Transfusion and Apheresis Science 54 (2016) 416–420

Contents lists available at ScienceDirect

Transfusion and Apheresis Science

journal homepage: www.elsevier.com/locate/transci

End-of-life decisions in surgical intensive care medicine – the relevance of blood transfusions

Jan A. Graw [a,*], Claudia D. Spies [a], Klaus-D. Wernecke [b], Jan-P. Braun [c]

[a] Department of Anesthesiology and Intensive Care Medicine, Campus Charité Mitte and Campus Virchow Klinikum, Charité – Universitätsmedizin Berlin, Germany
[b] Charité – Universitätsmedizin Berlin and SOSTANA GmbH, Berlin, Germany
[c] Department of Anesthesiology and Intensive Care Medicine, HELIOS Klinikum Hildesheim, Germany

ARTICLE INFO

Article history:
Received 11 January 2016
Received in revised form 21 March 2016
Accepted 22 March 2016

Keywords:
End-of-life decision
Blood transfusion
Intensive care medicine
Surgical intensive care unit
Limitation order

ABSTRACT

Background: End-of-life decisions (EOLDs) are common in the intensive care unit (ICU). EOLDs underlie a dynamic process and limitation of ICU-therapies is often done sequentially. Questionnaire-based and observational studies on medical ICUs and in palliative care reveal blood transfusions as the first therapy physicians withhold as an EOLD.
Methods: To test whether this practice also applies to surgical ICU-patients, in an observational study, all deceased patients (n = 303) admitted to an academic surgical ICU in a three-year period were analyzed for the process of limiting ICU-therapies.
Results: Restriction of further surgery (85.4%) and limiting doses of vasopressors (75.8%) were the most frequent forms of limitations in surgical ICU therapies. Surgical patients, who had blood transfusions withheld (44.6%), had more ICU-therapies withheld or withdrawn simultaneously than patients who had transfusions maintained (5 ± 2 vs. 2 ± 1, $p < 0.001$). Secondary EOLDs and subsequent limitations occurred less frequently in patients who had transfusions withheld with their first EOLD (17.1% vs. 35.6%, $p < 0.05$).
Conclusion: Limitation orders for blood transfusions are not a prioritized decision in EOLDs of surgical ICU patients. Withholding blood transfusions correlates with discontinuation of further significant life-support therapies. This suggests that EOLDs to withhold blood transfusions are part of the most advanced limitations of therapy on the surgical ICU.

1. Introduction

Decisions to limit life-sustaining treatment precede most deaths on European intensive care units (ICUs) [1–3]. End-of-life decisions (EOLDs) underlie a dynamic process where intensive care therapy shifts from full life-support to a palliative approach. ICU-therapies that are commonly limited include endotracheal intubation, mechanical ventilation, renal replacement therapy, catecholamine infusions, surgery, antimicrobial therapy, blood product transfusions, nutrition and hydration. Most patients on the ICU require several of those interventions and physicians generally withhold or withdraw therapeutic approaches sequentially in an EOLD [3,4].

Questionnaire-based studies revealed that in palliative care, blood transfusions are the most likely therapy that physicians from different medical backgrounds would like to withdraw first [5,6]. Blood transfusions are a life saving therapy and one of the most common procedures in intensive care medicine [7]. Besides culture, religion, and legislation, a physician's base specialty influences his decision making in end-of-life therapy [8–10]. Surgery often is part of vigorous efforts to reverse acute life-threatening illnesses [9]. Furthermore, patients admitted to the ICU

* Corresponding author. Department of Anesthesiology and Intensive Care Medicine, Charité – Universitätsmedizin Berlin, Campus Charité Mitte and Campus Virchow Klinikum, Charitéplatz 1, 10117 Berlin, Germany. Tel.: +49 (30) 450 531051; fax: +49 (30) 450 531911.
E-mail address: jan.graw@charite.de (J.A. Graw).

http://dx.doi.org/10.1016/j.transci.2016.03.005
1473-0502/

postoperatively receive on average more blood transfusions than those admitted for medical reasons [11].

To our knowledge, no observational data exist about physician preferences to withhold or withdraw blood transfusions on surgical ICU-patients. Therefore, in a retrospective analysis on our surgical ICU, we analyzed the sequence of ICU-therapies that were limited and compared characteristics and the decision making process in surgical ICU-patients who had blood transfusions withheld with surgical ICU-patients who continued to receive blood products after an EOLD.

2. Methods

The study was approved from the Medical Ethics Committee of Charité University Hospital (number of ethical approval EA1/292/10). All patients (n = 4510) admitted between August 2008 and September 2011 to a 22-bed academic ICU with twenty-four/seven coverage by board certified intensive care medicine consultants, were included in the study. Two hundred twenty-six (74.6%) of all deceased patients (n = 303) were surgical ICU patients and 157 (69.5%) of them received a decision to "withhold or withdraw life support" (WH/WDLS) [10].

