End-of-life practices in Hong Kong intensive care units: results from the Ethicus-2 study

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A B S T R A C T

Introduction: The need for end-of-life care is common in intensive care units (ICUs). Although guidelines exist, little is known about actual end-of-life care practices in Hong Kong ICUs. The study aim was to provide a detailed description of these practices.

Methods: This prospective, multicentre observational sub-analysis of the Ethicus-2 study explored end-of-life practices in eight participating Hong Kong ICUs. Consecutive adult ICU patients admitted during a 6-month period with life-sustaining treatment (LST) limitation or death were included. Follow-up continued until death or 2 months from the initial decision to limit LST.

Results: Of 4922 screened patients, 548 (11.1%) had LST limitation (withholding or withdrawal) or died (failed cardiopulmonary resuscitation/brain death). Life-sustaining treatment limitation occurred in 455 (83.0%) patients: 353 (77.6%) had decisions to withhold LST and 102 (22.4%) had decisions to withdraw LST. Of those who died without LST limitation, 80 (86.0%) had failed cardiopulmonary resuscitation and 13 (14.0%) were declared brain dead. Discussions of LST limitation were initiated by ICU physicians in most (86.2%) cases. Shared decision-making between ICU physicians and families was the predominant model; only 6.0% of patients retained decision-making capacity. Primary medical reasons for LST limitation were unresponsiveness to maximal therapy (49.2%) and multiorgan failure (17.1%). The most important consideration for decision-making was the patient's best interest (81.5%).

Conclusion: Life-sustaining treatment limitations are common in Hong Kong ICUs; shared decision-making between physicians and families in the patient's best interest is the predominant model. Loss of decision-making capacity is common at the end of life. Patients should be encouraged to communicate end-of-life treatment preferences to family members/surrogates, or through advance directives.

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New knowledge added by this study

- Life-sustaining treatment (LST) limitation at the end of life is common in Hong Kong intensive care units (ICUs).
- Compared with international practices, the time from admission to LST limitation is relatively long in Hong Kong.
- Shared decision-making between healthcare providers and patients, family members, or patient surrogates is the predominant decision-making model.
- Most patients lack the mental capacity for decision-making at the end of life.
- Patient preferences regarding the use of life-sustaining therapies at the end of life are usually unknown, and the use of advance directives is rare.

Implications for clinical practice or policy

- End-of-life care practices in Hong Kong ICUs generally align with local guidelines and the international consensus.
- Local factors possibly preventing earlier implementation of LST limitation in appropriate patients should be explored.
- The public should be educated to communicate their preferences regarding the use of life-sustaining therapies in ICUs to surrogates/family members, or through advance directives.

香港深切治療病房的臨終照顧實務：來自「Ethicus-2」前瞻性觀察研究的結果

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引言：深切治療病房經常需要照顧臨終患者。儘管存在指引，但我們對香港深切治療病房臨終護理實踐所知甚少。本研究旨在對這些實踐提供詳細描述。

方法：這項Ethicus-2研究的前瞻性、多中心觀察性子分析探索了香港8家參與醫院深切治療病房的臨終護理實踐。在研究期間選取的6個月內入住深切治療病房並出現維生治療限制或死亡的成年患者被納入研究。隨訪持續至患者死亡或決定維生治療限制後兩個月。

結果：在4922名經篩選的患者中，548人（11.1%）出現維生治療限制（包括不施行或撤回）或死亡（心肺復蘇失敗／腦死亡）。455名患者（83.0%）出現維生治療限制，當中353人（77.6%）決定停止維生治療，102人（22.4%）撤回維生治療的決定。在沒有維生治療限制而死亡的患者中，80人（86.0%）心肺復蘇失敗，13人（14.0%）被宣告腦死亡。大多數病例（86.2%）都是由深切治療科醫生發起維生治療限制的討論。深切治療科醫生與家屬之間的共同決策為主要模式；只有6.0%患者保有決策能力。維生治療限制的主要醫療原因包括對最大療法無反應（49.2%）和多重器官衰竭（17.1%）。決策最重要的考量是患者的最佳利益（81.5%）。

結論：在香港，深切治療病房患者的維生治療受到限制是普遍的。以患者最佳利益為依歸的醫生與家屬間的共同決策是主導模式。鑑於患者臨終時經常失去決策能力，應鼓勵患者將臨終治療偏好告知家屬／代理人，或透過預設醫療指示來進行溝通。

