24%
				Exsanguination		13%
				Cerebral		14%
				Sepsis		5%
				Aortic dissection/ rupture		3%
Sulzgruber[9]	2019	51	ICHA with TTE within 2 months prior to event	Aortic stenosis of any severity	Survival/adjusted odds ratio survival to discharge	19%/0.14 (0.04–0.48)

CPA = cardiopulmonary arrest; CPC = cerebral performance category; CPC 1- = good cerebral performance (normal life); CPC 2- = moderate cerebral disability (disabled but independent); CPR = cardiopulmonary resuscitation; DNAR = do-not-attempt-resuscitation; ED = emergency department; ICU = intensive care unit; IHCA = in-hospital cardiac arrest; NSTEMI = non-ST elevation myocardial infarction; PE = pulmonary embolus; PEA = pulseless electrical activity; STEMI = ST-elevation myocardial infarction; TTE = transthoracic echocardiogram; VF = ventricular fibrillation; VT = ventricular tachycardia.

The cost of survival for those who survive

Proponents of the drive towards "catch-all CPR first, think later" algorithmic management of in-hospital cardiac arrest will point to the improvements in survival over the last 20 years for all types of in-hospital cardiac arrest documented in both large United States of America (US)[12] and Swedish registry data[5] (Table 3). However, cardiac arrest survival is highest in countries with the lowest incidence (Table 3). Given the international standardisation of care, it seems likely that patient selection or possibly attitudes towards resuscitation substantively impact survival. Furthermore, adjusted 30-day survival only improved in younger patients, whereas older patients (>85 years) experienced no improvement.[5] It is important to emphasise to proponents of CPR that system improvements such as time to treatment—mainly defibrillation and adrenaline—are also driving survival gains more than chest compressions.[13,14]

For survivors, recovery is complex. Despite 79.5% of US in-hospital cardiac arrest survivors attaining CPC category 1–2,[12] 40% have life-changing disability after discharge[5] and only half

Table 3: Data from the five countries with national in-hospital cardiac arrest databases.

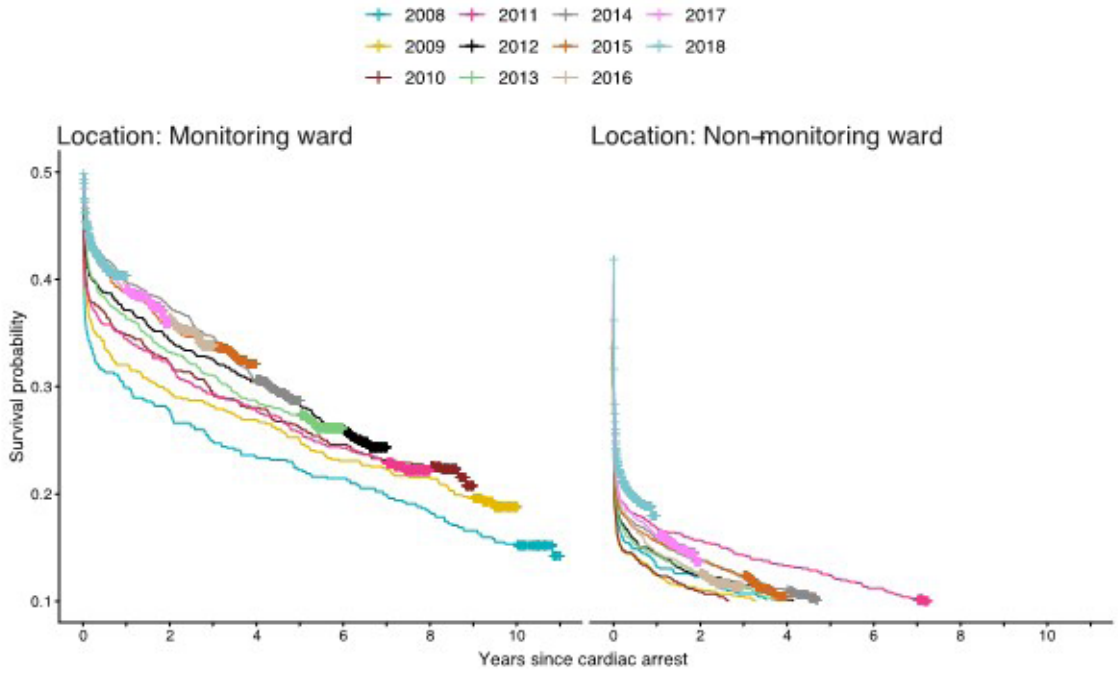
Author Year Country	Incidence	Witnessed	Monitored	Shockable	Condition	RoSC	Survival
Tsao[12] 2022 US (n=33,874)	4.0/1,000 admissions (all cardiac arrest)		56.2%	13.7%	Overall		22.4%* (to discharge)

