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Risk Adjusted Outcomes for Cystectomy: Surgical and Anaesthetic Perspectives

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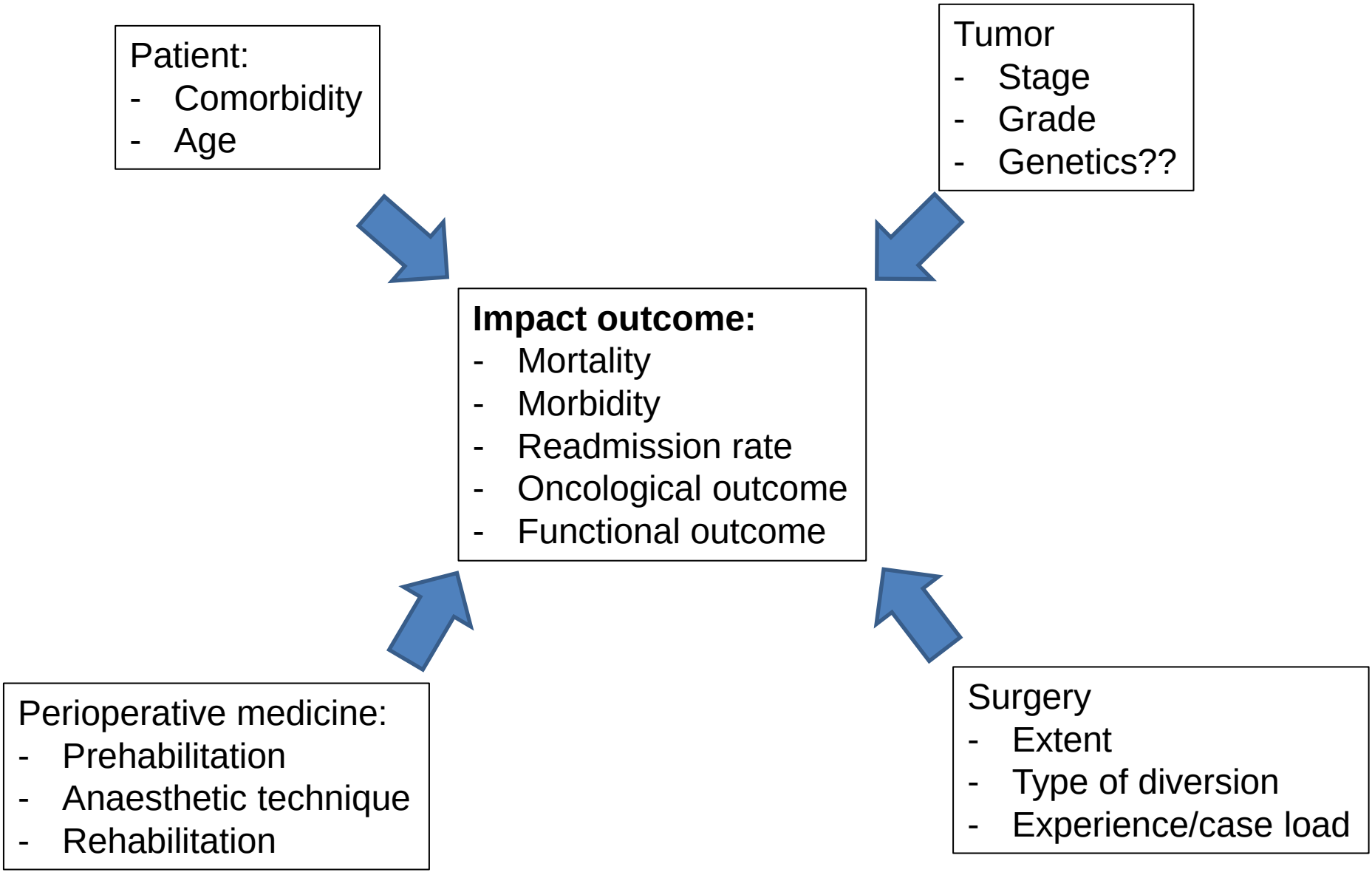
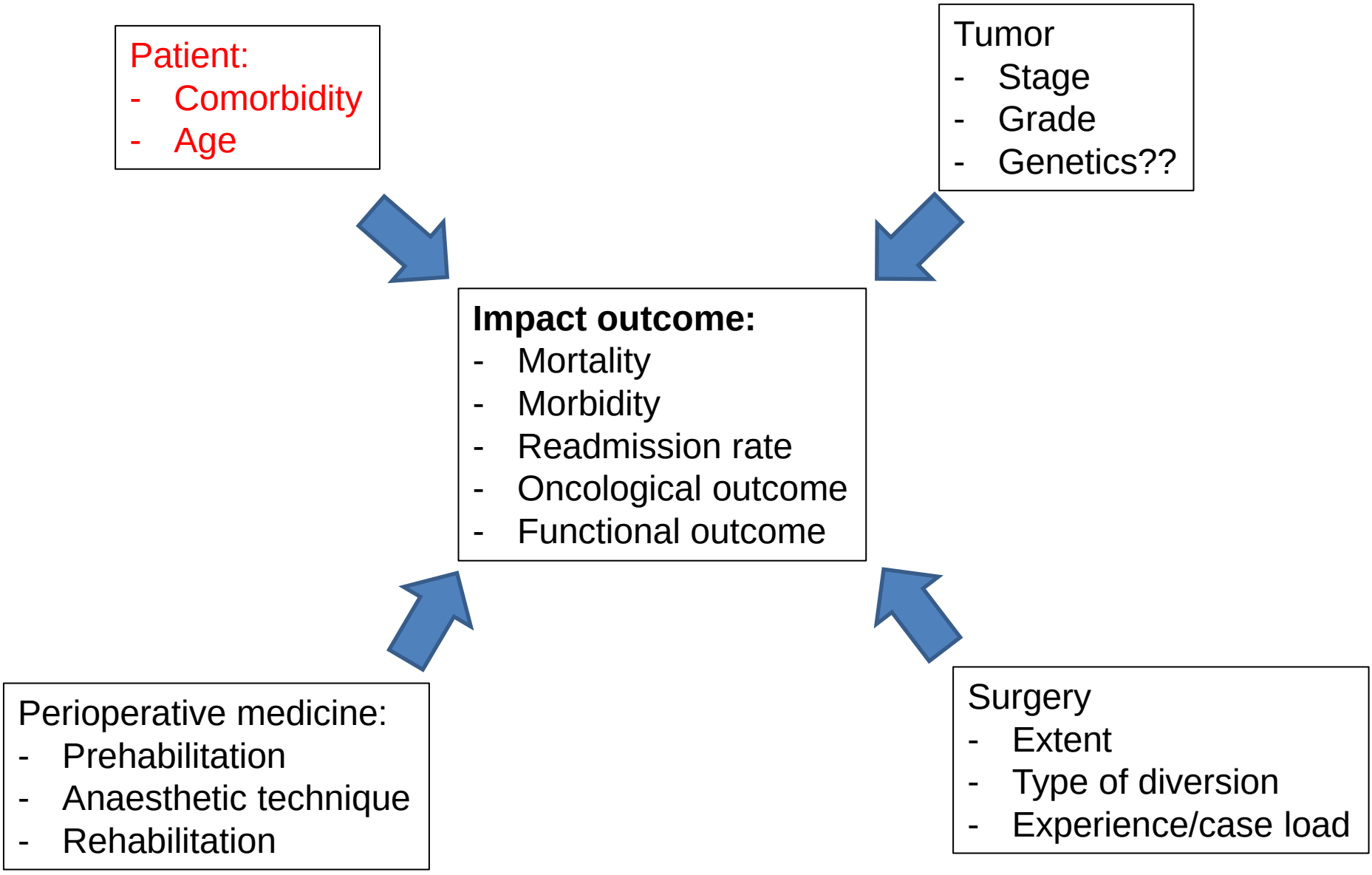