Introduction

Despite high-quality care, many patients admitted to the intensive care unit (ICU) do not survive; therefore, management of the dying process is a required skill among modern healthcare professionals.[1] Life-sustaining technology has advanced sufficiently that it is possible to maintain vital organ function despite the knowledge that the patient's return to health and an acceptable quality of life is no longer feasible. In these situations, a decision to limit life-sustaining treatment (LST) has become a common clinical practice in most countries worldwide.[2-6] In recent decades, attempts to define desirable principles for end-of-life care according to a global professional consensus have achieved considerable success.[3] Nevertheless, decision-making processes for death and dying are likely to be heavily influenced by regional and cultural norms and expectations; thus, it is reasonable to expect different medical practices related to end-of-life decisions. Several local and international surveys of healthcare professionals have revealed regional differences in attitudes towards end-of-life ethical concerns, as well as substantial differences in clinical practices.[7-11] Limited prospective observational data from international studies support the existence of regional variability in end-of-life practices.[5,12,13]

Hong Kong is a special administrative region of China with an overwhelmingly Chinese population; nevertheless, it maintains an independent fiscal budget and healthcare system. The Hong Kong Hospital Authority, funded by the Hong Kong SAR Government, provides >90% of hospital-based services available for the local population; although nearly all healthcare workers in the public health services exhibit Chinese ethnicity, health services are based on Western medical conventions.[14] Hong Kong is considered a high-income region, and recently published patient outcomes data indicate that the Hong Kong Hospital Authority provides high-quality intensive care services.[15] The juxtaposition of a Western medical system and a culturally Chinese population creates a situation where Western medical practices (driven by Western cultural and ethical values) may conflict with Chinese cultural values, particularly at the end of life when deep-rooted cultural beliefs may become more relevant. A small number of studies have explored end-of-life care practices in Hong Kong ICUs; these include a survey of ICU physicians' ethical attitudes concerning end-of-life care[8] and a prospective observational study regarding end-of-life practices at a single tertiary university hospital.[16] No observational territory-wide data have been published thus far. Additionally, end-of-life practices in Europe have substantially changed in recent decades[17]; similar changes may have occurred in Hong Kong, although previous comparative data are sparse.[16] Multiple Hong Kong ICUs participated in the recent worldwide Ethicus-2 study,[13,18] with the understanding that the Hong Kong data would be accessible for secondary analysis. The aim of this study was to provide a detailed description of current end-of-life care practices in Hong Kong.

Methods

This study constituted a secondary analysis of the Ethicus-2 database, focusing on the Hong Kong data. The Ethicus-2 study was a prospective, multicentre, global observational study of end-of-life practices in 199 ICUs across 36 countries.[13,17] All 15 adult ICUs in publicly funded hospitals in Hong Kong were invited to participate by the Hong Kong study coordinator, representing the Hong Kong Society of Critical Care Medicine. Eight ICUs in Hong Kong participated.

Consecutive adult patients admitted to the ICU over an individual ICU-selected 6-month period between 1 September 2015 and 30 September 2016 with LST limitation or death were included. Follow-up continued until death or 2 months from the initial decision to limit LST. End-of-life categories included withholding LST, withdrawing LST, active shortening of the dying process, failed

cardiopulmonary resuscitation (CPR), and brain death. These categories were mutually exclusive; if more than one limitation was triggered in a particular case, the most stringent limitation was chosen (ie, active shortening of the dying process was considered more stringent than LST withdrawal, followed by LST withholding).

Data were collected by the senior physician, or a representative, responsible for making end-of-life decisions. De-identified patient data were entered into a secure online database. Collected data included age; sex; religion; end-of-life category; admission date, time, and diagnoses; chronic disorders; use of ventilation and vasopressors, sedatives, or analgesics; date and time of hospital and ICU admission; and date and time of death or discharge from the ICU or hospital. End-of-life process data collected included type, date, and time of LST; presence of information about patient wishes; discussions with the patient or their family; degree of concurrence between the decision and patient/family wishes; and reasons for treatment decisions.

Data quality was monitored by concurrent audit and feedback, with a quality review involving 5% of all patients.[17] Categorical variables were reported as numbers and percentages within end-of-life groups. After normality assessment using the Shapiro–Wilk test, continuous variables were reported as means (standard deviations) or medians (interquartile ranges [IQRs]), as appropriate. Differences among LST withholding, LST withdrawal, and no LST limitation groups were compared using analysis of variance, the Kruskal–Wallis H test, or the Chi squared test, as appropriate. Subsequent pairwise group comparisons were performed with Bonferroni correction for multiple tests. All analyses were performed using SPSS software (Windows version 27.0; IBM Corp, Armonk [NY], United States).

