Supplementary Information:

Methodology

REBOA and RTACC Studies

Table S1: Overview of studies used to calculate REBOA outcomes

Reference	Location	Population size	RBC Units (Mean)	ISS	Mean Age	Mortality (%)	Complication
Low [1]	Unknown	15	N/A	N/A	N/A	13/15 (87)	None
Wolf & Berry[2]	USA	1	12	N/A	43	0/1 (0)	None
Gupta [3]	USA	21	N/A	N/A	25	14/21 (67)	Thrombosis (1 patient)
Matsuoka [4]	Japan	1	N/A	N/A	47	0/1 (0)	None
Martinelli [5]	France	13	19	48	42	7/13 (54)	Thrombosis (2 patients)
Brenner [6]	USA	6	N/A	33.83	39.5	2/6 (33)	None
Ogura [7]	Japan	7	12	50	62	1/7 (14)	None
Irahara [8]	Japan	14	28.8	29.5	46.9	9/14 (64)	Acute kidney injury (1 patient)
Norii [9]	USA/Japan	452	N/A	35.6	51.5	343/452 (76)	Unknown
Saito [10]	Japan	24	15.6	47	59	17/24 (71)	Acute kidney injury (9 patients), Amputation (2 patients)
Moore [11]	USA	24	N/A	N/A	41	15/24 (63)	None
DuBose [12]	USA	46	20.5	31	43.2	33/46 (72)	Pneumonia (2), DVT (2), Sepsis (3), Dialysis (2)

Table S2: Overview of studies used to calculate RTACC outcomes

Reference	Location	Population size	RBC units (Mean)	ISS	Mean age	Mortality (%)	Complications
Branney [13]	USA	124	N/A	N/A	30	115/124 (92)	1 NI
Velmahos [14]	South Africa	118	N/A	N/A	N/A	110/118 (93)	N/A
Durham [15]	USA	124	N/A	N/A	N/A	119/124 (96)	N/A
Ivatory [16]	USA	19	N/A	N/A	N/A	19/19 (100)	N/A
Feliciano [17]	USA	185	N/A	N/A	N/A	180/185 (97)	N/A
Schwab [18]	UK	31	N/A	N/A	N/A	30/31 (97)	N/A
Danne [19]	USA	6	N/A	N/A	35.5	7/8 (88)	1 Empyema
Vij [20]	USA	2	N/A	N/A	n/a	2/2 (100)	N/A
Flynn [21]	USA	6	N/A	N/A	n/a	6/6 (100)	N/A
MacDonald [22]	USA	9	N/A	N/A	n/a	9/9 (100)	N/A
Millikan [23]	USA	39	17	n/a	30.8	12/17 (71)	1 Pneumothorax
Van waes [24]	Netherlands	56	N/A	25	32	20/56 (36)	2 Reop, 1 NI
Lorenz [25]	USA	463	9	34	35	402/463 (87)	5 Reop + 3 NI
Abe [26]	Japan	367	N/A	34	56.7	355/367 (97)	N/A
Seamon et al. (AAST)[27]	global	856	N/A	N/A	N/A	796/856 (93)	8 NI
DuBose [12]	global	68	20	31.5	40.8	55/68 (81)	2 Infection, 1 Haemothorax. 9 NI
Brautigan [28]	Unknown	47	N/A	N/A	N/A	34/47 (72)	5 NI
Seamon [29]	USA	50	28.6	39.4	N/A	42/50 (84)	N/A
Seamon EDT surv. [30]	USA	37	N/A	N/A	N/A	30/37 (81)	N/A
Ledgerwood [31]	USA	40	N/A	N/A	32	34/40 (85)	1 Sepsis

NI - Neurological impairment

Mortality and Quality of Life of complications

As explained in the search strategy in the main body, the RTACC and REBOA papers did not contain sufficient data regarding complications to generate a cost-utility analysis so data regarding mortality, costs and utility for those complications reported in the RTACC/REBOA papers was identified from the following studies.