Table 3 (continued): Data from the five countries with national in-hospital cardiac arrest databases.

Author Year Country	Incidence	Witnessed	Monitored	Shockable	Condition	RoSC	Survival
Peberdy[15] 2003 US (n=14,720)		86%		25%	Overall	44%	17% (to discharge)
					VT/VF	63/58%	35/34%
					Asystole	35%	10%
					PEA	39%	10%
Andersen[16] 2019 Denmark (n=4,069)		77%		18%	Overall	53.8%	27.8% (30 day)
					Shockable	81.7%	57.6%
					Non-shockable	41.8%	16.1%
Nolan[1] 2014 UK (n=22,628)	1.6/1,000 admissions (only cardiac arrest attended by team†)		44%	16.9%	Overall	45%	18.4% (to discharge)
					VT/VF	76%	49%
					Asystole	26.2%	8.7%
					PEA	40.9%	11.4%
Ohbe[17] 2022 Japan (n=274,664)	5.1/1,000 (all cardiac arrest)				Overall		12.7% (to discharge)
					Patients with defibrillation		23.3%
					Patients without defibrillation		10.5%
Hessulf[4] 2018 Sweden (n=18,069)	1.7/1,000 all cardiac arrest	81%	50%	32%			28.5% (30 day)
Adielsson[5] 2020 Sweden (n=23,186)		79.3%		26.3%	Overall	52.2%	30% (30 day)
					Shockable	79.4%	60.6%
					Non-shockable	38.2%	16.9%

RoSC = Return of Spontaneous Circulation; PEA = pulse electrical activity; UK = United Kingdom; US = United States of America; VT = ventricular tachycardia; VF = ventricular fibrillation.
*First decline in in-hospital cardiac arrest survival since records began reflecting the COVID-19 pandemic.
†UK registry data excludes episodes treated by base teams such as those in coronary care or operating theatres.

Figure 1: Kaplan–Meier curves for survival after cardiac arrest, stratified by calendar year at the time of arrest and on the basis of the monitoring level of the ward.



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are discharged home. This harm is not readily available in the statistics.[15] Longer-term survival continues to decline after discharge, particularly for general ward patients compared with those on monitored wards such as coronary care and operating theatres (Figure 1).[5]

Monitored wards include coronary care, intensive care, operating theatres, cardiac catheter laboratories and emergency departments.

CPR can be harmful

Closed chest cardiac massage was the natural evolution from open cardiac massage conducted through an emergency thoracotomy. Although simple to administer, closed chest cardiac massage only produces about 20–40% of the usual cardiac output[18] and causes rib fractures, with older age as a risk factor.[19] It can also cause life-threatening injuries,[20] and this could contribute to the high (60%) incidence of death following the initial return of spontaneous circulation (RoSC).[13,19]

Survival rates for CPR in subacute decline are low

Deciding which patients are likely to benefit and should opt in for "attempt CPR" requires three separate considerations: patient factors, with frailty being more important than age (Table 4), the aetiology of illness and cardiac arrest as outlined above and whether that arrest has occurred despite optimal treatment. Rates of survival after cardiac arrest in sepsis and all patients in intensive care units are low (Table 2).[8,10] In subacute decline, treatment has often already been optimised.