This prospective observational study has been reported in accordance with the STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) checklist for observational studies.

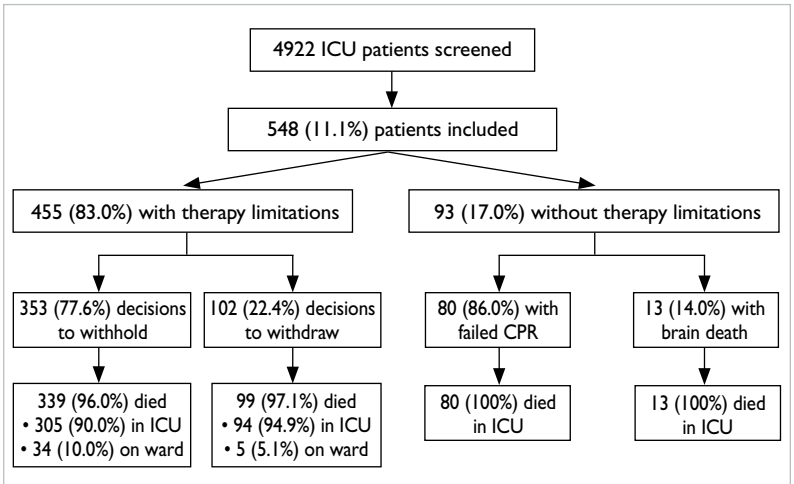

FIG 1. Patient flow diagram
Abbreviations: CPR = cardiopulmonary resuscitation; ICU = intensive care unit

Results

The eight participating ICUs were distributed across Hong Kong; at least two ICUs represented each of the New Territories, Kowloon, and Hong Kong Island. Two ICUs were located in academic university hospitals (comprising 20 and 25 acute ICU beds, respectively), and the remainder were located in medium-to-large regional hospitals (ranging from 12 to 22 acute ICU beds per unit).

Among the 4922 consecutive patients screened during the study period, 548 (11.1%) patients with LST limitation (withholding or withdrawal) or death (failed CPR or brain death) were included in the study. Life-sustaining treatment limitation occurred in 455 (83.0%) patients, including 353 (77.6%) with decisions to withhold LST and 102 (22.4%) with decisions to withdraw LST. Of the 93 patients who died without LST limitation, 80 (86.0%) had failed CPR, and 13 (14.0%) experienced brain death (Fig 1). No patients underwent shortening of the dying process.

Patient characteristics are summarised in Table 1; knowledge of patient and family/surrogate wishes, as well as the timing of end-of-life processes, are described in Table 2. Patients without LST limitation had a shorter duration of ICU stay (median: 3 days, IQR=1-6) compared with patients who had decisions to withhold (median: 4 days, IQR=2-13) or withdraw (median: 6 days, IQR=3-11) [P<0.001].

The prevalences of treatments withheld or withdrawn at the initial and final decisions to limit LST are shown in Figure 2. Higher percentages of patients had endotracheal tube (P=0.009), renal replacement therapy (P<0.001), and sedation/analgesia (P=0.002) withheld at the final decision, compared with the initial decision. Similarly, higher percentages of patients had endotracheal tube, mechanical ventilation, vasopressor, and renal replacement therapy withdrawn at the final decision (all P<0.001), compared with the initial decision.

Information about decision-making practices for patients with LST limitation is provided in Table 3. In the majority of cases, the ICU physician was involved in key aspects of end-of-life decision-making and implementation. The responsible ICU physicians' explanations of the reasons and considerations for supporting end-of-life decisions are provided in Table 4. The primary clinical reason for limiting LST was unresponsiveness to maximal therapy; the patient's best interest, perceived good