Table S3: Studies from which relevant mortality and utility values for complications were obtained

Reference	**Location**	**Population**	**Complication studied**	**Mortality**	**Utility (EQ-5D)**
Sprengers [32]	Netherlands	47	Limb ischaemia/Thrombosis	N/A	0.34
Lyaker [33]	USA	N/A	Limb Ischaemia/Thrombosis	4-15%	N/A
Galanaud [34]	Germany	1643	DVT	4.4%	N/A
Tennvall [35]	Sweden	310	Major lower limb amputation	N/A	0.31
Fortington [36]	Unknown	299	Major lower limb amputation	32.5%	N/A
Fagon [37]	France	1978	Pneumonia in ICU	52.4%	N/A
Ringburg [38]	Netherlands	246	Major trauma	N/A	0.73
Campbell [39]	UK	441	Length of stay after major trauma and bleeding	N/A	N/A
Xie [40]	USA	1040	Neurological impairment	N/A	0.69
Korosec [41]	Slovenia	164	Sepsis	N/A	0.717
Granja [42]	Portugal	305	Sepsis	34%	N/A
Griffith [43]	USA	90	Haemothorax	2.2%	N/A
Yoon [44]	Unknown	370	Pneumothorax	3.3%	N/A
Sogaard [45]	Denmark	1,841	Empyema	10%	N/A
Morris [46]	USA	78	Dialysis	57%	N/A
Nisula [47]	Finland/Australia	635	Acute Kidney Injury	35.3%	N/A
NICE [48]	UK	N/A	Cost of Red Blood Cells	N/A	N/A

REBOA Probabilities

Probability at the exit of each chance node adds up to 1. The sources used to calculate probabilities are listed in Table S1.

Chance node A

- Node A1 “Definitive Intervention”: Of the 625 patients in the studies analysed who received REBOA, 558 survived to definitive procedure, either surgery or angioembolization or both. Probability is 558/(625-14+15): 0.936.
- Node A2 “Death”: 67 patients died before receiving any definitive intervention. Probability is thus 1-0.936 = 0.064.

Chance Nodes B

- B1 “Survive”: From the studies analysed, 164 of 558 patients survived the definitive procedure, a probability of 0.29390681.
- B2 “Dead”: Probability of death was obtained by subtracting 1 from the probability of surviving.

Chance Nodes C

After surviving the definitive intervention, patients are admitted to intensive care. It was assumed that everyone received the same level of care and this was derived from Campbell et al.[39] The only complications considered were for those who survived to discharge as it was assumed that patients died prior to having the time to develop them. The studies analysed mentioned a number of complications related to the procedure and the level of care required. Some patients did not have any complications. No patient sustained any neurological impairment as a result of the procedure in the available literature. All studies commented on the presence or absence of all complications reported. Importantly, Norii et al.[9] , by far the largest study analysed, did not report on complications therefore this patient dataset was excluded. Data for complications was available for only 55 patients of the total thereby limiting the quality of the analysis.

- C1 “Pneumonia”: DuBose et al.[12] reported 2 patients with pneumonia
- C2 “Acute Kidney Injury”: Saito et al.[10] and Irihara et al.[8] reported a total of 10 cases of acute kidney injury from which total recovery occurred
- C3 “Leg Amputation”: 3 amputations were reported in Saito et al.[10] resulting from the use of REBOA. Many studies had amputation as one of the consequences of the injuries sustained.
- C4 “Sepsis”: Sepsis was reported in 3 patients by DuBose et al.[12]
- C5 “Thrombosis”: Thrombosis leading to critical leg ischaemia requiring thrombectomy was reported in Martinelli et al.[5] and Gupta et al.[3] in a total of 3 patients.
- C6 “No Complication”: Patients who did not sustain any of the complications mentioned in this node were 30. This was obtained by subtracting those who did from the total patients that survived to discharge for whom data was available.
- C7 “Dialysis”: DuBose et al.[12] reported on 2 patients who developed end-stage renal failure requiring dialysis as an inpatient.
- C8 “Deep Vein Thrombosis”: DuBose et al.[12] reported on 2 patients who developed a DVT.

