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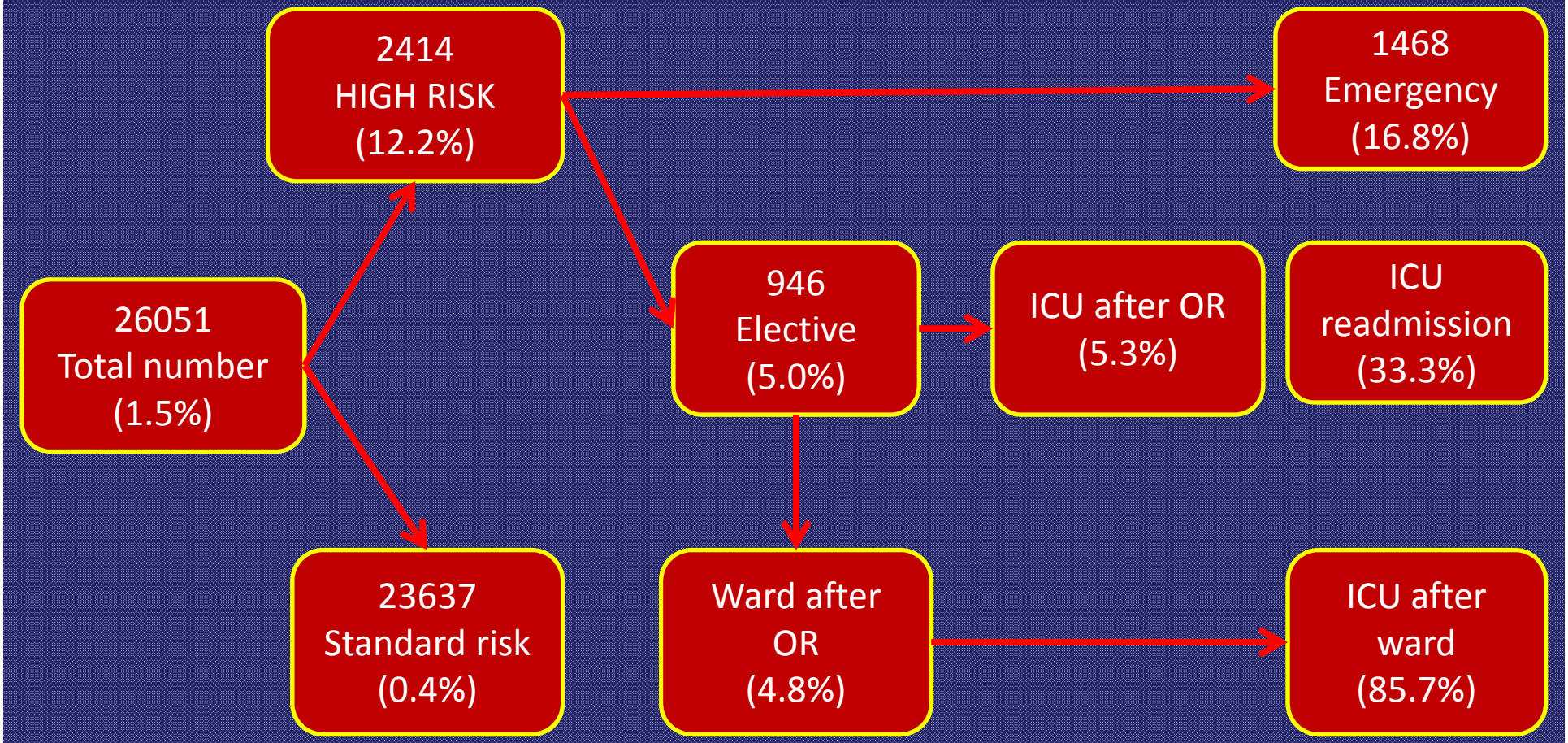
RICOVERO APPROPRIATO IN TERAPIA INTENSIVA: IL SISTEMA ASPRA

26° Congresso Nazionale della Società Italiana di Terapia Intensiva
Firenze, 14-16 Novembre 2013

Mortality of high-risk surgical patients



Jhanji et al. Anaesthesia 2008

Outcome of high-risk surgical patients

	Standard	"HIGH-RISK"
n° of pts.	3.603.803	513.924
Age	54 (38-69)	75 (62-83)
H-LOS	3 (1-6)	16 (9-29)
Mortality	15.038 (**0.42%**)	63.340 (**12.3%**)