While RoSC occurs in around 50% of in-hospital cardiac arrests, that reprieve is often brief before death ensues.[1] Although injuries related to CPR and resuscitation may contribute, it is more likely that deterioration occurs in a patient not responding to treatment, and cardiac arrest results as the end-point of natural dying.[1] Over 60% of patients who survive their initial cardiac arrest will subsequently have active treatment withdrawn or limited and die naturally during the same hospital admission.[13]

DNACPR should only limit CPR, not halt other forms of resuscitation in hospital

DNACPR decisions must not compromise the quality of care for any patient. Decisions to prevent CPR should not be misinterpreted as an

unofficial stop sign to other appropriate interventions. DNACPR decisions were associated with doubling the risk of death at 30 days for intracranial haemorrhage (OR 2.17 95% CI 1.38–3.41) despite adjustment for disease and age.[21]

Narrowing the definition of CPR to chest compressions and rescue breaths clarifies the practice, enabling clinicians to offer other treatments and resuscitative measures as appropriate.

This is enabled by the New Zealand national Shared Goals of Care form (Appendix), where individual levels of care can be ascribed between four options. Shared Goal of Care A is where the patient is for treatment with curative or restorative intent and includes CPR. Shared Goal of Care B is where the patient is for treatment with curative or restorative intent B but excludes CPR. Option C focusses on improving symptoms with non-burdensome treatments, and D cares for the dying patient. Patients who have been ascribed a Shared Goal of Care B can still access other resuscitative measures in the peri-arrest period aimed at halting their deterioration into cardiac arrest.

Communication with patients and families about CPR in hospital

Despite clear benefits and extensive training, healthcare teams remain hesitant to have comprehensive end-of-life or resuscitation discussions. In a study of patients with advanced cancer recruited to examine the impact of these conversations,

Table 4: Patient factors associated with survival after in-hospital cardiac arrest.

	Study population	Condition	Outcome measure	Outcome
Smith[22] 2019 (n=318)	All IHCA cardiac arrests in tertiary centre	Hospital Frailty Risk score ≥5	% Discharged home (unadjusted OR, 95% CI)	4% (OR 0.13, 0.04–0.41, p<0.001)
		Previous hospital admission		15% (OR 0.54, 0.31–0.95, p=0.03)
		Unplanned admission		16% (OR 0.41, 0.25–0.67, p<0.001)
Hirlekar[23] 2017 (n=11,396)	IHCA >70 Swedish CPR register	70–79 years	% 30-day survival	28%
		80–89 years	% 30-day survival	20%
		>90 years	% 30-day survival	14%
		Prior HF	Unadjusted OR 30-day survival	OR 0.71 (0.65–0.78)
		Prior diabetes		OR 0.87 (0.78–0.96)
		Prior respiratory failure		OR 0.49 (0.43–0.55)
		Prior malignancy		OR 0.7 (0.62–0.79)
		Prior renal dysfunction		OR 0.54 (0.49–0.59)

CPA = cardiopulmonary arrest; CPR = cardiopulmonary resuscitation; HF = heart failure; ICU = intensive care unit; IHCA = in-hospital cardiac arrest.

only 37% of patients reported prior discussions.[24] A review of calls requesting medical emergency advice for hospital inpatients suggests that a third (estimated 30,000 calls per year in New South Wales, Australia) were for end-of-life issues in elderly frail patients who were often unaware that they were dying.[25] Initiatives such as ReSPECT in the UK demonstrate similar low engagement with discussions (6–41% of patients admitted to test sites had a ReSPECT form).[2]