TABLE 1. Patient demographics and characteristics on admission*

	All patients (n=548)	Decisions to withhold (n=353)	Decisions to withdraw (n=102)	No treatment limitation (n=93)	P value
Age, y	67 (57-79)	67 (58-78)	68 (57-81)	66 (53-78)	0.169
Male sex	369 (67.3%)	231 (65.4%)	73 (71.6%)	65 (69.9%)	0.431
Religion†					
Buddhist, Christian, Hindu, other	39 (7.1%)	26 (7.4%)	10 (9.8%)	3 (3.2%)	
Catholic	7 (1.3%)	4 (1.1%)	1 (1.0%)	2 (2.2%)	
Protestant	4 (0.7%)	4 (1.1%)	0	0	
Islam	1 (0.2%)	1 (0.3%)	0	0	
No religion	117 (21.4%)	79 (22.4%)	23 (22.5%)	15 (16.1%)	
Unknown	380 (69.3%)	239 (67.7%)	68 (66.7%)	73 (78.5%)	
Diagnosis on admission‡					
Neurological	59 (10.8%)	36 (10.2%)	13 (12.7%)	10 (10.8%)	0.766
Surgical (non-trauma)	142 (25.9%)	97 (27.5%)	19 (18.6%)	26 (28.0%)	0.176
Respiratory	238 (43.4%)	157 (44.5%)	43 (42.2%)	38 (40.9%)	0.789
Cardiovascular	170 (31.0%)	98 (27.8%)	31 (30.4%)	41 (44.1%)	0.010
Gastrointestinal	96 (17.5%)	65 (18.4%)	24 (23.5%)	7 (7.5%)	0.010
Metabolic	141 (25.7%)	81 (22.9%)	38 (37.3%)	22 (23.7%)	0.013
Haematologic	16 (2.9%)	11 (3.1%)	3 (2.9%)	2 (2.2%)	0.886
Trauma	14 (2.6%)	10 (2.8%)	1 (1.0%)	3 (3.2%)	0.524
Sepsis	208 (38.0%)	140 (39.7%)	47 (46.1%)	21 (22.6%)	0.002
Other	18 (3.3%)	8 (2.3%)	6 (5.9%)	4 (4.3%)	0.164
Pre-existing co-morbidity‡					
Cardiovascular	273 (49.8%)	172 (48.7%)	52 (51.0%)	49 (52.7%)	0.767
Neurological	75 (13.7%)	47 (13.3%)	14 (13.7%)	14 (15.1%)	0.910
Respiratory	58 (10.6%)	40 (11.3%)	8 (7.8%)	10 (10.8%)	0.600
Renal	100 (18.2%)	67 (19.0%)	16 (15.7%)	17 (18.3%)	0.750
Gastrointestinal	47 (8.6%)	31 (8.8%)	11 (10.8%)	5 (5.4%)	0.393
Immunological	25 (4.6%)	16 (4.5%)	5 (4.9%)	4 (4.3%)	0.979
Malignancy	27 (4.9%)	22 (6.2%)	5 (4.9%)	0	0.047
General history	219 (40.0%)	151 (42.8%)	34 (33.3%)	34 (36.6%)	0.175
Unknown	11 (2.0%)	5 (1.4%)	3 (2.9%)	3 (3.2%)	0.410

* Data are shown as No. (%) or median (interquartile range), unless otherwise specified
† P value not calculated because of predominance of the 'unknown' category
‡ More than one diagnosis possible

medical practice, and autonomy were key decision-making considerations.

Discussion

This is the first large, multicentre, prospective, observational study of end-of-life care practices in Hong Kong ICUs. Our main findings were that LST limitation preceded >80% of patient deaths, and that death occurred in the vast majority of patients with LST limitation; only 4% of patients with LST limitation were alive at 2 months. Only 15% of ICU patients died after failed CPR (ie, without any LST limitations). Advance directives were rarely available, and no cases of active shortening of the dying process (euthanasia) were reported. Life-sustaining treatment limitation occurred in the majority (83.0%) of patients, predominantly via withholding (77.6%); withdrawal was less common (22.4%) [Fig 1]. High rates of LST limitation, such as those observed in this study, are generally presumed to reflect good end-of-life practices and have been associated with the presence of written end-of-life guidelines,[19] such as those provided by the Hong Kong Hospital Authority.[20]