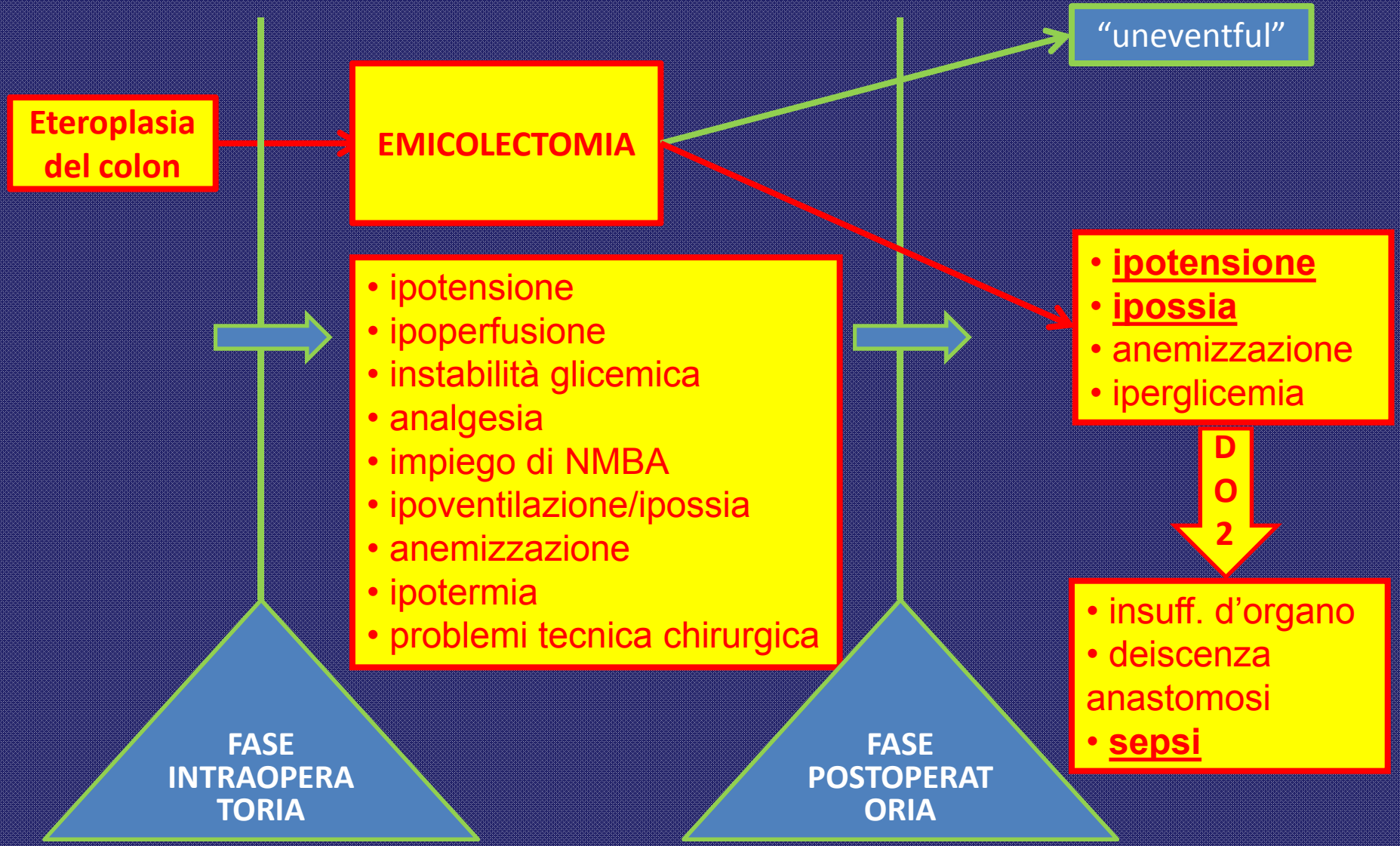
"HIGH RISK" surgical patient:

- elderly
- comorbidities
- major surgery

- **Only 15% electively admitted to ICU**

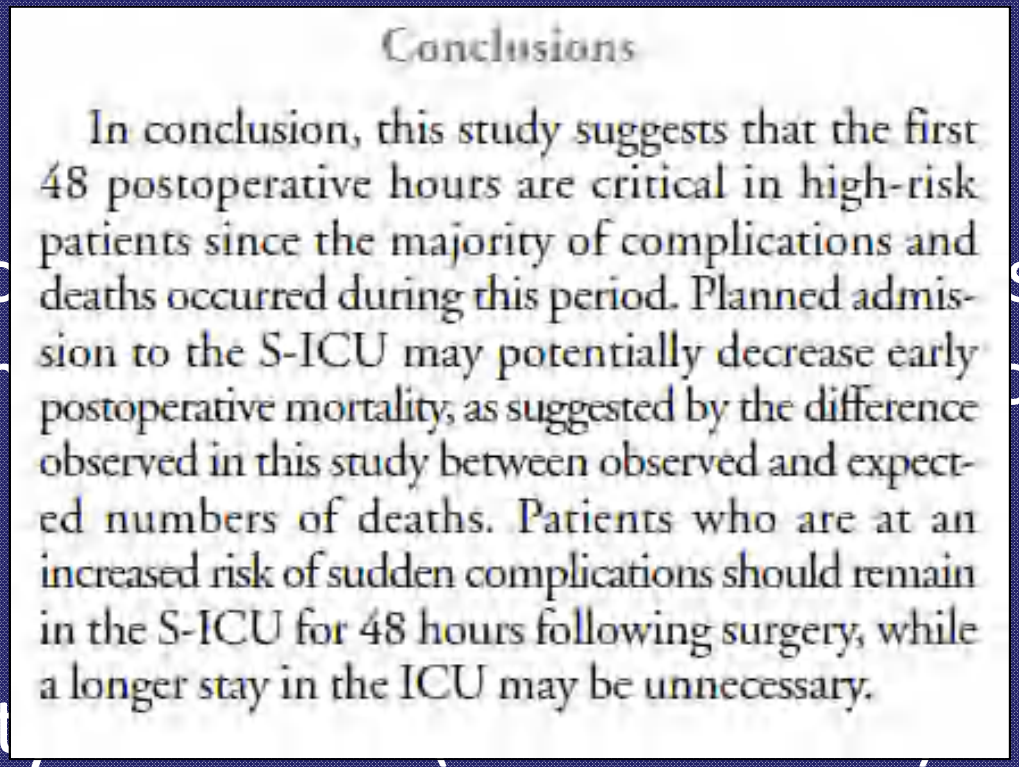
Pearse et al. Crit Care. 2006

“road map” della complicanza postoperatoria



Outcome of high-risk surgical patients

- Prospective survey: 1045 pts. admitted to SICU
- Complic s.); early: hypoter ce and sepsis
- Mortalit



Conclusions

In conclusion, this study suggests that the first 48 postoperative hours are critical in high-risk patients since the majority of complications and deaths occurred during this period. Planned admission to the S-ICU may potentially decrease early postoperative mortality, as suggested by the difference observed in this study between observed and expected numbers of deaths. Patients who are at an increased risk of sudden complications should remain in the S-ICU for 48 hours following surgery, while a longer stay in the ICU may be unnecessary.

Cavaliere et al. Minerva Anestesiol 2008

Postoperative ICU admission

"PROS"

- Early and aggressive treatment of complications
- Lower mortality

"CONS"

- Costs
- Lenght-of-stay
- Exposure to MDR germs
- …bed shortage

Postoperative care after pulmonary resection: postanesthesia care unit versus intensive care unit

Table 4 Characteristics of postanesthesia care unit, step down unit and ICU

	PACU [15]	SDU [16]	ICU
Goal	Short-term critical care for postoperative patients	Care for low-acuity critically ill patients who do not need active ICU treatment	Prolonged care for sicker patients or need of specialized organ support
Location	Close to the OR	As part of ICU or as an independent area	Independent area
Equipment	Ventilators, CPAP, continuous monitoring	Continuous monitoring, invasive and noninvasive ventilation	Ventilators, CPAP, continuous monitoring, specialized organ support
Patients	Postoperative surgical patients	Critically ill who do not need full ICU resources	Critically ill medical–surgical patients
Staff	Critical care-trained nurses specialized in postoperative care, anesthesiologist, primary surgical team (still responsible for patient care)	Specialized nurses, radiology, respiratory therapist, physiotherapy, pharmacy, nutrition, social workers	Critical care nurses, intensivist, radiology, physiotherapy, pharmacy, nutrition, social workers
Nurses/patient ratio	1 : 2	1 : 2 to 1 : 4	1 : 1
LOS	<24 h (if longer/complex care needed, ICU admission is required)	>24 h	>24 h
Cost	Moderate	Moderate (38% of the daily ICU cost)	Expensive ($13 566 on day 1 if mechanical ventilation needed against $6536 if not) [6]
Limitations	Unavailable to provide: 1 specialized organ support (hemodialysis, hemofiltration); 2 physical therapy and aggressive mobilization	According to what set-up is in place, costs can still be high with no changes in LOS (independent facility)	High costs

ICU admission criteria

CLINICAL DATA

- Age, BMI, …
- Cardiovascular status
- Respiratory reserve
- ….