Chance Nodes D

- D1, D3, D5, D7, D9, D11, D13 “Survival”: Data on the survival following each of the complications was obtained from literature describing these complications in intensive care and major trauma patients, when possible. If there was no data describing mortalities in patients in these conditions then data was used from studies looking at the general population although this represents a limitation of our study.
- D2, D4, D6, D8, D10, D12, D14 “Death”: Mortality was obtained by subtracting the survival rates from 1.

Chance Nodes E

- E1 “Discharged with dialysis”: Morris et al.[46] reported that patients who required dialysis after major trauma required long-term dialysis in 18% of cases. It was assumed that this was haemodialysis.

- E2 “Discharged without dialysis”: This represents the remaining 82% of patients who did not require haemodialysis long-term.

RTACC Probabilities

Sources of all the data are delineated in Table S2.

Chance Node A (intervention, Death)

- The “Definitive Intervention” node values were calculated using the rates of patients undergoing RTACC as an intervention, who had data for mortality before arriving at the operating room (OR). Once the rates were found, these were converted into probabilities. The natural log calculations yielded the same values over the one-year study period.
- “Death” values were found by taking away the probability of getting to the OR from 1.

Chance Node B (Survival, Death)

- The “survival” patients were those who arrived to the OR and survived either a laparotomy or angioembolisation procedure. The data for this was limited, included in only 3 studies.
- Those in the “death” category was the mortality rate of the patients undergoing procedures. This was calculated using the number of patients receiving an intervention divided by the were the number of patients who died in the studies with data available for this node.

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Chance Node C (Complications)

The rates of complications were assessed using only the values available in the studies reporting this variable. Many studies mentioned, but did not state the number of complications and were therefore excluded.

- C1 (No complications). “no complication” data was a composite of the other papers, once the incidence of complications was found, 1 take away the probabilities of other complications. In literature, the complication rates are reported to be 35%[26], our rate of 34% is close to the literature values.
- C2 (Sepsis). “sepsis” was reported in one study of 40 patients.
- C3 (Reoperations). For RTACC, “reoperation” is seen in 7 patients across 2 studies, in a total population of 519.
- C4 (Pneumothorax). “Pneumothorax” was a rare complication, seen in 1 out of 39 patients.
- C5 (Haemothorax). “Haemothorax” was seen in 1 patient out of 68.
- C6 (Empyema). “Empyema” was seen in 1 patient in a study where there were only 6 procedures observed. It is likely that this is overstated due to the small sample patient population.
- C7 (Infection). “Infection” is a more common complication of a thoracotomy due to the invasive and roadside element of this procedure. It was seen in two patients in a study of 68.
- C8 (Neurological Impairment). As the occlusion of the aorta limits blood flow to the brain “neurological impairment” was the most common complication observed and seen in 6 studies and one of the foci of the meta-analysis. In total, 29 patients survived with neurological impairment.

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Chance Node D (survival, death)

- D1, D2, D3, D4, D5, D6, D7, D8, D9, D10, D11, D12. All these values were obtained from literature. The mortality rates were converted into probabilities to find the chance of dying. In order to get the “survival” node, the mortality probability was subtracted from 1. Those undergoing reoperation were assumed to have the same survival probability as those previously undergoing surgery, as is would be for the same procedure.

Sensitivity Analysis

The purpose of a sensitivity analysis is to assess the level of uncertainty in the model we created and whether changes in the data used impacted the overall probabilities, costs or utilities of each intervention as well as the overall ICER. The node column indicates which branch of the decision tree the calculation impacts, the categories where split for simplification of display. The variable column indicates the original value at the node identified from the first column and the alternative value given from literature. Once the alternative values had been inputted, we monitored the impact of this on the overall cost and utility of the REBOA or RTACC branch. Finally, these values were put into the ICER formula to demonstrate changes from the initial values. If the alternative value gave an overall ICER of less than £30,000 (the NHS' willingness-to-pay), then the alternative value was deemed to be cost-effective.

