Quality of Life in Critically Ill Patients: A Systematic Review

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Authors' contributions

This work was carried out in collaboration between all authors. All authors read and approved the final manuscript.

Review Article

ABSTRACT

Objective: This paper aims to present a comprehensive literature review of Quality of Life (QOL) in patients who are suffering from serious medical illness as evidenced by receiving treatment in the intensive care setting. By examining the instruments used to measure QOL, as well as the factors that influence it, this review will explore the relevance of QOL to patient care and management.

Data Sources: From Medline and other online resources, over 467 articles were identified, of which 73 articles were selected for inclusion in this review by three independent reviewers. The reviewers reached a consensus using pre-defined selection criteria.

Study Selection Criteria: Articles had to: 1) be written in English or have an available published English translation, 2) be published in a peer-reviewed journal, 3) study adult humans, 4) focus on serious medical illnesses, such as sepsis and MI (myocardial infarction), rather than focusing exclusively on terminal illnesses (any study design was accepted), and 5) use at least one QOL measure.

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Data Extraction: The study selection process yielded 73 articles. Research methodology and key findings were derived from the full text and tables of the selected studies.

Data Synthesis: QOL is very poor in gravely ill medical patients and continues to decline with further deterioration of medical status. A model that incorporates QOL and the severity of the medical illness, in addition to the patient's wishes, might have the potential to improve overall QOL for patients and their families and guide end-of-life decisions.

Conclusions: A formal assessment of the patient's QOL and final wishes could assist the patient, their loved ones, and the treating physician in making critical decisions about how to improve QOL through comfort/palliative care.

ABBREVIATIONS

QOL: Quality of life; ICU: Intensive Care Unit; SF-36: Short Form 36; EQ-5D: EuroQol 5D; HRQOL: Health Related Quality of Life; MPM: Mortality Probability Model; APACHE: Acute Physiology and Chronic Health Evaluation; MODS: Multiple Organ Dysfunction Score; TISS: Therapeutic Intervention Scoring System; NEMS: Nine Equivalents of Nursing; QLI: Quality of Life Index; MQOL: McGill Quality of Life Questionnaire; MQOL-CSF:McGill Quality of Life Questionnaire-Cardiff Short Form; PQLI: Palliative Care Quality of Life Instrument; EQ-VAS: EuroQol VAS; SAPS: Simplified Acute Physiologic Score; IQCODE-SF: Informant Questionnaire on Cognitive Decline in the Elderly Short Form; ADL: Activities of Daily Living; QOLSS: Quality of Life Survey Score; ODIN: Organ Dysfunction and/or Dysfunction; TI:Trauma Injury; MPM: Mortality Probability Model; LODS: Logistic Organ Dysfunction System; POSSUM: Physiologic & Operative Severity Score for the Enumeration of Mortality & Morbidity; TRIOS: Three days recalibrated ICU outcome Score; IRISS: Ischemia Reperfusion Injury Severity Score; GCS: Glasgow Coma Scale; EORTC QLQ-C30: Quality of Life in Oncology Practice SOFA: Sequential Organ Failure Assessment.

1. INTRODUCTION

Quality of Life (QOL) is a broad concept that refers to the general well-being of individuals and societies. In 1997, the World Health Organization (WHO) defined QOL as an individual's "perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns" [1]. Within a medical context, assessing QOL becomes a matter of measuring a patient's satisfaction with their physical, social, and psychological health [2,3,4]. For healthcare providers, awareness of where a medically ill patient stands across these domains may have significant implications for their treatment and management. In using such knowledge, the ultimate goal is to enhance a patient's quality, as opposed to quantity, of survival [1].

Due to its multidimensional nature, many different instruments are used to measure QOL, with each instrument placing various degrees of emphasis on its physical, mental, and social subcomponents (refer to Table 2). While all of these instruments play an integral part in evaluating a patient's well-being, they do not help establish overall prognosis.

There are, however, multiple instruments that can predict the severity of illness and give prognostic indicators for survival. Illness severity can be quantified by a series of questionnaires that are completed by the healthcare provider. Several studies have shown the effectiveness of these instruments in accurately predicting the outcomes and mortality of patients that have severe illnesses [5-12]. In particular, some cases show a correlation between QOL and length of stay in the Intensive Care Unit (ICU) in determining the overall prognosis for QOL post-admission [5,7-12]. To get a proper QOL assessment several dimensions need to be measured including the patients perceived well being (psychometric approach), utility of treatment, and severity of the illness [1,9]. Pre- and post-ICU QOL assessments have to be made in order to get a relevant response for all these dimensions, for quality assurance

purposes [2,5,11-30]. With this in mind, it is important to identify the most appropriate methods for evaluating and assessing QOL in order to obtain the most meaningful results.