The preferences of patients and their families for cardiac arrest treatment requires clinical support beyond asking a patient if they would like their "heart restarted". This approach undersells the complexity of treatment and does not represent shared decision-making. Patient selections are often confused and paradoxical. Treatment can be complicated and dynamic. For example, respondents to a treatment preference survey indicated that 74% wished to receive chest compressions, whereas only 61% selected defibrillation and 42% ventilation.[26] Over-estimation of surviving CPR is common and imagined to be between 55%.[26] This is perhaps unsurprising due to the misrepresentation of outcomes by clinicians, but also in television and other media.[27]

Initiatives such as ReSPECT and the national Shared Goals of Care programme in New Zealand encourage early discussions. Clinicians ultimately lead the medical decision-making process in these programmes. Although patient engagement has improved, qualitative interviews suggest a culture of *informing* rather than partnering with patients in these discussions, especially for CPR conversations.[28] An example from interview-based analysis, one consultant said:

> *"I went in with quite clear views of what had to be done and as you say the patient's son started to suggest that 'actually he would want to be resuscitated wouldn't you Dad'... and I gently had to steer him away to explain why I didn't think that would be a good idea."*[28]

In the US, stronger tactics with graphic descriptions of resuscitation are common.[29] One doctor's comment in a study of DNAR discussions illustrates how choice of language manipulates patient autonomy:

> *"This is kind of paternalistic, but if I feel strongly that the patient wouldn't benefit from resuscitation, I'll be pretty graphic ... I want you to know we have to press really hard and break ribs."*[29]

The culture of conversations in New Zealand is likely to be similar and may use graphical illustrations to manipulate patient requests or use medical leading of the conversation. Although these practices are not illegal, the opportunity to bring the person and their goals and values into the conversation is completely lost.

Better CPR conversations

The ideal process in hospital is a discussion centred solidly around the patient's goals, and frameworks such as the serious illness conversation guide[30] have been adopted and regionalised for use in New Zealand. Although these frameworks derive broader treatment goals than just CPR, the information gathered from a structured approach will help the clinician better understand what matters to the individual and their whānau. This enables the clinician to make a clinical recommendation incorporating patient-centred goals alongside factors for successful CPR.

For the patient, articulating their goals should be followed with clear explanations of the specific, medically indicated treatments that will support those goals, in the event of deterioration.

Partnering with patients to improve their understanding of CPR as a bridging measure could shift emphasis from graphic illustrations of resuscitation to a more open and honest discussion about what may lie ahead.

Conclusion

The limited scope of CPR (chest compressions and rescue breaths) in hospitalised patients is poorly recognised by the public (and possibly clinicians); a conversation about this is overdue.

We argue that non-specific language around CPR complicates how well it is understood and discussed. Many hospitalised patients at risk of subacute deterioration towards anticipated dying have risk factors for CPR-related injuries and low survival after ROSC. Their treatment should be focussed on preventing cardiac arrest with other measures while preparing to meet their care wishes during dying. Reframing CPR as its original concept and uncoupling it from resuscitation may improve how clinicians discuss treatment options and enable patients to recognise that beneficial treatments are not being withheld.

COMPETING INTERESTS
KG is Chair of the HNZ Canterbury Clinical Ethics Advisory Group.
There are no other competing interests to declare.

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AUTHOR INFORMATION
Tammy Pegg: Cardiologist, Health New Zealand, Nelson Marlborough, New Zealand.
Alex Psirides: Specialist in intensive care medicine, Health New Zealand, Capital, Coast and Hutt Valley, New Zealand.
Niamh Berry-Kilgour: House Surgeon, Health New Zealand, Canterbury, New Zealand.
Jane Goodwin: Advance care planning programme manager, Health New Zealand, New Zealand.
Joshua Lakin: Palliative care physician, Dana–Farber Cancer Institute, Boston, Massachusetts, United States.
Kate Grundy: Palliative medicine specialist, Health New Zealand, Canterbury, New Zealand.