Table S4: Sensitivity analysis to determine impact of probability, cost and utility on ICER

Node	Category	Descriptor	Variable		Δ Costs (£)		Δ Utility (QALY)		ICER (£/QALY)			Cost effective?
			Original	Alternative	Original	Alternative	Original	Alternative	Original	Alternative	% Change	
		Survival at RTACC/REBOA										
RE(A1)	Probability	Survival REBOA (min)	0.936	0.457	4575.45	1896.04	0.1025	0.0168	44617.4446	112800.02	152.82%	no
	Probability	Survival REBOA (max)	0.936	1.000	4575.45	4931.56	0.1025	0.1139	44617.4446	43280.63	-3.00%	no
RT(A1)	Probability	Survival RTACC (min)	0.522	0.000	4575.45	7577.46	0.1025	0.1673	44617.4446	45283.74	1.49%	no
	Probability	Survival RTACC (max)	0.522	1.000	4575.45	1824.23	0.1025	0.0432	44617.4446	42250.89	-5.30%	no
		Survival at Definitive Intervention										
RE(B1)	Probability	Survival REBOA (min)	0.294	0.162	4575.45	4238.76	0.1025	0.0291	44617.4446	145803.47	226.79%	no
	Probability	Survival REBOA (max)	0.294	1.000	4575.45	6377.73	0.1025	0.4959	44617.4446	12861.79	-71.17%	yes
RT(B1)	Probability	Survival RTACC (min)	0.173	0.095	4575.45	4611.46	0.1025	0.1308	44617.4446	35262.26	-20.97%	no
	Probability	Survival RTACC (max)	0.173	0.344	4575.45	4496.37	0.1025	0.0406	44617.4446	110808.90	148.35%	no
		Complications										
RE(C6)	Probability	No complications REBOA (min)	0.545	0.000	4575.45	5475.67	0.1025	0.0632	44617.4446	86643.39	94.19%	no
	Probability	No complications REBOA (max)	0.545	1.000	4575.45	3825.25	0.1025	0.1353	44617.4446	28263.94	-36.65%	yes
RT(C1)	Probability	No complications RTACC (min)	0.780	0.000	4575.45	4295.12	0.1025	0.1085	44617.4446	39590.62	-11.27%	no
	Probability	No complications RTACC (max)	0.780	1.000	4575.45	4655.54	0.1025	0.1009	44617.4446	46162.44	3.46%	no
		ISS										
RE(A1,A2) &	Cost	REBOA/RTACC (min)	9487.00	7272.00	4575.45	4579.07	0.1025	0.1025	44617.4446	44652.76	0.08%	no
RT(A1,A2)	Cost	REBOA/RTACC (max)	9487.00	14280.00	4575.45	4567.61	0.1025	0.1025	44617.4446	44541.03	-0.17%	no
		Blood Products										
RE(A1,A2)	Cost	REBOA (min)	18.60	12.00	4575.45	3493.81	0.1025	0.1025	44617.4446	34069.84	-23.64%	no
	Cost	REBOA (max)	18.60	28.80	4575.45	6247.07	0.1025	0.1025	44617.4446	60918.28	36.53%	no
RT(A1,A2)	Cost	RTACC (min)	11.30	9.00	4575.45	4953.34	0.1025	0.1025	44617.4446	48302.44	8.26%	no
	Cost	RTACC (max)	11.30	28.60	4575.45	1733.06	0.1025	0.1025	44617.4446	16899.88	-62.12%	yes
		Proportion Angio:Lap										
RE(A1)	Cost	REBOA (min)	0.474 Angio	0 Angio	4575.45	5817.63	0.1025	0.1025	44617.4446	56730.58	27.15%	no
	Cost	REBOA (max)	0.474 Angio	1 Angio	4575.45	3196.99	0.1025	0.1025	44617.4446	31175.44	-30.13%	no
RT(A1)	Cost	RTACC (min)	0.167 Angio	0 Angio	4575.45	4331.10	0.1025	0.1025	44617.4446	42234.76	-5.34%	no
	Cost	RTACC (max)	0.167 Angio	0.273 Angio	4575.45	4730.54	0.1025	0.1025	44617.4446	46129.81	3.39%	no
		Survey QoL Values										
RE(A1) &	Utility	ITU - REBOA/RTACC (min)	0.286	0.169	4575.45	4575.45	0.1025	0.1019	44617.4446	44904.24	0.64%	no
RT(A1)	Utility	ITU - REBOA/RTACC (max)	0.286	0.335	4575.45	4575.45	0.1025	0.1028	44617.4446	44498.42	-0.27%	no
RT(C4)	Utility	Pneumothorax (min)	0.237	-0.126	4575.45	4575.45	0.1025	0.1026	44617.4446	44616.31	0.00%	no
	Utility	Pneumothorax (max)	0.237	0.592	4575.45	4575.45	0.1025	0.1025	44617.4446	44618.55	0.00%	no
RT(C6)	Utility	Empyema (min)	0.233	-0.199	4575.45	4575.45	0.1025	0.1026	44617.4446	44613.17	-0.01%	no
	Utility	Empyema (max)	0.233	0.531	4575.45	4575.45	0.1025	0.1025	44617.4446	44620.40	0.01%	no
RT(C5)	Utility	Haemothorax (min)	0.237	-0.126	4575.45	4575.45	0.1025	0.1026	44617.4446	44616.35	0.00%	no
	Utility	Haemothorax (max)	0.237	0.592	4575.45	4575.45	0.1025	0.1025	44617.4446	44618.52	0.00%	no