Although our main focus is to understand the most effective ways improve a patient's QOL, we also have to consider family members and the patients primary legal healthcare guardian or proxy. As healthcare providers, we should always remember the importance of a patient's loved ones, as well as the financial and emotional impacts that a serious illness can have on them. Family members and proxies can also give the provider better insight into the patient's wishes [31-39,17]. Many articles reiterate this point and consistently report that a patient's own answers tend to correlate with their proxy's answers on matters pertaining to assessment and end of life care [31-37,17]. In situations where the healthcare provider is unable to determine a patient's wishes directly, proxies can be used as surrogates [17,31-38, 40].

When making treatment decisions on critically ill patients their QOL and final wishes should all be considered. In this review, we show how assessing QOL and illness severity with the proper instruments can be used to guide treatment decisions of critically ill patients in the ICU and enhance the quality of patient care. In a step-wise manner, we will divide this paper into four sections 1) pre-ICU assessment QOL instruments, both from patients and proxies; 2) categorizing severity of illness and prognosis; 3) exploring the patient's wishes after initial diagnosis and prognosis; and 4) management and treatment options based on the latter two steps with post-ICU follow-up QOL instruments.

2. MATERIALS AND METHODS

2.1 Data Sources

A systematic literature search was conducted using the following databases: Pubmed/Medline; Cochrane database of systemic review; ACP Journal club; Journal of Chronic Disease; Respiratory and Intensive Care Units Journal; lastly, PsycInfo from 1992-2015 was used in this review. In our search we used the following key words; Quality of Life (QOL), terminal cases, seriously ill patients, Cancer, Intensive Care Units (ICU), well-being, Health Related Quality of Life (HRQOL), and palliative care. We scanned the reference list of review articles for additional studies. The initial search yielded 467 articles.

2.2 Study Selection Criteria

Three independent authors reviewed the abstracts of 467 articles using the following selection criteria: 1) Articles in English or have an available published English translation, 2) Published in a peer-reviewed journal, 3) Studies on adult humans of any design focusing on serious medical illnesses during ICU care and not only terminal illness, and 4) Studies that used at least one QOL measure.

2.3 Data Extraction and Yield

After reading the abstracts 156 articles were retrieved. A total of 73 articles met the inclusion criteria after being reviewed and 83 were excluded. Research methodology and key findings were derived from the full text and tables of the selected studies.

The review methods and yield are depicted in Fig. 1.

The information extracted from these articles was organized into four sections in the manuscript. "In the first section data regarding pre and post ICU surveys was analyzed". The second section dealt with instruments that measured the severity of illness and develop a prognosis. This was followed by a review of literature discussing patients request in end of life care. Finally, this paper discusses palliative care interventions and post-ICU QOL instruments.

3. RESULTS

While QOL remains a subjective assessment, various instruments have been developed to provide a standardized approach. Although these instruments have their advantages and disadvantages, they have been shown to provide physicians with valid assessments regarding QOL. Of the different instruments, the SF-36 and EQ-5D, which will be explained in greater detail later in the article, are two of the most popular questionnaires being used to measure various domains of physical and mental QOL.

Through our systematic search we also came across several different instruments for determining the prognosis of severe illnesses. The most commonly accepted and validated instruments in predicting mortality or severity of illness are the Acute Physiology and Chronic Health Evaluation (APACHE) and Simplified Acute Physiologic Score (SAPS).
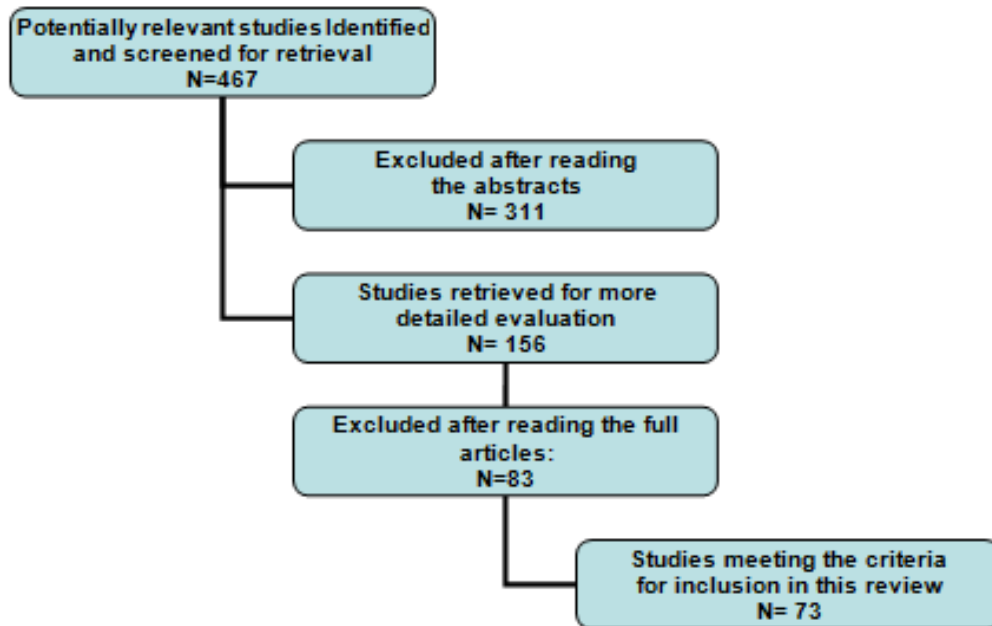
Fig. 1. A Article Search Algorithm