CLINICAL SCORES

- ASA-ps
- POSSUM
- APACHE II
- Linee guida
- ….

ASA-physical status, 1941

ASA Physical Status (PS) Classification System*:

ASA PS Category	Preoperative Health Status	Comments, Examples
ASA PS 1	Normal healthy patient	No organic, physiologic, or psychiatric disturbance; excludes the very young and very old; healthy with good exercise tolerance
ASA PS 2	Patients with mild systemic disease	No functional limitations; has a well-controlled disease of one body system; controlled hypertension or diabetes without systemic effects, cigarette smoking without chronic obstructive pulmonary disease (COPD); mild obesity, pregnancy
ASA PS 3	Patients with severe systemic disease	Some functional limitation; has a controlled disease of more than one body system or one major system; no immediate danger of death; controlled congestive heart failure (CHF), stable angina, old heart attack, poorly controlled hypertension, morbid obesity, chronic renal failure; bronchospastic disease with intermittent symptoms
ASA PS 4	Patients with severe systemic disease that is a constant threat to life	Has at least one severe disease that is poorly controlled or at end stage; possible risk of death; unstable angina, symptomatic COPD, symptomatic CHF, hepatorenal failure
ASA PS 5	Moribund patients who are not expected to survive without the operation	Not expected to survive > 24 hours without surgery; imminent risk of death; multiorgan failure, sepsis syndrome with hemodynamic instability, hypothermia, poorly controlled coagulopathy
ASA PS 6	A declared brain-dead patient who organs are being removed for donor purposes	

*ASA PS classifications from the American Society of Anesthesiologists

American Society of Anesthesiologists

Cleveland Clinic

ASA-physical status, 1941

PROS:

- easy to use
- wi
- ec
- co

"ge
of t

CONS:

- subjective

gical

	Total	ASA 1	ASA 2	ASA 3	ASA 4
Morbidity rate	376/1020 (36%)	40/108 (36.4%)	124/364 (34%)	173/466 (36.3%)	39/82 (**41.5%**)
Mortality rate	25/1020 (2.5%)	2/108 (1.9%)	1/364 (0.3%)	10/466 (2.14%)	12/82 (**14.6%**)
		Paziente sano	Iperteso Fuma	CHF, asintomatico COPD, asintomatico	CHF con sintomi COPD con sintomi

Cavaliere et al. Minerva Anestesiol 2008

Physiologic and Operative Severity Score for the enumeration of Mortality and Morbidity

Physiology "set":

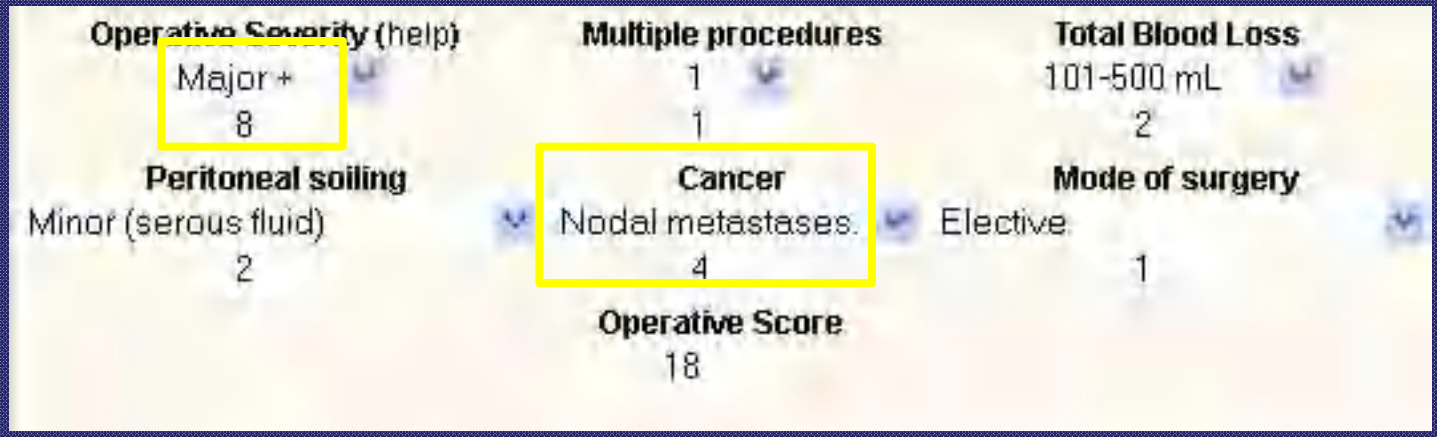
- Age
- GCS
- Respiratory function
- Cardiac failure
- Serum urea
- Pulse rate
- Hb (g/l)
- Total leukocyte cou
- ECG
- Potassium (mEql/l)
- Sodium (mEql/l)
- Systolic blood pres