TABLE 2. Patients' treatment wishes and subsequent end-of-life processes*

	All patients (n=548)	Decisions to withhold (n=353)	Decisions to withdraw (n=102)	No treatment limitation (n=93)	P value
Patients with decision-making capacity	33 (6.0%)	24 (6.8%)	7 (6.9%)	2 (2.2%)	0.227
Advance directive available	2 (0.4%)	1 (0.3%)	0	1 (1.1%)	0.421
Legal representative available	1 (0.2%)	1 (0.3%)	0	0	0.758
No. of patients with available data about their treatment wishes	504	344	99	61	
Yes	203 (40.3%)	139 (40.4%)	57 (57.6%)	7 (11.5%)	<0.001
If yes, from patient	32 (15.8%)	24 (17.3%)	7 (12.3%)	1 (14.3%)	0.681
If yes, from family	192 (94.6%)	132 (95.0%)	53 (93.0%)	7 (100%)	0.696
If yes, from another source	5 (2.5%)	2 (1.4%)	3 (5.3%)	0	0.267
Patient wishes followed if known†	55 (68.8%)	35 (71.4%)	18 (64.3%)	2 (66.7%)	0.807
Designated surrogate treatment wishes followed†	331 (99.1%)	220 (99.5%)	95 (97.9%)	16 (100%)	0.348
Time between hospital admission and first LST limitation, d	5.3 (1.6-15.7)	5.1 (1.5-15.7)	6.0 (1.9-19.3)	N/A	0.381
Time between ICU admission and first LST limitation, d	1.8 (0.5-6.8)	1.5 (0.4-6.7)	2.8 (1.0-8.5)	N/A	0.017
Time between first LST limitation and death, d	0.6 (0.2-2.4)	0.6 (0.2-2.9)	0.4 (0.1-1.8)	N/A	0.105
No. of days in ICU	4 (2-11)	4 (2-13)	6 (3-11)	3 (1-6)	<0.001
Died in ICU	492 (89.8%)	305 (86.4%)	94 (92.2%)	93 (100%)	<0.001
No. of days in hospital	9 (3-21)	10 (3-24)	11 (5-21)	6 (3-13)	<0.001
Died in hospital	531 (96.9%)	339 (96.0%)	99 (97.1%)	93 (100%)	0.145

Abbreviations: ICU = intensive care unit; LST = life-sustaining treatment; N/A = not applicable

* Data are shown as No. (%) or median (interquartile range), unless otherwise specified

† Calculated according to the number of patients with available data

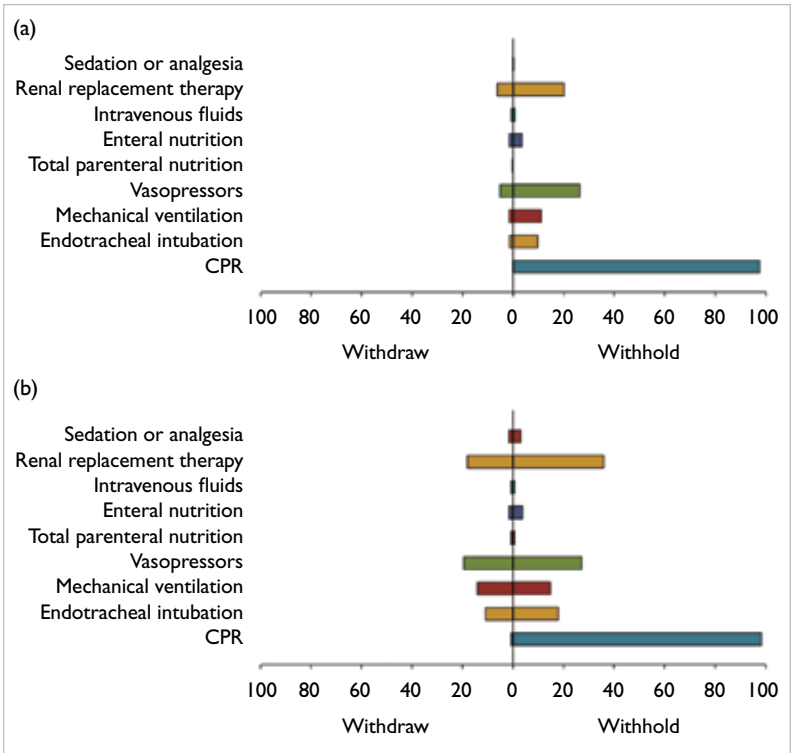

FIG 2. Life-sustaining treatment limitation (in percentages) at the time of (a) initial and (b) final decisions to withhold or withdraw life-sustaining treatment