The literature reviewed centered on the following four steps in assessing QOL in seriously medically ill patients:

Fig. 2. Study organization layout
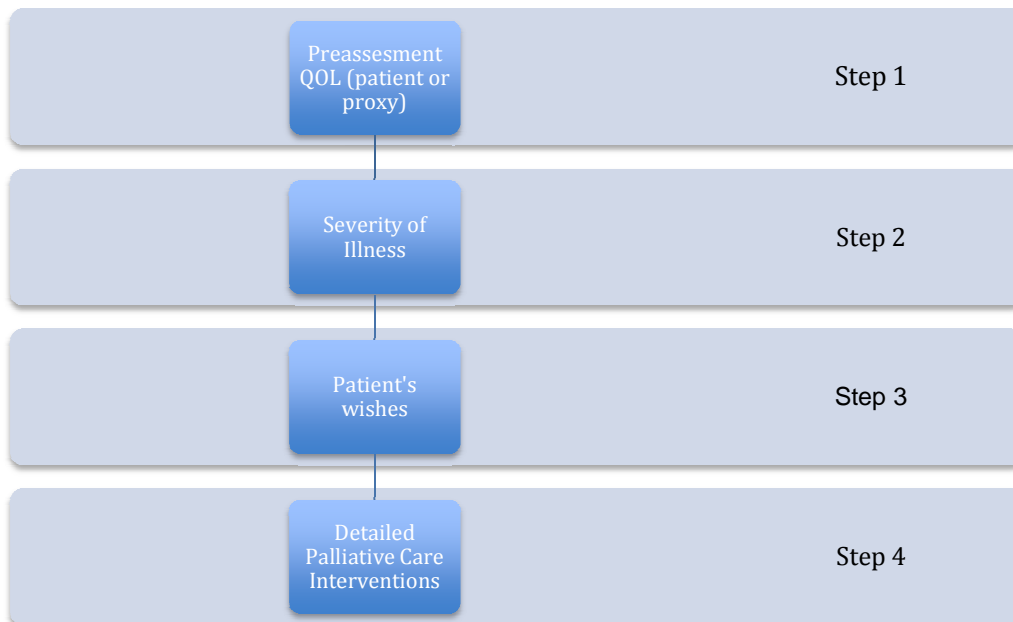
3.1 STEP 1: Pre-ICU Assessment of QOL by Patient or by Proxy

The literature has shown that pre-assessing a patient can determine the prognosis for survival and aid in QOL assessment [41,31,16,18,8,10-11,22,12,42]. Of the selected 71 articles 39 were referenced for Pre-ICU assessment. Most of these articles came to the same conclusion, that a decreased score on Health Related Quality of

Life (HRQOL) assessment prior to ICU admission correlated with poorer overall outcomes [41,31,16,18,8,10-11,22,12,42]. Although there are many instruments to ascertain the pre-ICU QOL or HRQOL (depending on the literature's definition), only a few were used frequently and validated throughout the studies that were analyzed.

Of those evaluated, the two most significant QOL instruments are Short Form 36 (SF-36) and the EuroQol-5D (EQ-5D) [41,32]. The SF-36 questionnaire is generally completed by a proxy and can reliably assess the QOL of a critically ill patient on admission to the ICU [43]. SF-36 has been cited over 1400 times and validated in numerous studies. The EQ-5D is a short, concise instrument for assessing HRQOL [44]. The EQ-5D has seen widespread use in population surveys and clinical studies in many countries due to its ease of use for respondents [45]. It is beneficial for healthcare providers to assess patient's QOL, not only for management purposes, but also for outcomes after discharge from the ICU [14-15,20,22-30,35,37]. Using the correct instrument to accurately come up with a management plan is imperative and potentially life altering.

The table below illustrates the most commonly used instruments to determine the QOL. The table gives a brief description of each instrument, explains their common applications, and highlights the associated statistical significance. Descriptive information for each instrument includes the number of items, categories assessed, and any other scales that are pertinent to determining QOL in a patient. Many of the reviewed articles used the SF-36 and EuroQoL-5D in assessing patients, unless the article proposed a new instrument for assessment (refer to notable instruments).

3.2 Step 2: Categorizing Severity of Illness and their Prognosis

Many articles cited a variety of severe illnesses and their respective outcomes. In most cases, pre-ICU QOL was compared to post-ICU QOL; the differences between these two assessment points were then correlated with ultimate outcomes.