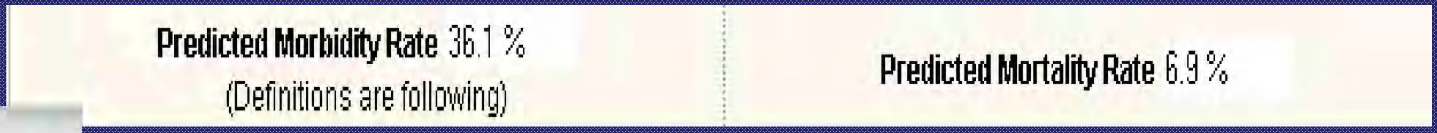
Operative "set":

- Multiple procedures
- Total loss of blood
- Neoplastic process
- Type of surgery

- **Wound dehiscence/hematoma/infection**
- **Anastomotic leakage/sepsis**
- **DVT/PE**
- **Cardiovascular failure**
- **Respiratory failure**
- **AKI**
- **Death**

Fumatore, etp gastrico (ASA 2)





SFAR
Société Française d'Anesthésie et de Réanimation

Physiologic and Operative Severity Score for the enumeration of Mortality and Morbidity

Mortality group (%)	N° of pts.	Predicted deaths	Observed deaths	O/P ratio
0-100 (total)	1020	65 (6.3%)	25 (2.5%)	38%
10-100	440	44 (10%)	20 (4.5%)	45%
30-100	76	23 (30%)	7 (9%)	30%
60-100	20	12 (60%)	2 (10%)	16%
70-100	4	3	0	-

Cavaliere et al. Minerva Anestesiol 2008

POSSUM…what's next?

Modified POSSUM scores:

- Porthsmouth-POSSUM
- Colorectal-POSSUM
- Oesophageal-POSSUM
- Vascular-POSSUM

Specific scores:

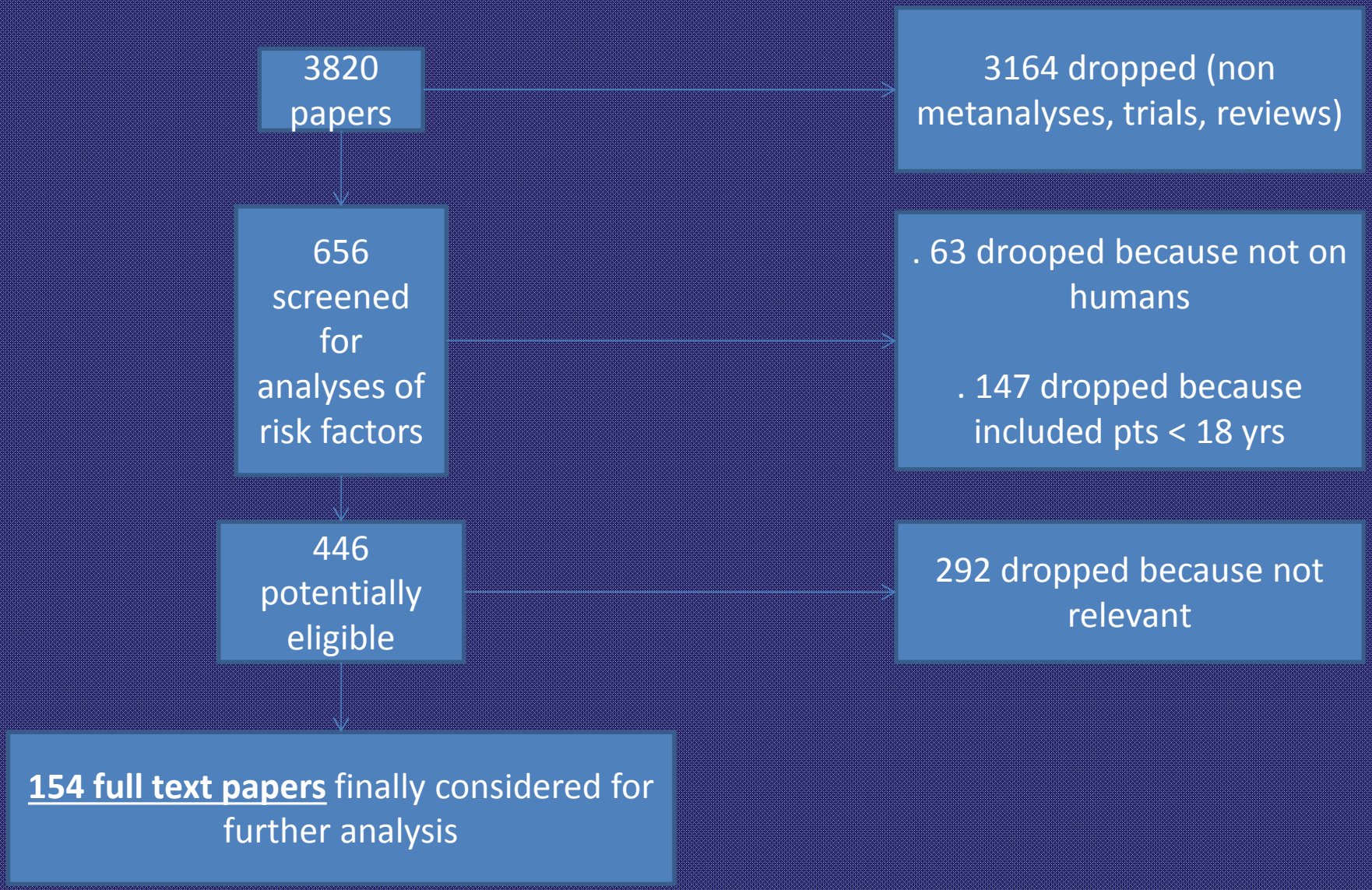
- Thorascore
- Euroscore
- Mortality Probability Model for cancer patient