Patient:
- Comorbidity
- Age
Tumor
- Stage
- Grade
- Genetics??
Impact outcome:
- Mortality
- Morbidity
- Readmission rate
- Oncological outcome
- Functional outcome
Perioperative medicine:
- Prehabilitation
- Anaesthetic technique
- Rehabilitation
Surgery
- Extent
- Type of diversion
- Experience/case load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Global «graying» of the population

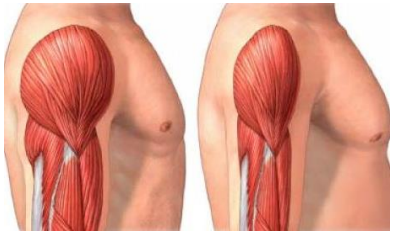
- In Switzerland, a sexagenarian now has a 50% chance, if male, and 70% if female, of reaching the age of 80
- In the U.S. 1/7 persons is > 65 yrs
- By 2030 70% of cancers would occur in > 65 yrs old people in the U.S.

➢ 40% of total surgical volume are patients > 65 yrs

Physiology of the old age

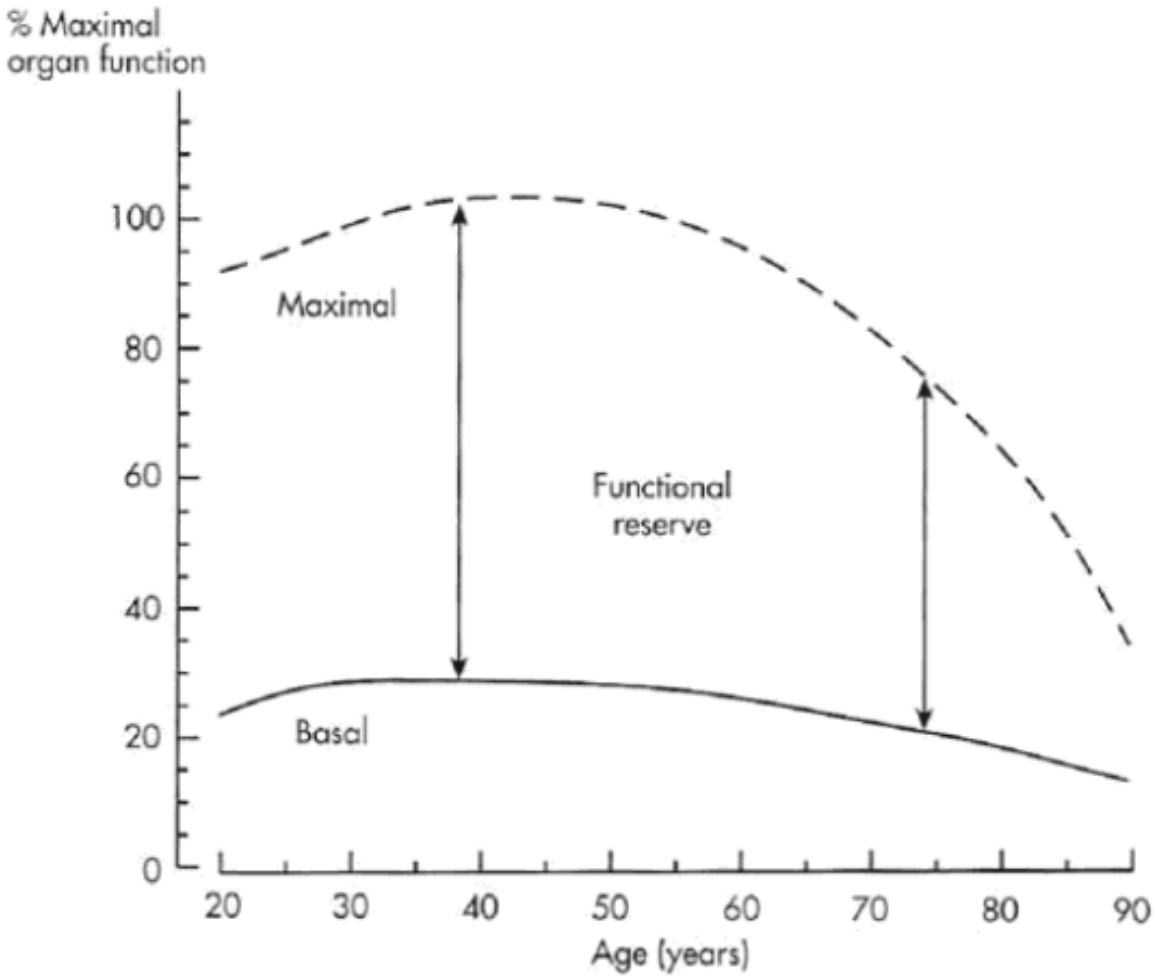
- CNS:
  - We loose 50’000 neurons/day
  - Until 80 yrs: **75%** of the brain is lost