Abbreviation: CPR = cardiopulmonary resuscitation

Withholding and withdrawing life-sustaining treatment

Regarding treatments that were withdrawn or withheld, the withholding of CPR universally accompanied all limitation decisions. Nutrition, hydration, and sedation were rarely withheld or withdrawn at any time, consistent with guidance from professional bodies in Hong Kong that additional safeguards are necessary when considering these actions.[20] At the time of the initial limitation decision, there was relatively frequent withholding of vasopressors and renal replacement therapy; withholding or withdrawal of endotracheal tubes was less common. Although the patterns of LST limitation were similar between the initial and final decisions, such that withholding remained more prevalent than withdrawal, a substantial increase was observed in the prevalence of LST withdrawal at the time of the final decision. This finding may reflect the common Chinese cultural perspective that LST withholding and withdrawal are not ethically equivalent, with a documented preference for withholding over withdrawal as an end-of-life care strategy.[8,11] The increase in withdrawal prevalence at the time of the final decision across key treatment categories (eg, vasopressors, mechanical

ventilation, and renal replacement therapy) suggests that, with increasing prognostic certainty and clear progression towards death, LST withdrawal becomes more acceptable. There also appeared to be a greater reluctance to adopt withdrawal strategies early in the ICU stay, evidenced by the longer interval between ICU admission and initial limitation, if the initial limitation was withdrawal. This tendency may also reflect the need for greater prognostic certainty prior to the implementation of a withdrawal strategy. Comparisons with international data indicate that although the high rate of LST limitation prior to death is similar to practices in other countries, the early and more frequent use of withholding (rather than withdrawal) remains distinct from practices reported in North America, North and Central Europe, and Asia.[13]

Comparative historical data from Hong Kong are limited. A single-centre observational study conducted between 1997 and 1999 showed that LST limitation occurred in 59% of patients,[16] although its LST limitation categories are not fully aligned with those of the current study. Notably, the mean interval between ICU admission and LST limitation in this previous study was nearly 8 days,[16] whereas the median interval in the current study was 1.8 days (IQR=0.5-7); this difference suggests that recognition of the need for LST limitation is occurring much earlier in Hong Kong, consistent with a pattern observed in Europe during the same period.[17,21] When LST limitation is indicated, earlier intervention leads to a shorter duration of patient discomfort; the observed reduction in time to limitation may represent a meaningful practice improvement over time.

Despite similar rates of LST withholding/withdrawal, the low rate of survival after LST limitation in Hong Kong (3%-4%)—comparable to the findings in a previous pan-European study[12]—contrasts with current European ICU outcomes, where the combined survival rate after LST withdrawal or withholding was 20%.[17] This difference may possibly be attributed to implementing LST in patients at the very end-of-life when prognostic certainty is greater. The earlier implementation of end-of-life interventions may represent an area for further exploration to improve end-of-life ICU practices and minimise suffering.

Practice components of end-of-life care

Key practices in end-of-life decision-making included the initiation of discussions to limit LST by ICU physicians in the vast majority of cases; when such discussions began, ICU physicians were always involved in end-of-life decision-making processes. Notably, shared decision-making between ICU physicians and families was the predominant model reported. These findings align with the best

TABLE 3. End-of-life practices in patients with life-sustaining treatment limitation (n=455)*

Who first introduced the topic of withholding/withdrawing LST?	
ICU physician	392 (86.2%)
Consulting physicians	7 (1.5%)
Primary physician	28 (6.2%)
Nurses	0
Patients	8 (1.8%)
Families	20 (4.4%)
Who was involved in making end-of-life decisions?	
Doctors	454 (99.8%)
Nurse	38 (8.4%)
Patient	18 (4.0%)
Family	335 (73.6%)
Other doctors	58 (12.7%)
Others	2 (0.4%)
Withholding/withdrawal was discussed with	
The patient	
If yes (n=28),	
the patient was informed	2 (7.1%)
the patient was asked	7 (25.0%)
there was shared decision-making	19 (67.9%)
If no (n=427), the reason given was that	
the patient was unconscious/incompetent	406 (95.1%)
the patient would not understand	5 (1.2%)
other reason	16 (3.7%)
The family/surrogate	443 (97.4%)
If yes (n=443),	
the family/surrogate was informed	96 (21.7%)
the family/surrogate was asked	8/442 (1.8%)
there was shared decision-making	338/442 (76.5%)
If no (n=12), the reason given was that	
no family existed	8 (66.7%)
family was unavailable	3 (25.0%)
other reason	1 (8.3%)
Other parties	
ICU physicians	411 (90.3%)
Primary referring physicians	151 (33.2%)
Consulting physicians	47 (10.3%)
Nurses	183 (40.2%)
Agreement was reached on the end-of-life decision taken between	
Doctors and nurses	334 (73.4%)
Family members	436 (95.8%)
Healthcare staff and the patient	27 (5.9%)
Healthcare staff and family	436 (95.8%)
ICU doctors and other doctors	246 (54.1%)
There was a delay in withholding/withdrawal decision-making because of disagreement	11 (2.4%)
There was a written order for DNR decisions	437 (96.0%)
There was documentation of DNR decisions, or withholding/withdrawal in the medical record	447 (98.2%)