Note: Values in the table are rounded for display purposes. Therefore, they may not add up.

Discussion

Table S5 - List of assumptions used in study

Assumption	Rationale for assumption	Source (if applicable)
Length of ventilation/ICU/hospital stay	No sufficient data from studies on the overall length of stay, length of stay in ICU and duration and rate of use of invasive ventilation. Therefore, this analysis relied on data from this large UK study	Campbell [39]
TISS-28 Score	This score was calculated for a typical patient estimated by our group to reach the tariff for major trauma	Lefering [49]
Conscious level	Due to incomplete reporting of this measure all patients were assumed to be unconscious and intubated and ventilated by the time or during their A&E management.	N/A
Dialysis post-discharge	Most dialysis regimens in the UK involve 3 sessions per week. It was assumed this was the case for our patients	Fluck [50]
In-Hospital Dialysis	It was assumed that dialysis was required only during intensive care stay, when a patient is sickest and where the facilities for dialysis are available, and at the same rate as outpatient dialysis	N/A
Procedure location	It was assumed every REBOA/RTACC was performed in a major trauma centre	N/A
Pre-hospital costs	Pre-hospital costs were excluded because they are identical to both patient sets. It can be assumed that some patients were transported using air ambulances whilst others would be transported using conventional road ambulances. The different probabilities of both patient sets using either of these methods of transport could have impacted on the results but there was insufficient data for this.	N/A
ICU care	The tariff for ICU stay is agreed locally and is conditional on the number of organs supported. It was unknown how many organs were supported in each patient therefore this was eliminated from the costing altogether.	N/A

Pneumothorax, Haemothorax, Empyema	It was assumed all these complications occurred after ICU stay and took 5 days to resolve, except for empyema which took the full duration of general medical ward stay.	
Utilities derived from questionnaire	A questionnaire was undertaken with experienced medical professionals to reach to the utility of being in ICU, empyema, pneumothorax and haemothorax. No data was available on the utilities for these health states in the literature.	
Time of death	Patients who died are assumed to have survived to the end of the standardised admission as there was extremely sparse data on length of stay.	
Utility Ventilation	Assumed to be 0. Patients are unconscious and the health state is equivalent to being dead.	
Utility Neurological Impairment	There was no uniform definition in the literature on what the neurological outcomes were of those who suffered impairment. Therefore, it was assumed that the utility was the same as that of patient suffering from an ischaemic stroke.	Xie [40]
Utility Sepsis	Data using EQ-5D on the utility after severe sepsis in critical illness, our subset of patients, was derived from a study looking at this utility at 2 years. No available study was found using EQ-5D at 1 year or earlier that gave a concrete number. It was assumed that this utility would be the same from discharge, similar to what Brown (2007) assumed in their paper.	Korosec [41]
Mortality Thrombosis Lower limb amputation DVT	Mortality for these three complications were not obtained for patients specific to major trauma. Evidence for patients in general was used. This is likely to understate the mortality as trauma patients are likely to be more unwell.	Fortington [36]; Lyaker [33]; Galanaud [34]
Mortality AKI	It was assumed nobody died within a year after admission with acute kidney injury. This was because the severity of the injury was low and no patient suffered any adverse outcome as a result. Patients with severe renal failure, requiring haemodialysis, were modelled separately	