Table 1. A Quality of Life Instruments

Method	Description	Common Applications	Biostatistics
SF-36 [44,46]	The SF-36 instrument is comprised of 36 items, which includes a transition question and 35 questions on quality of life. The 35 questions are grouped into two general components: Physical and Mental. Further broken into eight sub-scales that are organized under these categories: Physical includes: physical function, role limitation, pain and general health. Mental includes: vitality, social role limitations and mental health transition [44]. It is the most widely used method worldwide.	Most widely used measure of general health in clinical studies throughout the world.	Item-internal consistency (97% passed) and item-discriminate validity (92% passed). Reliability coefficients ranged from a low of 0.65 to a high of 0.94 across scales (median = 0.85) and varied somewhat across patient subgroups [46].
EuroQoL-5D [47-50]	This questionnaire includes five items assessed at three levels: mobility, personal care and usual activities, pain/discomfort and anxiety/depression; as well as a visual component scale, Visual Analogue Scale (VAS). [47]	Applicable to a wide range of health conditions and treatments.	Reliability [intra class correlation coefficient (ICC) = 0.70] is acceptable for aggregate level data. [48], Test-retest reliability correlations for previous versions ranged between 0.69 and 0.94 [49]. The validity of the EQ-5D was demonstrated by the fulfillment of 20 of the 26

Method	Description	Common Applications	Biostatistics
			hypothesis known-groups construct validity [50]
Concise Quality of Life Index (QLI) – Dr. Walter O. Spitzer (1980) [31,51]	Focusing on 5 areas of functioning; total of 10 points (1-2 point scale); physicians and proxies can finish this instrument if patient is not able to complete; found to be well validated.[31], There are different versions of QLI, for example English Version, Spanish Version…	This instrument is cancer-specific.	The test-retest reliability correlation coefficient of the QLI-Sp mean score was .89. The discriminate validity of the QLI-Sp was documented by the highly significant difference obtained between the mean scores of the two samples selected to represent quite different levels of quality of life[51]
McGill Quality of Life Questionnaire (MQOL): [52,53]	16 questions, using a 7-scale rating, total score of 98 with 4 subscales. [52], Four subscales were identified through factor analysis and 16 Items (Physical: items 1-4, Psychological: items 5-8, Existential: items 9-14 and Support domains: items 15, 16) [53]	An instrument made for advanced or life threatening disease.	Internal consistency: Cronbach alpha Whole scale = 0.83 Physical symptoms = 0.84 Psychological symptoms = 0.77 Existential well-being = 0.86 Support domains: 0.83 [53]
McGill Quality of Life Questionnaire-Cardiff Short Form (MQOL-CSF): [54]	the McGill Quality of Life Questionnaire-Cardiff Short Form (MQOL-CSF: 8 items) 8 item shortened survey using scale 1-7 for each item. (Global QOL: 1 item, Physical symptoms: 3 items.Pshycological:2 items, Existential: 2 items)	In terminally-ill patients and palliative care patients	The internal consistency reliability was moderate to high (Cronbach's alpha = 0.462-0.858) and test-retest reliability (Spearman's r (s)) ranged from 0.512-0.861.
The Missoula–VITAS quality of life index [32]	20 questions, using a 5 point scale, (symptom, function, interpersonal, well-being, and transcendent) totaling 100; with a patient rating of overall treatment; valid with other similar instruments for depth of each dimension. [32]	Advance for terminal phase of disease	Internal consistency (Cronbach's alpha = 0.77). Test-retest reliability was not evaluated.
The Palliative Care Quality of Life Instrument (PQLI) In Terminal Cancer Patients [33]	28 questions scale of 1-7 with 7 factors; average time to complete is 8 minutes, and allows patient's beliefs to be incorporated [33].	For terminal cancer patients.	Internal consistency assessed by Cronbach's alpha coefficient ≥.70, Test-retest reliability in terms of Spearman-rho coefficient was also satisfactory ($p < 0.05$). The PQLI is a reliable and valid measure for the assessment of quality of life in patients with advanced stage

Method	Description	Common Applications	Biostatistics
			cancer [33].
Quality of Life in Oncology Practice: Prognostic Value of EORTC QLQ-C30 Scores in Patients with Advanced Malignancy [16,55]	In patients native language; 28 questions, rating scale of 0-100; questions 29 and 30 QOL 7-point scale; determined that QOL is directly related to overall survival [16].	Prognostic indicator in advanced cancer patients.	Seven of the nine EORTC QLQ-C30 scales showed good reliability for both the African Americans and the Caucasians in the sample (Cronbach's alpha > 0.75). Although the overall reliabilities of seven of the scales showed good fit, many of the item-to-scale correlations did not [55].
The Functional Index Living Cancer [5,56]	22-questions, 7-point scale; given day-to-day basis, and impact is shown on patient's QOL with progressive treatments, well validated against other instruments. [5]	For cancer patients	The validation studies demonstrate the lack of correlation between traditional measures of patient response and other significant functional factors such as depression and anxiety (r = 0.33)[5], except for cognitive (a=0.50) and social (a=0.63) scales, all scales had Cronbach's a coefficients above the acceptable level of 0.70 [56]