- Muscle and connective tissue:
  - Sarcopenia
  - Articular stiffness
  - Increase of fat and fibrosis



- Cardiovascular:
  - Vascular stiffness: Blood pressure and systemic resistance ↑
  - Stroke volume and cardiac output ↓
  - Maximal heart rate ↓

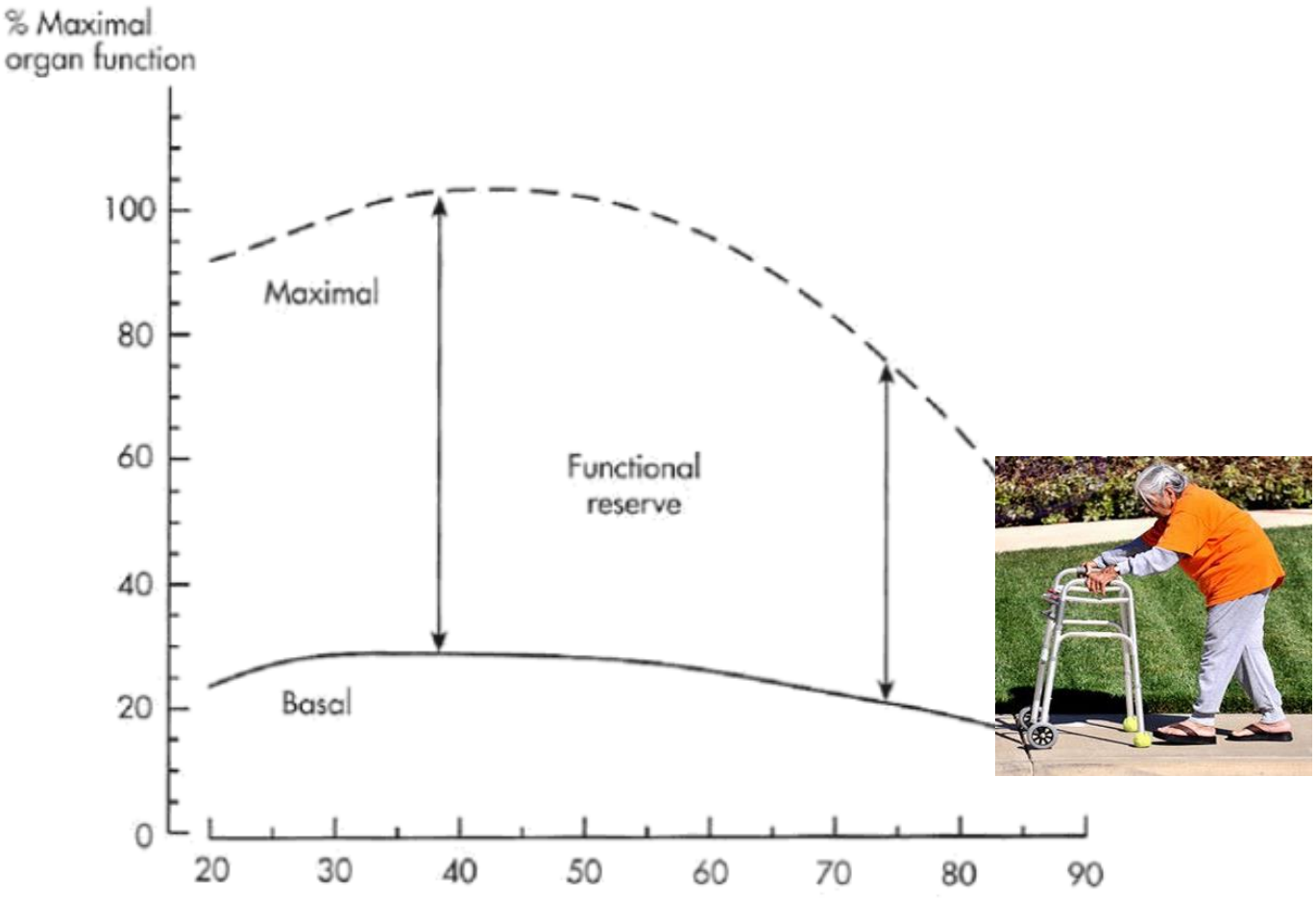
Physiology of the old age



Functional reserve is diminished!