Decisions to limit life-sustaining ICU-treatment such as "Do-not-resuscitate" (DNR) orders and WH/WDLS orders were taken in EOLD conferences as prescribed previously [3]. Every participant of the EOLD-conference had to give consent to the decision when associated life support was withheld or withdrawn. WH/WDLS orders differentially included withholding or withdrawing endotracheal intubation, mechanical ventilation, renal replacement therapy, catecholamine infusions, surgery, antimicrobial therapy, blood product transfusions, nutrition, and fluid therapy. Non-documented treatment options were considered continued. As the withdrawal of a blood transfusion literally relates to a discontinuation of an ongoing transfusion, we used the term "withholding" for both the "withholding" and "withdrawing" of blood products. Collected data always refer to a patient's first WH/WDLS decision. Time, participants and the results of end-of-life conferences were documented in the daily progress notes in an electronic patient data management system (PDMS; Copra System, Sabachswalden, Germany). Furthermore, all documentation of ward rounds, orders and progress notes, as well as data from vital signs monitors, daily ICU scores like the simplified acute physiology score II (SAPS II) and sequential organ failure assessment (SOFA), and all medical or nursing events to the patient were prospectively recorded in the PDMS.

Results are expressed as arithmetic mean ± standard deviation (SD) or median with interquartile range (IQR) for continuous variables, as appropriate and frequencies (%) for categorical variables. Differences between groups were tested by the non-parametric (exact) Wilcoxon–Mann–Whitney test for independent groups. Frequencies were tested by the (exact) Chi-square-test. A two-tailed p-value <0.05 was considered statistically significant. All tests were conducted in the area of exploratory data analysis. Therefore, no adjustments for multiple testing have been made. All numerical calculations were performed with *IBM SPSS Statistics*, Version 22.

Table 1
Frequency of ICU-therapies withheld or withdrawn after a WH/WDLS decision. Ranking by frequency (ICU = intensive care unit).

ICU life support withheld/withdrawn	All (n = 157)	(%)
Surgery	134	(85.4)
Vasopressor dose limit defined	119	(75.8)
Antibiotics	74	(47.1)
Blood products	70	(44.6)
Vasopressors	68	(43.3)
Dialysis	42	(26.8)
Nutrition	24	(15.3)
Ventilation	23	(14.6)
Intravenous fluids	16	(10.2)
Intubation	12	(7.6)

3. Results

After restriction of further surgery (85.4%), defining a maximum dose of vasopressor hemodynamic support (75.8%), and withholding anti-infective drugs (47.1%), blood transfusions were withheld in 70 (44.6%) deceased surgical ICU-patients (Table 1, relative frequencies for ICU therapies withheld: supplemental Fig. S1). Each patient with a WH/WDLS decision had an average of three different ICU therapies withheld at the same time. Patients who had blood transfusions withheld (n = 70) usually had more ICU therapies withheld or withdrawn than patients who had blood transfusions maintained (n = 87) [number (median ± IQR) of ICU-therapies withheld or withdrawn: 2 ± 1 for transfusions continued vs. 5 ± 3 for transfusions withheld ($p < 0.001$)]. Fig. 1 shows the number of ICU therapies that were withheld or withdrawn together with or without blood transfusions.

There were 31 (35.6%) patients that initially had transfusions continued and received additional WH/WDLS orders during their ICU course. In contrast, only 12 (17.1%) patients had additional WH/WDLS orders when transfusions were withheld with the first WH/WDLS order ($p = 0.012$). In patients who had blood transfusions withheld, time from the WH/WDLS decision to death was shorter

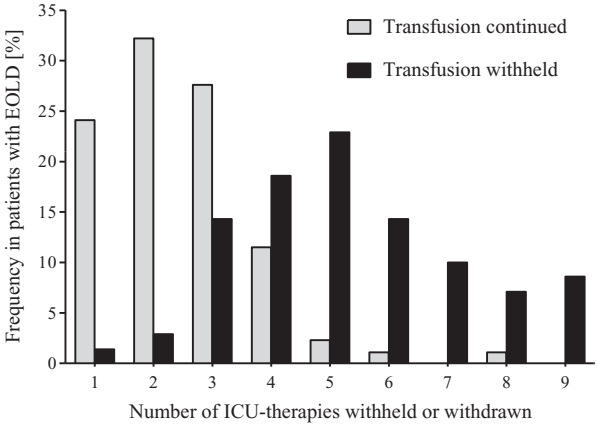

Fig. 1. Percentage of patients who had various numbers of ICU-therapies withheld or withdrawn after a WH/WDLS order (ICU = intensive care unit; WH/WDLS = withhold/withdraw life support).