Different instruments have been constructed to help the healthcare provider determine the prognosis of severe illnesses. The most popular instruments are Acute Physiology and Chronic Health Evaluation (APACHE), Simplified Acute Physiologic Score (SAPS), and Mortality Probability Model (MPM) [6-8,10-12,59]. Since there is a plethora of scoring systems, we had to categorize them into different clusters, resulting in three main groups:

- **Group A:** (included APACHE, SAPS and MPM) The most frequently used instruments; assess the severity of a patient's disease upon admission.
- **Group B:** Scores a patient's organ dysfunction. Examples include MODS (Multiple Organ Dysfunction Score) and SOFA (Sequential Organ Failure Assessment).
- **Group C:** Was used to estimate the amount of nursing care that would be required for the patient in order to determine nurse workload assignments. Examples include the TISS (Therapeutic Intervention Scoring System) and NEMS (Nine Equivalents of Nursing Manpower). Although these scoring systems have been validated and tested, many selection factors need to be considered in order to determine the most appropriate instrument. In evaluating any scoring system, the two primary factors that should be considered are the calibration (weight) given to each of the questions, and the discriminative ability (sensitivity/specificity) of the questionnaire overall. While APACHE showed better calibration and SAPS ranked first in discrimination, all of the listed testing instruments were found to provide good predictions of mortality. Commonly recognized factors include: 1) the proposed use; 2) validity; and 3) reliability. Other considerations should be given for the customization of an instrument for its intended use and consistency for updating.

Table 2. Overview of studies on quality of life in intensive care units patients

Name and date	Number of patients	Quality of life (QOL) measures.	Results and data	Discussion/Comments
Perrins J et al. 1998 [7]	72 patients – with a 1 year follow-up	General health questionnaire 28 items, Rosenberg self-esteem scale and Impact of Events scale.	Psychological recovery: mode of admission, type of illness and recall can distinguish patients	Post-ICU follow-up and QOL need to be done.
Eddlestone JM et al. 2000 [10].	143pts total followed up for 12 months	Apache II and Short Form 36.	80% were satisfied with their QOL. Fatigue, Poor Concentration and Sleep Disturbance were present at 3 months and improved after 9 months; low prevalence of psychological distress.	Women were more likely to complain, and QOL should be done post-ICU
Garcia lizana F et al. 2001[57].	152 pts, >65 yrs, 1 yr follow-up.	Modified EuroQol instrument	21% got worse than the previous QOL and 17% were incapacitated. & 83% were able to live independently. Predicting factor for QOL were previous QOL (P<.0002) & Age (P<.0002)	Dependency was found between mortality rate and organ failure and the age will not affect mortality, so the age can not affect mode of care.
Badia X et al. 2001[9].	334 pts: 62 with Trauma injury (TI);181 with scheduled surgery (SS); 19 with unscheduled surgery (US); and 72 with medical conditions (MC)	EQ-VAS (visual analogues scale)	QOL in TI was the worst, while scheduled surgery showed a significant increase, unscheduled and medical patients had slight decreases. 12 months later SS, US, and TI still had problems with usual activities.	QOL prior to admission diagnosis is necessary to determine outcome. Proxies were a viable source to complete instruments.
Kvale R et al. 2003 [19].	100 pts: 26 were medical and 74 were surgical, >18 yrs in age; followed from 6 months to 2 yrs post ICU	Cohort study, SAPS-II and SF-36	QOL was improved overall in 6 out of the 8 dimensions with an average increase in SF score about 4.0. Most improved were neurological and respiratory cases, while no improvement were shown in cardiovascular cases.	Although sample size limits this study, general improvement was noted in HRQOL.