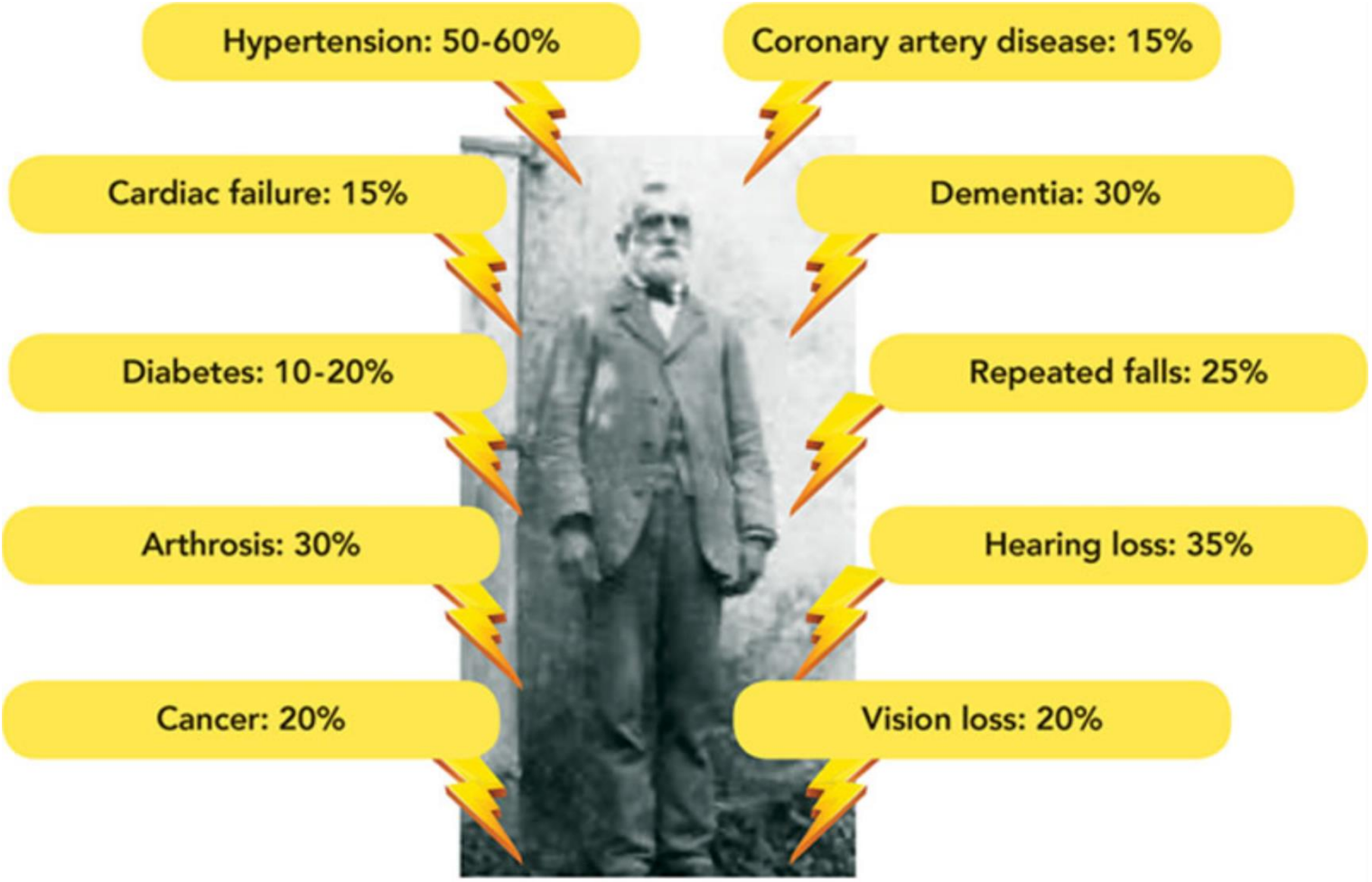
Muravchick S. Geroanesthesia:
Principles for Management of the Elderly Patient; St Louis Mosby Book 1997