Abbreviations: DNR = do not resuscitate; ICU = intensive care unit; LST = life-sustaining treatment

* Data are shown as No. (%)

TABLE 4. End-of-life decision-making: primary clinical reasons, considerations, and difficulties reported for patients with life-sustaining treatment limitation (n=455)[*] [†]

Primary clinical reason for withholding/withdrawing LST	
Unresponsive to maximal therapy	224 (49.2%)
Neurologic dysfunction/failure	62 (13.6%)
Patient request	18 (4.0%)
Multiorgan failure	78 (17.1%)
Chronic disease	16 (3.5%)
Poor quality of life	8 (1.8%)
Family request	5 (1.1%)
Sepsis/septic shock	11 (2.4%)
Other	33 (7.3%)
Important considerations for decision-making	
Good medical practice	51 (11.2%)
Patient's best interest	371 (81.5%)
Autonomous patient decisions	22 (4.8%)
Cost effectiveness	10 (2.2%)
Living will	1 (0.2%)
Religious principles	0
Social pressures	0
Need for an ICU bed	0
Major difficulties for physicians in withholding or withdrawing LST	
Ethical	6 (1.3%)
Legal	1 (0.2%)
Disagreements among patient, family, and staff	8 (1.8%)
Religious	0
None	440 (96.7%)

Abbreviations: ICU = intensive care unit; LST = life-sustaining treatment

[*] Data are shown as No. (%)

[†] Responses to all possible choices were reported

practices described in recent international expert consensus documents.[1,3] Despite frequent use of the shared decision-making model, direct or indirect knowledge of the patient's wishes regarding LST was available for fewer than half of patients (40.3%); in the vast majority of cases (94.6%), this information was transmitted by relatives rather than by the patient themselves. Only 33 (6.0%) patients had decision-making capacity during the decision-making process, and only two (0.4%) patients had advance directives (Table 2). These results highlight the need to encourage patients to discuss their wishes regarding future end-of-life care preferences with relatives, or communicate such wishes through the use of advance directives, ensuring that patients receive the preferred level of care at this critical time. Nevertheless, levels of agreement among all parties regarding end-of-life decisions were high, and delays in decision-making due to disagreement were uncommon.

Advance directives

Advance directives in Hong Kong ICUs were rarely available, possibly due to selection bias; individuals with advanced disease and a greater likelihood of advance directives may have lower ICU admission priority. However, the current rate of advance directive use in North American ICUs at the end of life is nearly 50%.[18] A relatively recent population-based study demonstrated very low public awareness of advance directives in Hong Kong, such that 86% of participants reported no previous knowledge of the advance directive concept.[22] However, once informed of this concept, the majority of participants indicated a willingness to consider using such directives. The legislative process to formalise advance directive use in Hong Kong has substantially progressed, and there is a recognised need for public education and healthcare professional–specific guidance to promote the use of these directives.[23,24]

Patient characteristics and reasons for limitations of life-sustaining treatment

In the present study, the most common diagnostic categories at ICU admission were respiratory (43.4%) and sepsis-related (38.0%) [Table 1], similar to reported findings in most other regions worldwide.[18] There were no substantial age or sex differences regarding LST limitation, but there were distinct differences in ICU admission diagnoses, such that limitation was less likely in patients with cardiovascular conditions and more likely in patients with sepsis or gastrointestinal disease. The vast majority of patients exhibited at least one co-morbidity, again similar to recently reported findings in other regions.[18] Intriguingly, no patients with cancer were among those who died without LST limitation.

The primary clinical reasons for initiating LST limitation included unresponsiveness to maximal therapy, multiorgan failure, and neurologic failure; in few cases, the limitation arose from a family request or mainly in relation to quality of life (Table 4). Overwhelmingly, the primary consideration for decision-making was the patient's best interest, followed by the principle of good medical practice, defined as the recognition that continued maximal therapy would not be beneficial for the patient (Table 4). These observations closely match the responses recently provided by a group of international experts who were asked to rank the triggers they would likely use in clinical practice to initiate discussions about LST limitation.[1]