Kaarlola A et al. 2003 [20].	169 pts participated; post ICU discharge; follow up at 1 and 6 years	Rand 36 via mail.	QOL improved with time; most of the patients had good to satisfactory QOL.	Timing of QOL assessment is essential; emotional domain improves slowly.
Dowdly et al. 2005 [21].	7320 patients in 21 independent studies (literature review)	SF-36 EURO -5D Nottingham health profile and Sickness impact profile.	3/3 studies showed QOL was lower than general population for every ICU patients. All dimensions on SF-36 had been lower, except bodily pain that was better post ICU discharge and 30 days after. 2/4 studies with 12 months follow-up pts had improved in all dimensions post ICU discharge, but they were still lower in score than the general population, as they had some sort of mental and general function problems.	Age & severity of illness are predictors of physical functions. It can be used to compare QOL in ICU subpopulations.
Cuthbertson BH et al. 2005 [10].	Assesses QOL before and after ICU admission. 300 pts at 3,6 and 12 months post-ICU.	SF-36 and EQ-5D being tested on those patients	"At 3 months there was a decrease in premorbid values;" and at 12 months, return to baseline was noted. Lower QOL values for pts that died than those who survived.	QOL increased slowly over a 12-month period, but still lower than general population.
Hofluis JG et al. 2008 [22].	QOL assessments made during ICU stay > 48hrs, and follow-up at 3 and 6 months post ICU. 252 pts could be reached at the 6 months interval.	SF-36 was used for assessment for ICU stay, 3 & 6 months thereafter.	Pre-ICU HRQOL was lower in survivors than general population, with gradual improvement at 6 months, except in bodily pain score.	ICU patients eventually return to baseline, but recovery is incomplete for physical, mental and social functioning.
Abelha et al. 2007 [11].	QOL assessment in 187 non-cardiac surgery candidates during ICU stay.	Quality of life Survey Score (QOLSS), SAPSII with respect to age, comorbidities and health status were conducted.	A worse preadmission QOL = increase SAPS score, with older pts, and physical status. QOL of pts who died was lower than those who survived.	Preadmission QOL correlated with age and severity of illness.
Fildissis G et al. 2008 [23].	QOL assessed during ICU and at 18 months post-ICU. 116 pts total measured.	Quality of life Spanish (QOL-SP).	Slight increase in QOL from baseline ICU admission to 6 months, than a decrease at 18 months. Age, male and length of ICU stay were the most	Male and age were the most significant improvement after 18 months. Lack of matched population (general population).

			important factors.	
De rooji SE et al. 2008 [24].	Measured QOL of 204 very elderly surviving patients 1 year post unplanned surgery or medical ICU.	Cohort study, Modified Katz ADL index and EQ-5D were answered by patients themselves; while relatives answered ADL cognitive version and informant questionnaire on cognitive decline short form (IQCODE-SF).	For those who were tested, 83% did not show severe cognitive impairment and 76% did not show severe physical limitations.	Patients QOL were similar to that of the normal population in that age group.
Graf J et al. 2008 [58].	QOL assessed for those who survived cardiopulmonary resuscitation; attacks were either in or out of hospital.	SF-36 being applied to those 110 patients from the original 354 post-cardiac arrests; pts were continued to be assessed up to five years, to discuss financial issues and ICU costs.	Of those who survived, QOL women vs. men,0.87 vs. 0.74 respectively, (P<0.05).	Cardiac arrest patients compared to age/gender controls similar QOL.
Ringdal M et al. 2009 [25].	Mental health and HRQOL assessment post ICU 6 to 18 months.	SF-36, hospital anxiety and depression scales, as well as an ICU memory tool.	Surviving patients had lower HRQOL in trauma then control. Anxiety, delusions and hallucinations were more prevalent in the younger age group.	Post injury trauma patients higher likelihood for symptoms of depression and lower HRQOL scores.
Iribarren-Diarosarri S et al. 2009 [12].	HRQOL prognostic factor of hospital and 1 year mortality.	PAEEC project of the epidemiological analysis of the critical care illness.	HRQOL correlates with severity by APACHE II scores. A twofold risk for demise in preadmission HRQOL high scores.	Bad HRQOL score is equivalent to overall mortality and survival at 12 months.

Despite the numerous trials, no single test can be identified as the best (most accurate) predictor of ultimate outcomes. The following table (Table 3) classifies the scoring system based on their common applications:

3.3 Step 3: Patients End of Life Wishes'

The goal of the ICU is to maintain the well-being of a patient who is suffering from a severe illness or life-threatening situation. Surprisingly, family members reported that the symptoms of their dying relatives in the ICU were poorly controlled. For example, pain was under control most or all of the time in 47% of patients, and only 3% of patients reported comfortable breathing most or all of the time [60].

Various factors, such as patient mental state, can make it difficult to ascertain the course of the treatment. Even with limited patient communications, a healthcare provider can still fulfill the wishes of the patient by utilizing prior assessments or a patient's proxy.

Two questions are often raised. First, is the family member a good enough surrogate to facilitate the course of action that is comparable to patient's wishes? Secondly, do patients give greater weight to their own opinions, their loved-one's opinions, or their physician's opinions when it is time to make treatment decisions?

There are small discrepancies or biases when it comes to the overall care and projected outcome, when questioning both patient and proxy [17,26,27,34-37,39]. Even with the partialities, many studies have shown that the proxy can be a great surrogate for the patient who is in the ICU [17,37,34-38]. Studies have shown that surrogates made correct predictions of the patient's wishes in 66% of instances [61]. In a study by Dinglas et al. using the EQ-5D, it was found that agreement between the wishes of proxies and patient's was slight to fair [62]. In the event that a competent patient or their healthcare proxy disagree with the treatment plan of the healthcare provider, the wishes of the patient or proxy take precedent. Otherwise, the healthcare provider should ensure the well being of the patient at all costs.