Physiology of the old age, frailty



- Decreased resistance to stressors (such as surgery)
- 10% > 65 yrs are frail, nearly 100% > 95 yrs are frail
- Frailty is more prevalent in women
- **25-56% frail patients undergo surgery**

Frequency of main comorbidities in the elderly patients



Beyond 70 years = 5 comorbidities

Boddaert et al., Anesthesiology. 2014;121(6):1336-1341

Cystectomy patient = old comorbid patient

Bladder cancer: median age of diagnosis 70 yrs

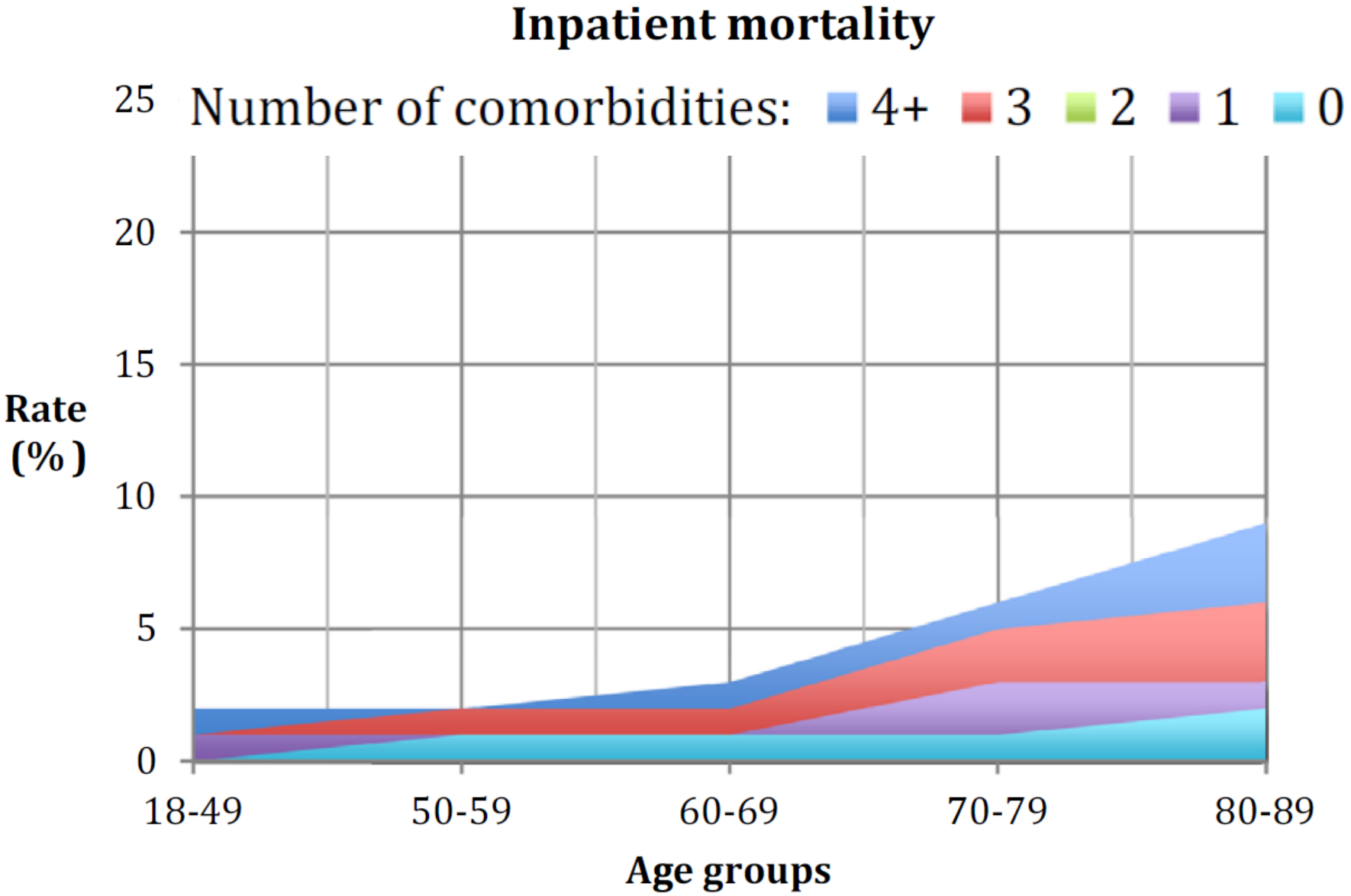
1/4 of the patients have > 4 comorbidities