Anesthesiological and Surgical Perioperative Risk Assessment (ASPRA) score

Implementation of ASPRA score: a quest for postoperative risk factors

- Extended search of PubMed database on “postoperative complications” and “risk factors” (MeshTerms included)
- All meta-analyses, review articles and trials (English, 1/1/2000-31/12/2010)
- Scores of 3, 2, 1 based on strenght of association between found risk factors and postoperative complications

Selecting relevant literature



Surgical-related risk factors

Low risk (1)
- Breast surgery
- Dental surgery
- Endocrine surgery (no pheochromocytoma)
- Eye surgery
- Gynecologic surgery
- Reconstructive surgery
- Minor orthopedic surgery (knee surgery)
- Urological-minor surgery

Intermediate risk (2)
- Abdominal surgery
- Carotid surgery
- Head and Neck Surgery
- Neurological/orthopedic surgery (hip and column)
- Lung/kidney/liver Transplant
- Laparoscopic surgery
- Urological-major surgery
- Endocrine surgery (phaeochromocytoma)
- Peripheral Vascular Surgery
- Any surgery > 180 min.

High risk (3)
- Aortic and major vascular surgery
- Pancreas/liver surgery
- Emergency Abdominal Surgery

Patient-related risk factors

Minor (1)

- Abnormal ECG (left bundle branch block, left ventricular hypertrophy, repolarization abnormalities, non-sinus rhythm)
- Untreated hypertension or hypertension not controlled with medical therapy
- Previous thrombo-embolism

Major (3)

- Unstable coronary syndromes: acute myocardial infarction (<30 days) with clinical or instrumental evidence of residual ischaemia, unstable or disabling angina
- Decompensated heart failure
- Symptomatic valvular disease
- Severe arrhythmias: AV block of advanced degree (second degree block, Mobitz 2> 2:1; block grade III), symptomatic ventricular arrhythmias, supraventricular arrhythmias with uncontrolled ventricular response

Intermediate (2)

- Stable or controlled angina
- Previous myocardial infarction
- Compensated heart failure or previous heart failure
- Diabetes mellitus
- Neoplastic disease
- Transfusion in preoperatory period (>4 units)
- Previous TIA / stroke
- **Alcoholism/binge drinking**
- **Albumin < 3,5 g/dl**
- Creatinine > 1,5 mg/dl
- **Steroid use**
- Surgery>180 min
- History of COPD/Dyspnea

The Clavien system

Grade 0	No deviation from normal postop course
Grade 1	Any complication requiring apeirents, diuretics, antifebriles or phyisiotherapy
Grade 2	Any complication requiring medical therapy other than grade 1, including transfusions or parenteral nutrition
Grade 3	Any complication requiring surgery, endoscopy or interventional radiology
Grade 4	“Life-threatening complications”, with associtaed organ failure and need for UTI admittance
Grade 5	Postoperative death

Derivation set

- Retrospective analysis of clinical charts
- All pts. undergoing general surgery (1/1-31/12/2011)
- ASPRA score assigned
- Postoperative complications/death recorded