With regards to the second question about whose opinion is most valued by the patient, Nolan MT et al. [63] found that, when considering

Table 3. Classification of Scoring Systems for Medical Severity and Prognosis

General scores	Specialized & surgical intensive care- Pre-op evaluation	Trauma scores	Therapeutic intervention nursing scores
SAPS II expanded & predicted mortality	Lung resection score	ISS (Injury Severity Score)	TISS (therapeutic intervention scoring system)
APACHE II & predicted mortality	EUROSCORE	RTS (revised trauma score)	TISS – 28 (simplified TISS)
SOFA (Sequential Organ Failure Assessment)	ONTARIO	TRISS (trauma injury severity score)	
MODS (Multiple Organ Dysfunction Score	Parsonnet score	ASCOT (a Severity characterization of trauma)	
ODIN (Organ Dysfunctions &/or Infection)	System 97 score	24h – ICU Trauma Score	
MPM (Mortality Probability Model)	QMMI score		
LODS (Logistic Organ Dysfunction System)	POSSUM (physiologic & operative severity score for the enumeration of mortality & morbidity)		
TRIOS (Three days recalibrated ICU outcome Score)	IRISS score		
	GCS		

the role of loved ones in terminally ill patients who are able to speak and to express their wishes, 50% of the patients would be independent of loved ones, 44% of patients would make decisions in collaboration with loved ones while only 6% of the patient's would rely largely on loved ones. When asked to judge the relative importance of the physician's opinion versus that of a relative, patients tended to give greater weight to the former. On the other hand, when asked to make the same comparison on the assumption that they were unconscious and unable to participate in the decision, 48% would weigh both equally, 33% would weigh their loved ones' input more heavily, and 19% would weigh the physician's input more heavily [63].

QOL assessments done prior to admission can provide some guidance as to what the patients wishes are with respect to medical care procedures. Pre-admission evaluation of a patient using the SF-36 or E5-QD (directly or via proxy), in conjunction with a Severity of Illness score from a disease appropriate instrument, form the basis of the medical care algorithm. Higher scores on a Severity of Illness scale and lower scores on a QOL scale are linked to worse prognoses and/or outcomes [5,10-12,42]. In such cases, our recommendation is to determine the patient's wishes with regards to any further interventions, palliative care, and hospice. This can be achieved either with input from the patient directly or through advanced directives via a proxy, surrogate, or living will. With an understanding of the patient's wishes, the ultimate goal is to improve the patient's QOL in their remaining time.

3.4 Step 4: Detailed Palliative Care Interventions

Managing a severely ill ICU patient is a daunting task that requires careful attention to every variable. Treatment plans need to take into consideration both the patients acute condition and their long term prognosis. Keeping this in mind, general methodologies can also be applied in conjunction with QOL and Severity of Illness instruments to make a more accurate assessment of the patients short term and long term needs. Both types of instruments can be used to predict outcomes and therefore guide us to specific treatments [18,8,19,10,22,37,58]. Mental and physical aspects of a patient can also give us insight into their prognosis. By applying these instruments; we cannot lose sight of what is considered hospital standards.

In deciding the course of treatment, we have to look at what is the standard of care for patients who have Do Not Resuscitate/Do Not Intubate (DNR/DNI) directives in order to continue with the treatment or to follow-up with palliative care [26]. The management of a patient can vary from hospital to hospital, and there can also be a bias by each individual physician. To ensure that the right steps were taken for the patient and their well being, further QOL assessments must be performed.

To get an accurate measure of the patients QOL, it is important to follow up with the patient post-discharge. Younger age and prolonged hospital stays are associated with lower mental or physical quality of life and may be targets for rehabilitation. Simple screening questionnaires such as the SF-36 at 4 months after ICU discharge may identify those likely to attend outpatient services [37]. Changes between the initial and follow-up assessments provide the actual test to see if the treatment regimen (s) and/or palliative care were sufficient enough to improve a patient's QOL [15,19,20,22-25,27-30].

As a standard of practice, continuity of care is essential and necessary to ensure that QOL is not compromised [15,19,20,22-25,27-30,64]. Comparisons were made to gain insight on how much of a difference there is between pre-ICU, post-ICU, and the general population in QOL [15, 19,20,22-25,27-30,38,65]. Further consideration should also be given toward the use of care managers. Recent literature in the chronic management of heart failure patients has shown that the use of care managers is associated with improved outcomes [66,67]. Ciccone and colleagues reported that heart failure patients assigned care managers exhibited more control and greater satisfaction with their health [66]. The use of care manager post-ICU could potentially improve QOL in terminal, chronic, and rehabilitative care settings. It is even feasible that a care manager could help a patient or their proxy decide on the best course of treatment while in the ICU.