Radical cystectomy and urinary diversion:

- 90d mortality: up to 15%
- 90d complication rate: up to 65% (>50% major)
- 30d readmission rate: up to 36%
- Discharge to other than home: up to 50%

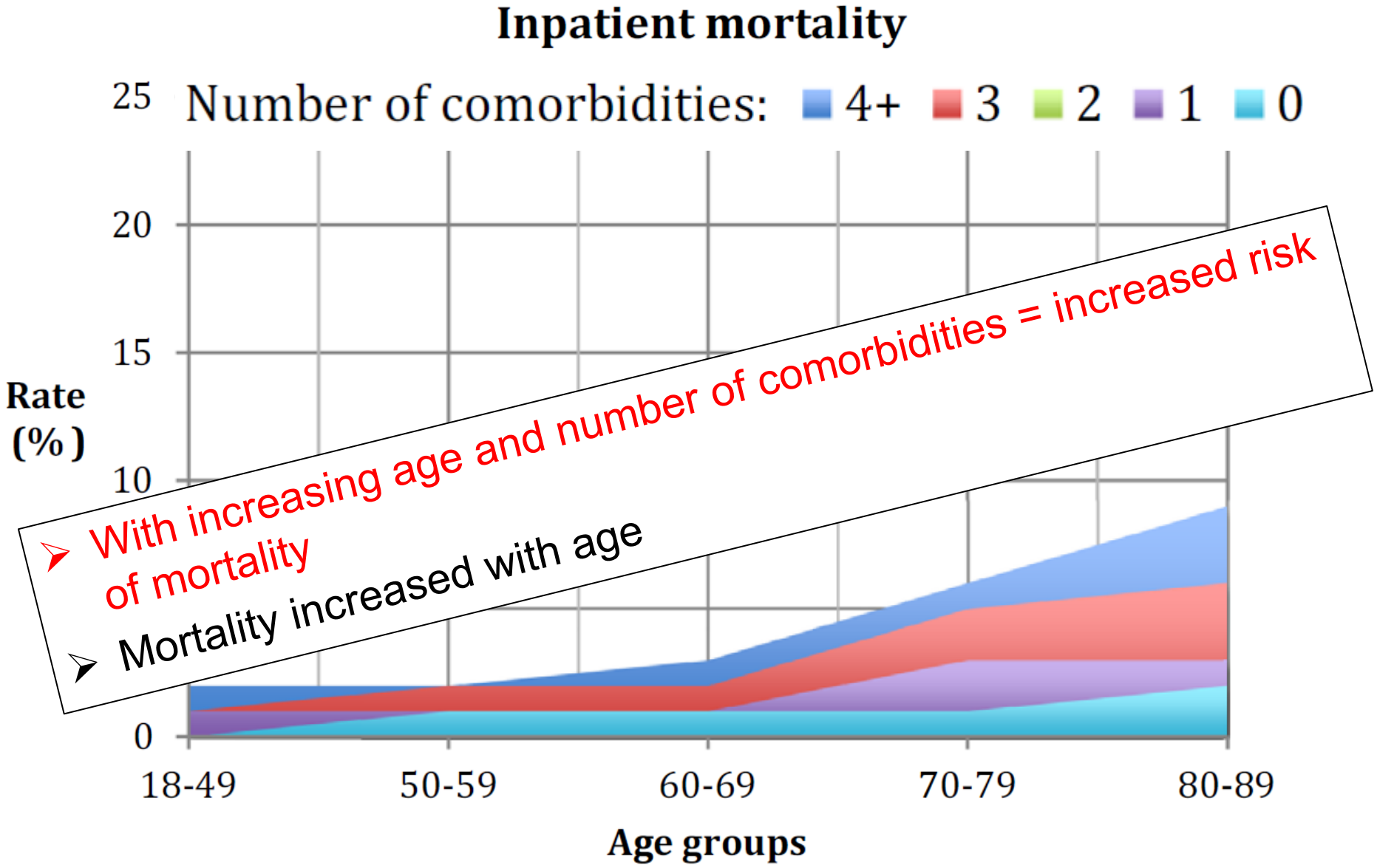
Nayak et al., Urologic Oncology 2016; Shabsigh et al. European Urology 2009