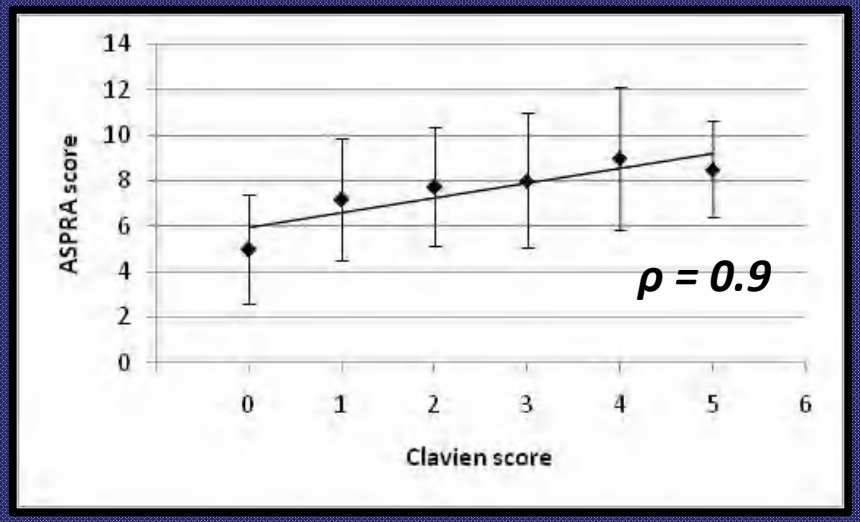
- ROC curve to evaluate the ability of ASPRA to discriminate between complicated and uncomplicated pts.

Derivation set: results

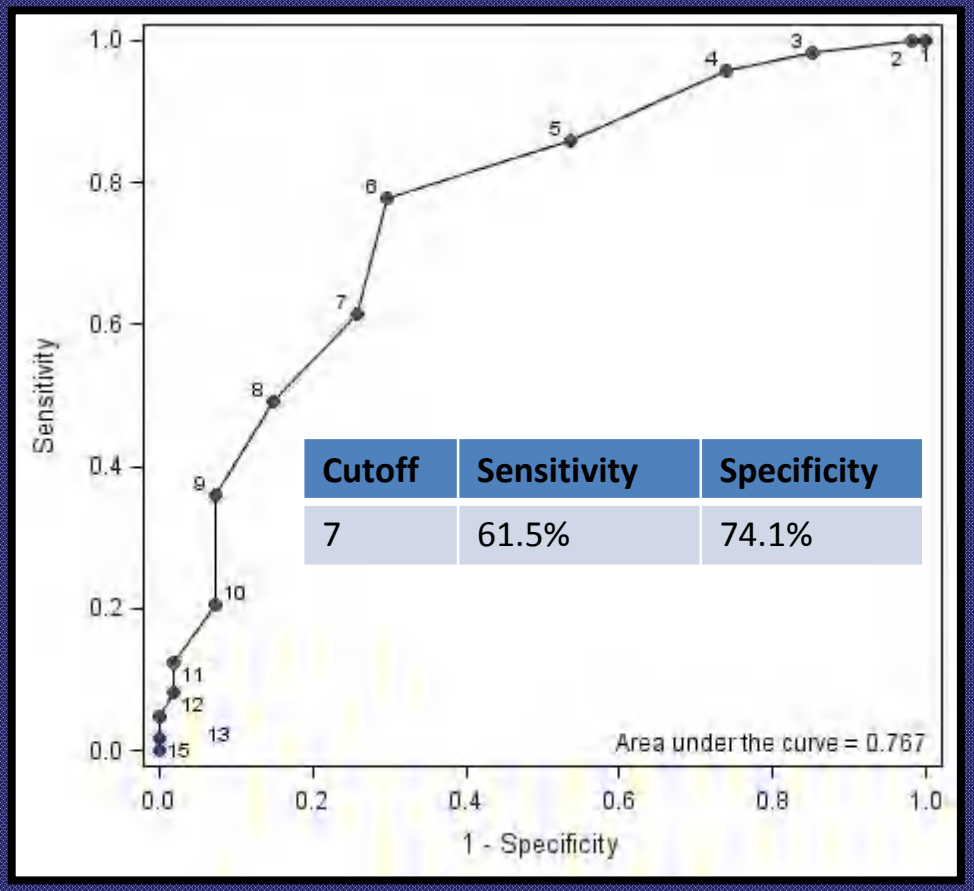
	Clavien 0	Clavien ≥ 1
Mean	5.00	7.54
SD	2.38	2.67
N	54	122

$p < 0.001$

176 pts.