Mortality localised infection	Two instances of localized infection at the site of thoracotomy were reported. None developed into sepsis. This was managed through a minor procedure. Therefore, it was assumed that this carries a mortality of 0.	DuBose [12]
Utility of reoperation	As this is due to a re-bleed from the initial intervention and likely to occur within hours of being operated on initially, the utility is that of being ventilated, as this is the health state at the time. It was costed as a further major surgery.	
Blood products	It was assumed that only red blood cells were used. Only a very small amount of studies reported on the use of blood products other than red blood cells, therefore it was only quantified and costed for this use.	

References

1. Low RB, Longmore W, Rubinstein R, et al. Preliminary report on the use of the percluder® occluding aortic balloon in human beings. *Annals of Emergency Medicine* 1986: 15 (12); 1466–1469.
2. Wolf RK, and Berry RE. Transaxillary intra-aortic balloon tamponade in trauma. *Journal of Vascular Surgery* 1986: 4 (1); 95–97.
3. Gupta BK, Khaneja SC, Flores L, et al. The role of intra-aortic balloon occlusion in penetrating abdominal trauma. *Journal of Trauma and Acute Care Surgery* 1989: 29 (6); 861–865.
4. Matsuoka S, Uchiyama K, Shima H, et al. Temporary percutaneous aortic balloon occlusion to enhance fluid resuscitation prior to definitive embolization of post-traumatic liver hemorrhage. *Cardiovascular and interventional radiology* 2001: 24 (4); 274–276.
5. Martinelli T, Thony F, Decléty P, et al. Intra-aortic balloon occlusion to salvage patients with life-threatening hemorrhagic shocks from pelvic fractures. *Journal of Trauma and Acute Care Surgery* 2010: 68 (4); 942–948.
6. Brenner ML, Moore LJ, DuBose JJ, et al. A clinical series of resuscitative endovascular balloon occlusion of the aorta for hemorrhage control and resuscitation. *Journal of Trauma and Acute Care Surgery* 2013: 75 (3); 506–511.
7. Ogura T, Lefor AT, Nakano M, et al. Nonoperative management of hemodynamically unstable abdominal trauma patients with angioembolization and resuscitative endovascular balloon occlusion of the aorta. *Journal of Trauma and Acute Care Surgery* 2015: 78 (1); 132–135.
8. Irahara T, Sato N, Moroe Y, et al. Retrospective study of the effectiveness of Intra-Aortic Balloon Occlusion (IABO) for traumatic haemorrhagic shock. *World Journal of Emergency Surgery* 2015: 10 (1); 1.
9. Norii T, Crandall C. and Terasaka Y. Survival of severe blunt trauma patients treated with resuscitative endovascular balloon occlusion of the aorta compared with propensity score-adjusted untreated patients. *Journal of Trauma and Acute Care Surgery* 2015: 78 (4); 721–728.
10. Saito N, Matsumoto H, Yagi T, et al. Evaluation of the safety and feasibility of resuscitative endovascular balloon occlusion of the aorta. *Journal of Trauma and Acute Care Surgery* 2015: 78 (5); 897–904.
11. Moore LJ, Brenner M, Kozar RA, et al. Implementation of resuscitative endovascular balloon occlusion of the aorta as an alternative to resuscitative thoracotomy for noncompressible truncal hemorrhage. *Journal of Trauma and Acute Care Surgery* 2015: 79 (4); 523–532.
12. DuBose JJ, Scalea TM, et al. The AAST Prospective Aortic Occlusion for Resuscitation in Trauma and Acute Care Surgery (AORTA) Registry: data on contemporary utilization and outcomes of aortic occlusion and resuscitative balloon occlusion of the aorta (REBOA). *Journal of Trauma and Acute Care Surgery* 2016: 81 (3); 409–419.
13. Branney S, Moore E, Feldhaus K, et al. Critical analysis of two decades of experience with postinjury emergency department thoracotomy in a regional trauma center. *Journal of Trauma and Acute Care Surgery* 1998: 45 (1); 87–94.
14. Velmahos G, Degiannis E, Souter I, et al. Outcome of a strict policy on emergency department thoracotomies. *Archives of Surgery Journal Impact & Description* 1995: 30 (7); 774–777.