4. DISCUSSION

Despite the fact that the idea of QOL has gained popularity over the last two decades, more effort should be made to truly understand its importance. In our literature review, we have covered this topic in a specific cohort, patients who are seriously ill--either chronically or terminally. Our goal as physicians is not just to add more days to a patient's life, but also to add

life to their remaining days. From our point of view, treating a patient is good, but ensuring an enhanced QOL is even better.

Physical function, disease and treatment related-symptoms, psychological/emotional well-being, and social interactions are critical domains that are essential to include in QOL instruments. Out of all the instruments that have been used to cover these domains, the SF-36 and the EQ-5D have been used most frequently [41,44,32,47]. Although we believe that there are many excellent instruments that have been used and validated for this purpose, our recommendation is to use one of these two instruments for upcoming research programs. EQ-5D is advantageous for critically ill patients due to its ease of use thus putting a low burden on respondents [62]. Similarly the SF-36 has generally been a highly rated tool for assessing the patients view of their health, the exception being in nursing homes residents [68]. Furthermore SF-36 screens more domains of health and is a more precise instrument [69]. Another dimension that should be explored is an instrument to ascertain a patient's QOL via proxies (family members). As is often the case, patients suffering severe illness in the ICU are often unconscious, either from illness or sedation, and thus rely heavily on proxies to carry out their treatment decisions [40]. Even though SF-36 has made great strides in accomplishing this, no single instrument can completely mirror a patient's own desires when using a proxy [44, 32]. However, patients wishes should be always be considered when devising a treatment plan regardless of the limited predictive value of these instruments.

When used by themselves, assessments of severity of illness are limited in their capacities to yield prognostic information. Illness severity measures should be used in conjunction with QOL assessments in order to better comprehend the true outcomes of a severe illness. We recommend assessing both QOL and the patient's severity of illness. Based on the results of these assessments, the patient's own wishes about any further interventions, as well as their views about hospice and palliative care should be explored. To better understand how QOL can change in response to specific treatment or management modalities, patient follow up evaluations should be conducted.

In order to run a practical and well-qualified system of care, we should keep contacting patients after discharging them from our units over regular intervals--6, 12, and 24 months, for instance [18,19,10,22,12,37,64]. A care manager is one alternative that could fulfill this role by acting as a coordinator of the patients care between the ICU team and other specialists [66]. Learning more about a patient's post-ICU clinical improvements will reinforce our research efforts and provide further direction for patient management. Keeping the latter in mind, patient follow-up data can help us devise a framework for effectively managing future patients with similar diseases [9,43,27,70,71].

The patient's living will and the family's role in the overall care of the patient present additional challenges to devising the best management plan. Even though studies validate a proxy's ability to act as a surrogate when it comes to patient assessment, using surrogate information to determine the best approach to patient management is not always so clear-cut [9,43, 37, 70,71]. Our main objective is to comply with each patient's wishes, but in the event they cannot communicate their wishes a patient proxy or living trust should be consulted. Pertinent information regarding the patient's condition, such as the diagnosis, treatment plan, and prognosis, should be given to family member's with the patients consent. Alternatively, a care manager could serve as an effective patient advocate by taking note of high risk patients wishes before they ever suffer an acute event. This would allow the family to make the most informed decision regarding possible directions for management and care.

Length of stay and economic burdens drive healthcare providers to cut-costs while working in the best interests of the patient. It is imperative to consider the repercussions of both. Many studies show that longer stays in the ICU correlate with an increased chance of demise throughout all age groups [10,37,58]. Furthermore, the financial burden placed on families by keeping a patient in the ICU for extended periods can be substantial. One study noted that in under or uninsured patients higher end of life costs was associated with increased quality of death rating while no such relationship was found in insured or Medicare patients [72]. All of these issues have to be accounted for when it comes to manage-ment. Studies show that QOL is increased when patients have a sense of security after a serious illness [18,6,10,22,12,37,73]. This is why post-ICU follow-up and interdisciplinary communi-cation is important and needs to be done.

5. CONCLUSIONS

The concept of Quality of Life is becoming increasingly popular in modern medicine. ICU and severely ill patients are of special interest. Our goal as health care professionals is not only to add more days to our patients' lives but also to add life to their remaining days. In order for us to achieve this goal, we need to find the most efficient method to assess our patients QOL. We recommend that a patient's QOL be assessed before ICU admission, more frequently during their ICU stay, and after discharge.

Although death is a natural part of life, the thought of dying still frightens many. Assessing the severity of a patient's illness as well as their QOL will enable physicians to provide patients with a clear and transparent picture of their present situation. This in turn, can help make life decisions made by patients or on their behalf by a proxy, easier and more efficient. Furthermore, it will help physicians become more in-tune with patient's wishes, especially in cases where they can no longer express their wishes directly. Advanced care planning is an essential part of managing severely ill patients, as it provides guidelines for health care professionals on how to best fulfill a patient's wishes and expectations.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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