$p < 0.05$



Cutoff	Sensitivity	Specificity
7	61.5%	74.1%

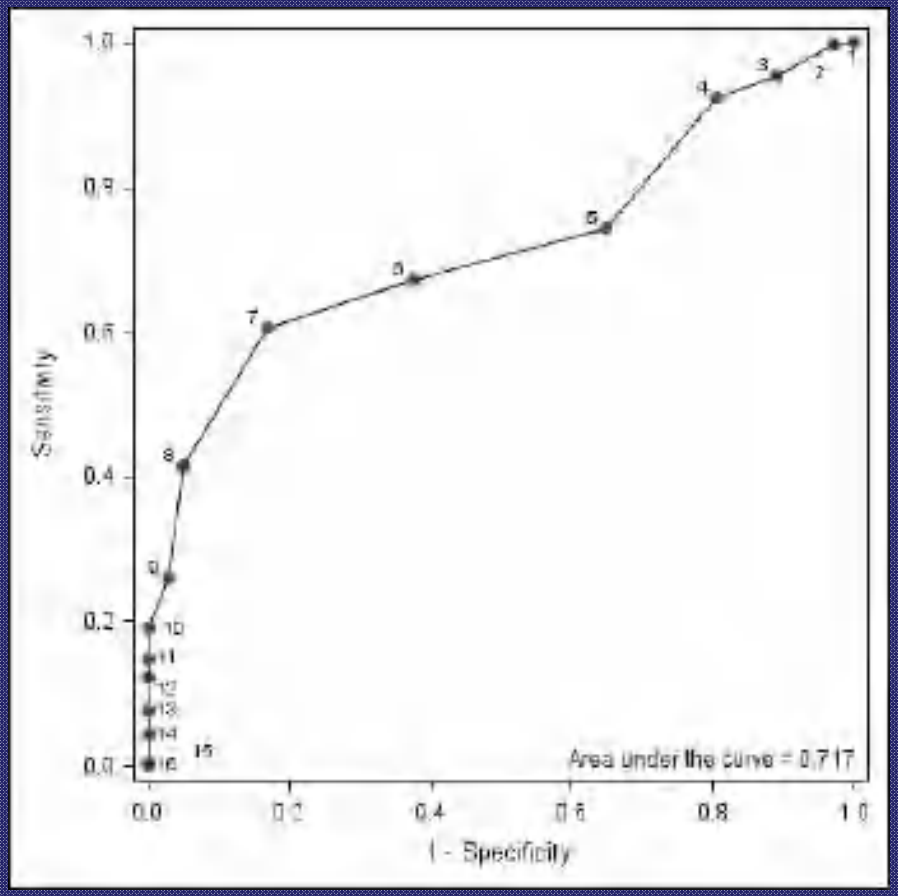
Chelazzi et al., Crit Care Med 2011

Validation set

- Prospective, blind analysis
- All pts. undergoing multi-disciplinary surgery (1/1/2012-30/6/2013)
- Postoperative complications/death recorded

- ROC curve to evaluate the ability of ASPRA to detect postoperative complications

Validation set: results



Score	ROC-AUC
Apache II	0.65
Possum	0.68
ASA ps	0.56
ASPRA	0.71
PSA for prostate cancer	0.68

Cutoff	Sensitivity	Specificity
7	60.5%	83%

1928 pts.

Chelazzi et al., Crit Care Med 2011

Accuracy of ASPRA in predicting postoperative complications

	Study group		
Accuracy measure	**Derivation set**	**Validation set**	P value[a]
Sensitivity, % (95% CI)	61.5 (52.2-70.0)	60.5 (57.7-63.2)	0.84
Specificity, % (95% CI)	74.1 (60.1-84.6)	83 (79.9-85.7)	0.14
Positive predictive value, % (95% CI)	84.3 (74.7-90.8)	**87 (84.5-89.1)**	**0.51**
Negative predictive value, % (95% CI)	46.0 (35.4-57.0)	52.8 (49.7-55.8)	0.91

Tab C. Accuracy measures of ASPRA score in predicting postsurgical complications.
Abbreviations: CI, confidence interval. [a]According to the chi-square test for differences among the 2 groups.

Chelazzi et al., Crit Care Med 2011

Conclusions

- Most postoperative complications are observed in a small group of “high-risk” patients
- Postoperative admittance in ICU may consent appropriate treatment of early postoperative complications (++ hypotension/hypoxia) with associated better outcomes
- Actual lack of objective system to predict postop. complications
- The new ASPRA system shows a good positive predictive value for postoperative complications