15. Durham L, Richardson R, Wall MJ, et al. Emergency center thoracotomy: impact of prehospital resuscitation. *Journal of Trauma and Acute Care Surgery* 1992: 32775–779.
16. Ivatory R, Kazigo J, Rohman M, et al. 'Directed' Emergency Room Thoracotomy: A Prognostic Prerequisite for Survival. *Journal of Trauma-Injury Infection & Critical Care* 1991: 31 (8); 1076–1082.
17. Feliciano DV, Bitondo CG, Cruse PA, et al. Liberal use of emergency center thoracotomy. *The American Journal of Surgery* 1986: 152 (6); 654–659.
18. Schwab C, Adcock O, and Max M. Emergency department thoracotomy (EDT). A 26-month experience using an 'agonal' protocol. *The American Journal of Surgery* 1986: 52 (1); 20–29.
19. Danne P, Finelli F and Champion H. Emergency bay thoracotomy. *Journal of Trauma and Acute Care Surgery* 1984: 24 (9); 796–802.
20. Vij D, Simoni E, Smith R, et al. Resuscitative thoracotomy for patients with traumatic injury. *Surgery* 1983: 94 (4); 554–561.
21. Flynn T, Ward R, and Miller P. Emergency room thoracotomy. *Annals of Emergency Medicine* 1982: 11413–416.
22. MacDonald JR and McDowell RM. Emergency department thoracotomies in a community hospital. *Journal of the American College of Emergency Physicians* 1978: 7 (12); 423–428.
23. Millikan JS, and Moore EE. Outcome of resuscitative thoracotomy and descending aortic occlusion performed in the operating room. *Journal of Trauma and Acute Care Surgery* 1984: 24 (5); 387–392.
24. Van Waes OJF, Van Riet PA, Van Lieshout, EMM, et al. Immediate thoracotomy for penetrating injuries: ten years' experience at a Dutch level I trauma center. *European Journal of Trauma and Emergency Surgery* 2012: 38 (5); 543–551.
25. Lorenz HP, Steinmetz B, Lieberman J, et al. Emergency thoracotomy: survival correlates with physiologic status. *Journal of Trauma and Acute Care Surgery* 1992: 32 (6); 780–788.
26. Abe T, Uchida M, Nagata I, et al. Resuscitative endovascular balloon occlusion of the aorta versus aortic cross clamping among patients with critical trauma: a nationwide cohort study in Japan. *Critical Care* 2016: 20; 400.
27. Seamon MJ, Haut, ER, Van Arendonk K, et al. An evidence-based approach to patient selection for emergency department thoracotomy: a practice management guideline from the Eastern Association for the Surgery of Trauma. *Journal of Trauma and Acute Care Surgery* 2015: 79 (1); 159–173.
28. Brautigan, MW. and Tietz, G. Emergency thoracotomy in an urban community hospital: Initial cardiac rhythm as a new predictor of survival. *The American journal of emergency medicine* 1985; 3 (4): 311–315.
29. Seamon MJ, Pathak AS, Bradley KM, et al. Emergency department thoracotomy: still useful after abdominal exsanguination? *Journal of Trauma and Acute Care Surgery* 2008: 64 (1); 1–8.
30. Seamon MJ, Fisher CA, Gaughan JP, Kulp H, et al. Emergency department thoracotomy: survival of the least expected. *World Journal of Surgery* 2008: 32 (4); 604-612.
31. Ledgerwood AM, Kazmers M, and Lucas CE. The role of thoracic aortic occlusion for massive hemoperitoneum. *Journal of Trauma and Acute Care Surgery* 1976: 16 (8); 610–615.
32. Sprengers RW, Teraa M, Moll FL, et al. Quality of life in patients with no-option critical limb ischemia underlines the need for new effective treatment. *Journal of Vascular Surgery* 2010: 52 (4); 843–849.
33. Lyaker MR, Tulman DB, Dimitrova GT et al. Arterial embolism. *International Journal of Critical Illness and Injury Science* 2013: 3 (1); 77–87.
34. Galanaud JP, Sevestre-Pietri MA, Bosson JL et al. Comparative study on risk factors and early outcome of symptomatic distal versus proximal deep vein thrombosis: results from the OPTIMEV study. *Thrombosis and haemostasis* 2009: 102493–500.
35. Tennvall GR and Apelqvist J. Health-related quality of life in patients with diabetes mellitus and foot ulcers. *Journal of Diabetes and its Complications* 2000: 14 (5); 235–241.
36. Fortington LV, Geertzen JHB, van Netten JJ, et al. Short and long term mortality rates after a lower limb amputation. *European Journal of Vascular and Endovascular Surgery* 2913: 46 (1); 124–131.

