Program on high value cost-conscious education in Intensive Care: Educational program on prediction of outcome and cost awareness on Intensive Care admission

CURRENT STATUS: UNDER REVIEW

BMC Medical Education BMC Series

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DOI:

10.21203/rs.2.20045/v1

SUBJECT AREAS

Internal Medicine *Educational Philosophy and Theory*

KEYWORDS

High-value cost-conscious care, post-graduate education, curriculum development, evaluation of education

Abstract

Introduction: Intensive Care (ICU) involves extended and long lasting support of vital functions and organs. However, current training programs of ICU residents mainly focus on extended support of vital functions and barely involve training on cost-awareness and outcome. We incorporated an educational program on high-value cost-conscious care for residents and fellows on our ICU and measured the effect of education. **Methods:** A cohort study with factorial survey design, in which residents and fellows ICU were asked to evaluate clinical vignettes, was performed on the mixed surgical-medical ICU of the Amsterdam University Medical Centre. Residents were offered an educational program focusing on outcome and costs of ICU care. Before and after the program they filled out a questionnaire, which consisted of 23 vignettes, in which known predictors of outcome of community acquired pneumonia (CAP), pancreatitis, acute respiratory distress syndrome (ARDS) and cardiac arrest were presented, together with varying patient factors (age, body mass index (BMI), acute kidney failure (AKI) and haemato-oncological malignancy). Participants were asked to either admit the patient or estimate mortality. **Results:** BMI, haemato-oncological malignancy and severity of pancreatitis were discriminative for admission to ICU in clinical vignettes on pancreatitis and CAP. After education, only severity of pancreatitis was judged as discriminative. Before the intervention only location of cardiac arrest (in- vs out of hospital) was distinctive for mortality, afterwards this changed to presence of haemato-oncological malignancy. **Conclusion:** We incorporated an educational program on high-value cost-conscious care in the training of ICU physicians. Based on our vignette study, we conclude that the improvement of knowledge of costs and prognosis after this program was limited.

Full Text

Due to technical limitations, full-text HTML conversion of this manuscript could not be completed.

However, the manuscript can be downloaded and accessed as a PDF.

Tables

Table 1: Variables in the clinical vignettes		
All cases	Presence of haematological malignancy	Yes/no
	Acute kidney failure	Yes/no
	Age	< 60 years/ 60-80 years/ >80 years
	BMI	< 20 / 20-25 / >25
Community acquired pneumonia	Presence of COPD	Absent / mild / severe
	Severity of Pneumonia (measured CURB-65 score)	CURB-65 score 0-1 / 2 / 3-5
Acute Pancreatitis	Presence of chronic liver disease	Absent/ Liver cirrhosis Child Pugh
	Severity of pancreatitis, measured by Ranson score	Ranson Score 3-4/ 5-6/ 7-8
ARDS	Type of ARDS	Primary/ Secondary
	Severity of ARDS	None/ Mild/ Moderate/ Severe
Cardiac arrest	First rhythm	Shockable (VF/ VT)/ Non-shockable (Asystole)
	Location of arrest	Out of hospital cardiac arrest/ In hospital cardiac arrest
	Delay until start CPR	< 3 minutes/ >3 minutes
BMI= body mass index, COPD = chronic obstructive pulmonary disease, CURB-65 score = confusion, urea, respiratory rate, blood pressure- score, ARDS = acute respiratory distress syndrome, VF= ventricular fibrillation, VT= ventricular tachycardia, PEA= pulseless electric activity, CPR= cardiopulmonary resuscitation		

Table 2: Demographics of participants of the online questionnaire			
Background		pre-education n=32 (100%)	post-education n
	Anaesthesiology	18 (56%)	15 (56%)
	Internal Medicine	8 (25%)	7 (26%)
	Emergency Medicine	1 (3%)	1 (4%)
	Cardiology	2 (6%)	2 (7%)
	Neurology	1 (3%)	1 (4%)
	Cardiothoracic surgery	1 (3%)	1 (4%)
	Neurosurgery	1 (3%)	0 (0%)
Year of residency			
	1 st year of residency	0 (0%)	1 (4%)
	2 nd year of residency	10 (31%)	6 (22%)
	3 rd year of residency	14 (44%)	13 (48%)
	Fellowship ICU	8 (25%)	7 (26%)
Experience in ICU care			
	None	4 (13%)	3 (11%)
	0-3 months	6 (19%)	2 (7%)
	3-6 months	8 (25%)	8 (30%)
	6-12 months	5 (16%)	5 (19%)
	More than 1 year	9 (28%)	9 (33%)
ICU= Intensive Care Unit			

Table 3: Odds ratios for the admission of the patient to the ICU.