Decision-making at end-of-life

Two questions related to decision-making and patient treatment wishes revealed an interesting observation. Across all end-of-life categories, approximately 70% of physicians in charge of end-of-life decision-making reported that if the patient's wishes were known, they were followed. In contrast, when a surrogate's treatment wishes were known, they were followed in nearly every case (Table 2). These responses indicate that the family's treatment preferences are respected more frequently compared with known patient preferences, in contrast to guidelines from the Medical Council of Hong Kong[25] and the Hospital Authority.[20] Both guidelines clearly state that treatment preferences should be sought via communication with patients and family when possible, and a consensus should be reached; however, when conflicting views cannot be reconciled, the patient's treatment preferences should supersede the family's preferences.[20,25] It is possible that physicians prioritised the family's preferences because few patients were capable of direct communication; there was low certainty regarding perceived patient wishes when communicated through third parties. Nevertheless, this finding warrants further investigation and reflection among Hong Kong ICU healthcare professionals.

Most communication related to end-of-life decision-making occurred between ICU physicians and family/surrogates; nurses, primary physicians, and consulting physicians were involved in fewer than half of the reported cases. It has been suggested that this relatively low percentage of nurse involvement is an underestimate because most data were reported by physicians who may be unaware of nurse involvement.[26] Decision agreement between healthcare staff and family members, as well as among family members, was reportedly very high (>95%) [Table 3]. Disagreements between family and staff were rare, as were delays in implementing end-of-life care because of disagreement, indicating a high level of acceptance of the decision-making process by the public and healthcare professionals in Hong Kong.

Strengths and limitations

This study's strengths included its involvement of a large number of patients over a 6-month period, provision of detailed follow-up data for up to 2 months, prospective design, and representation of most public ICUs in Hong Kong. Moreover, the data were provided by the physician in charge of end-of-life decision-making, with support from clear definitions and uniform collection across ICUs; they were also subjected to external quality control measures, minimising measurement bias. The main limitations were the lack of random ICU allocation and inclusion of consenting ICUs only, which may have introduced selection bias.

Conclusion

Data from the majority of Hong Kong ICUs, spanning the entire territory and representing both academic and non-academic ICUs, revealed that LST limitation occurs in most patients prior to death in ICU. Practices generally align with recommendations from local professional bodies and key international consensus documents. Although decision-making is usually initiated by ICU physicians, shared decision-making between medical staff and family/surrogates is the predominant model. Because a loss of decision-making capacity is common in the ICU, patients should be encouraged to communicate their wishes regarding end-of-life care through dialogue with relatives or more formal methods. Certain practices and outcomes observed in Hong Kong are more similar to those reported in North America and Europe than to patterns in other parts of Asia.

Author contributions

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Drafting of the manuscript: GM Joynt.
Critical revision of the manuscript for important intellectual content: All authors.

All authors had full access to the data, contributed to the study, approved the final version for publication, and take responsibility for its accuracy and integrity.

Conflicts of interest

All authors have disclosed no conflicts of interest.

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Ethics approval

This research was approved by the relevant Research Ethics Committee for each of the participating centres, including:
(1) Tuen Mun Hospital—The New Territories West Cluster Research Ethics Committee of Hospital Authority, Hong Kong (Ref No.: NTWC/CREC/15078);
(2) Prince of Wales Hospital and North District Hospital—The Joint Chinese University of Hong Kong–New Territories East Cluster Clinical Research Ethics Committee, Hong Kong (Ref No.: 2015.080);
(3) Caritas Medical Centre—The Kowloon West Cluster

Research Ethics Committee of the Hospital Authority, Hong Kong [Ref No.: KW/EX-15-103(88-02)];
(4) Kwong Wah Hospital—The Kowloon West Cluster Research Ethics Committee of the Hospital Authority, Hong Kong [Ref No.: KW/EX-15-105(88-04)];
(5) Pamela Youde Nethersole Eastern Hospital—The Hong Kong East Cluster Research Ethics Committee of the Hospital Authority, Hong Kong (Ref No.: HKEC-2015-028);
(6) Princess Margaret Hospital—The Kowloon West Cluster Research Ethics Committee of the Hospital Authority, Hong Kong [Ref No.: KW/EX-15-104(88-03)]; and
(7) Queen Mary Hospital—Institutional Review Board of The University of Hong Kong / Hospital Authority Hong Kong West Cluster, Hong Kong (Ref No.: UW 15-361).

The requirement for informed patient consent was waived by the relevant Clinical Research Ethics Committees as the study was observational only, where all collected data were anonymised at source and only de-identified data were passed on to the co-ordinating centre for analysis, and risk to participants was minimal.

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