37. Fagon JY, Chastre J, Vuagnat A, et al. Nosocomial pneumonia and mortality among patients in intensive care units. *Jama*. 1996: 275 (11); 866–869.
38. Ringburg AN, Polinder S, van Ierland MCP, et al. Prevalence and prognostic factors of disability after major trauma. *Journal of Trauma and Acute Care Surgery* 2011: 70 (4); 916–922.
39. Campbell HE, Stokes EA, Bargo DN, et al. Quantifying the healthcare costs of treating severely bleeding major trauma patients: a national study for England. *Critical Care* 2015: 19 (1); 276.
40. Xie,J, Wu EQ, Zheng ZJ, et al. (2006) Impact of stroke on health-related quality of life in the noninstitutionalized population in the United States. *Stroke* 2006: 37 (10); 2567–2572.
41. Korošec H, Jagodič K, and Podbregar M. Long-term outcome and quality of life of patients treated in surgical intensive care: a comparison between sepsis and trauma. *Critical Care* 2006: 10 (5); 134.
42. Granja C, Dias C, Costa-Pereira A. and Sarmento, A. Quality of life of survivors from severe sepsis and septic shock may be similar to that of others who survive critical illness. *Critical Care*. 2004: 8 (2); 91.
43. Griffith GL, Todd EP, McMillin, RD, et al. Acute traumatic hemothorax. *The Annals of Thoracic Surgery* 1978: 26 (3); 204–207.
44. Yoon JS, Choi SY, Suh JH, et al. (2013) Tension pneumothorax, is it a really life-threatening condition? *Journal of Cardiothoracic Surgery* 2013: 8 (1); 197.
45. Søgaard M, Nielsen R B, Nørgaard M, et al. Incidence, length of stay, and prognosis of hospitalized patients with pleural empyema: a 15-year Danish nationwide cohort study. *Chest* 2014: 145 (1); 189-92.
46. Morris JA, Mucha P, Ross, SE, et al. Acute posttraumatic renal failure: a multicenter perspective. *Journal of Trauma and Acute Care Surgery* 1991: 31 (12); 1584–1590.
47. Nisula, S., Vaara ST, Kaukonen KM, et al. Six-month survival and quality of life of intensive care patients with acute kidney injury. *Critical Care*. 2013; 17 (5); 250.
48. NICE. Costing statement: Blood transfusion Implementing the NICE guideline on blood transfusion (NG24). https://www.nice.org.uk/guidance/ng24/resources/costing-statement-2177158141. (2015, accessed 1 March 2017).
49. Lefering R, Zart M, and Neugebauer EAM. Retrospective evaluation of the simplified Therapeutic Intervention Scoring System (TISS-28) in a surgical intensive care unit. *Intensive Care Medicine* 2000: 26 (12); 1794-1802.
50. Fluck RJ, Fouque D, and Lockridge RS. Nephrologists' perspectives on dialysis treatment: results of an international survey. *BMC Nephrology* 2014: 15 (1); 16.