CORRESPONDING AUTHOR
Dr Tammy Pegg: Consultant Cardiologist, Health New Zealand, Nelson Marlborough, New Zealand. Ph: +64 27 429 5820.E: tammy.pegg@nmdhb.govt.nz.

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Appendix

New Zealand National Shared Goals of Care form

Shared goals of care plan

Family Name: _____

Given Name: _____ Gender: _____

AFFIX PATIENT LABEL HERE

Date of Birth: _____ NHI#: _____

Discuss the goal of care for this admission with the person, family, whānau or other (as appropriate).
Select the agreed goal of care and document your discussion.

Attempt CPR

A The goal of care is **curative** or **restorative.**

☐ Treatment aims to prolong life.

Attempt CPR: it is clinically recommended and in accordance with the person's known wishes.

Also for referral for ICU level care, 777 calls and all appropriate life sustaining treatments.

Additional comments: _____

Do not attempt CPR

B The goal of care is **curative** or **restorative.**

☐ Treatment aims to prolong life and enhance its quality.

Do not attempt CPR: this is likely to cause more harm than benefit or is not desired by the person.

Referral for ICU level care is appropriate ☐ Yes ☐ No

777 calls are appropriate.

Additional comments (e.g. non-invasive ventilation, dialysis): _____

C The goal of care is primarily **improving quality of life.**

☐ Treatment aims to control symptoms, enhance wellbeing and should be easily tolerated.

Do not attempt CPR: this is likely to cause more harm than benefit.

Referral for ICU level care is unlikely to be appropriate.

777 calls are appropriate ☐ Yes ☐ No

Additional comments (e.g. antibiotics, IV fluids, NG feeding): _____

D The goal of care is **comfort whilst dying.**

☐ Treatment aims to alleviate suffering in the last hours or days of life and allow a natural death.

Consider end of life guidelines such as *Te Ara Whakapiri.*

Do not attempt CPR. Referral for ICU level care and 777 calls are not appropriate.

Additional comments (e.g. pain management, fluids): _____

This plan has been discussed with the person. If not, record reason overleaf.

Name: _____ Date: / / Time: _____

Designation: _____ Signature: _____

☐ SMO informed, name: _____

This plan is not valid unless signed and dated. Clinically review the person if there are concerns or a change in their condition. Any change to the goal of care requires a new plan and the earlier plan crossed out. Include shared goals of care information in the discharge summary.

Side 1 of 2

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SHARED GOALS OF CARE FORM

Appendix (continued): New Zealand National Shared Goals of Care form

Shared goals of care plan

Use this side first to guide the discussion and record key points.

Family Name: _____

Given Name: _____ Gender: _____

AFFIX PATIENT LABEL HERE

Date of Birth: _____ NHI#: _____

Prepare

Consider the person's capacity, their privacy, support people, cultural needs and medical trajectory.

Do they have an:

- Advance Care Plan and/or Advance Directive? ☐ Yes ☐ No ☐ Unknown
- Enduring Power of Attorney (EPA) or legally appointed guardian? ☐ Yes ☐ No ☐ Unknown

If yes, circle either EPA or legal guardian and record their full name:

_____

Seek agreement with the person to have the discussion, with the people they want present.

Full name(s), relationship(s) and role(s) of those present: _____

_____

_____

Discuss

Ask about their understanding of their current condition and what may lie ahead.

Ask how much information they would want to know.

Share your understanding of their current condition and what may lie ahead.

Explore their values and what is important — their priorities, hopes, worries, what helps in tough times and what they would be willing to go through for more time.

_____

_____

_____

_____

_____

_____

_____

Summarise and check for shared understanding.

Recommend and close

Explain your recommendation in plain language, outlining which treatments are more likely to cause benefit than harm.

Reach a decision and document the goal of care overleaf.

Additional comments: _____

_____

_____

_____

_____

☐ Further information in clinical record.

If discussion not held with person, record reason below: _____

_____

_____

_____

_____

Document follow-up plan in the clinical record.

Side 2 of 2

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