		Pre-education		Post-education	
Factor		OR (95% CI)	p-value	OR (95% CI)	p-value
Presence of haematological malignancy		2.084 (1.257-3.454)	0.004	1.021 (0.582-1.789)	0.943
Acute kidney failure		0.694 (0.427-1.127)	0.140	0.803(0.465-1.388)	0.433
Age	<60 years	reference		reference	
	60-80 years	0.576 (0.231-1.438)	0.237	0.584 (0.214-1.590)	0.292
	>80 years	0.444 (0.142-1.394)	0.164	0.543 (0.153-1.931)	0.346
BMI > 25		2.931 (1.008-8.526)	0.048	3.228 (0.950-10.969)	0.060
Presence of COPD		0.890 (0.560-1.414)	0.622	0.866 (0.538-1.393)	0.553
Severity of Pancreatitis, measured by Ranson score ¹²					
	3-4	Reference			
	5-6	0.054 (0.019-0.156)	0.000	0.129 (0.050-0.334)	0.000
	7-8	0.664 (0.353-1.247)	0.203	0.626 (0.289-1.354)	0.234
Previous history of liver disease		0.633 (0.782-1.161)	0.633	1.000 (0.503-1.987)	1.000

OR= odds ratio, CI= confidence interval, BMI= body mass index, COPD= chronic obstructive pulmonary disease. The OR the average odd that the patient is likely to be not admitted to the ICU

Table 4: Factors of importance in the estimation of mortality in ARDS and cardiac arrest								
	Pre- education				Post- education			
	Mortality 40-80%		Mortality > 80%		Mortality 40-80%		Mortality > 80%	
Factor	OR (CI)	p	OR (CI)	p	OR (CI)	p	OR (CI)	p
Presence of haematological malignancy	0.188 (0.042-0.847)	0.029	0.161 (0.036-0.720)	0.017	4.320 (2.089-8.933)	0.000	3.124 (1.497-6.519)	0.000
Acute kidney failure	0.056 (0.007-0.426)	0.005	0.023 (0.003-0.169)	0.000	0.79 (0.010-0.604)	0.014	0.024 (0.003-0.177)	0.000
Location of cardiac arrest	6.740 (0.846-53.708)	0.072	9.274 (1.2-71.697)	0.033	NA	NA	0.406 (0.168-0.981)	0.000
Delay until start CPR	0.045 (0.010-0.199)	0.00	0.021 (0.005-0.94)	0.000	0.038 (0.005-0.294)	0.02	0.013 (0.002-0.100)	0.000
First heart rhythm in cardiac arrest	0.610 (0.283-1.314)	0.207	0.631 (0.297-1.343)	0.232	0.541 (0.269-1.555)	0.330	0.541 (0.225-1.297)	0.000
Severity of ARDS	0.065 (0.018-0.236)	0.000	0.012 (0.003-0.055)	0.000	0.056 (0.007-0.443)	0.006	NA	0.000
OR= odds ratio, CI= confidence interval 95%, CPR= cardiopulmonary resuscitation, ARDS= acute respiratory distress syndrome, OHCA = out of hospital cardiac arrest								

Figures

Figure 1

Percentage deviation of true cost of five different ICU products. Dots are pre-education, squares are post-education. Results are shown in means $\pm$ SEM. X-axis at 100% is the true cost of the product. All values close to the X-axis are approximating true product cost.

Abbreviations: ABG= arterial blood gas analysis, CT= computed tomography, Tx= transfusion.

Supplementary Files

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