Comorbidities and outcome



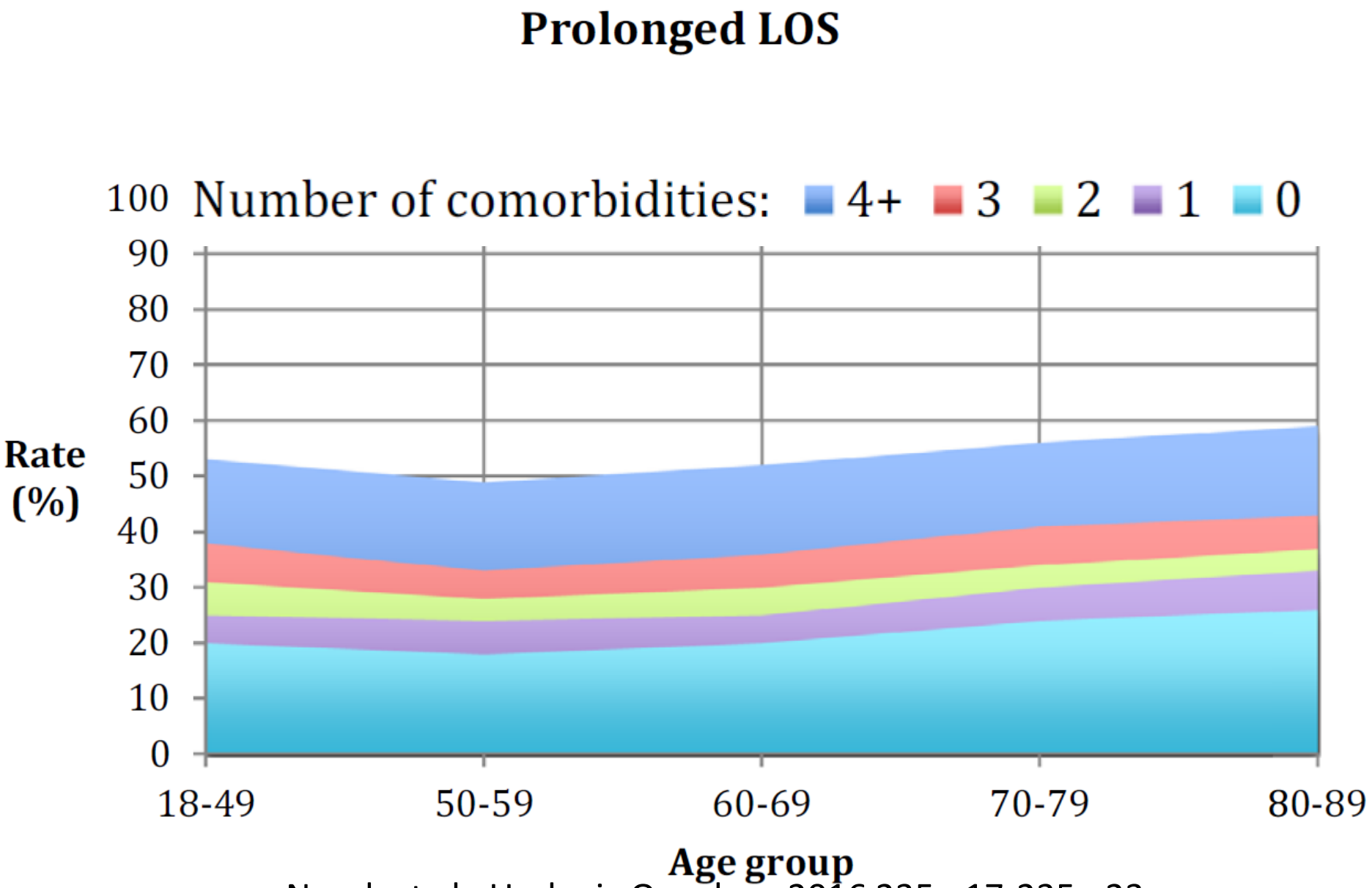
Nayak et al., Urologic Oncology 2016 235.e17-235.e23

Comorbidities and outcome



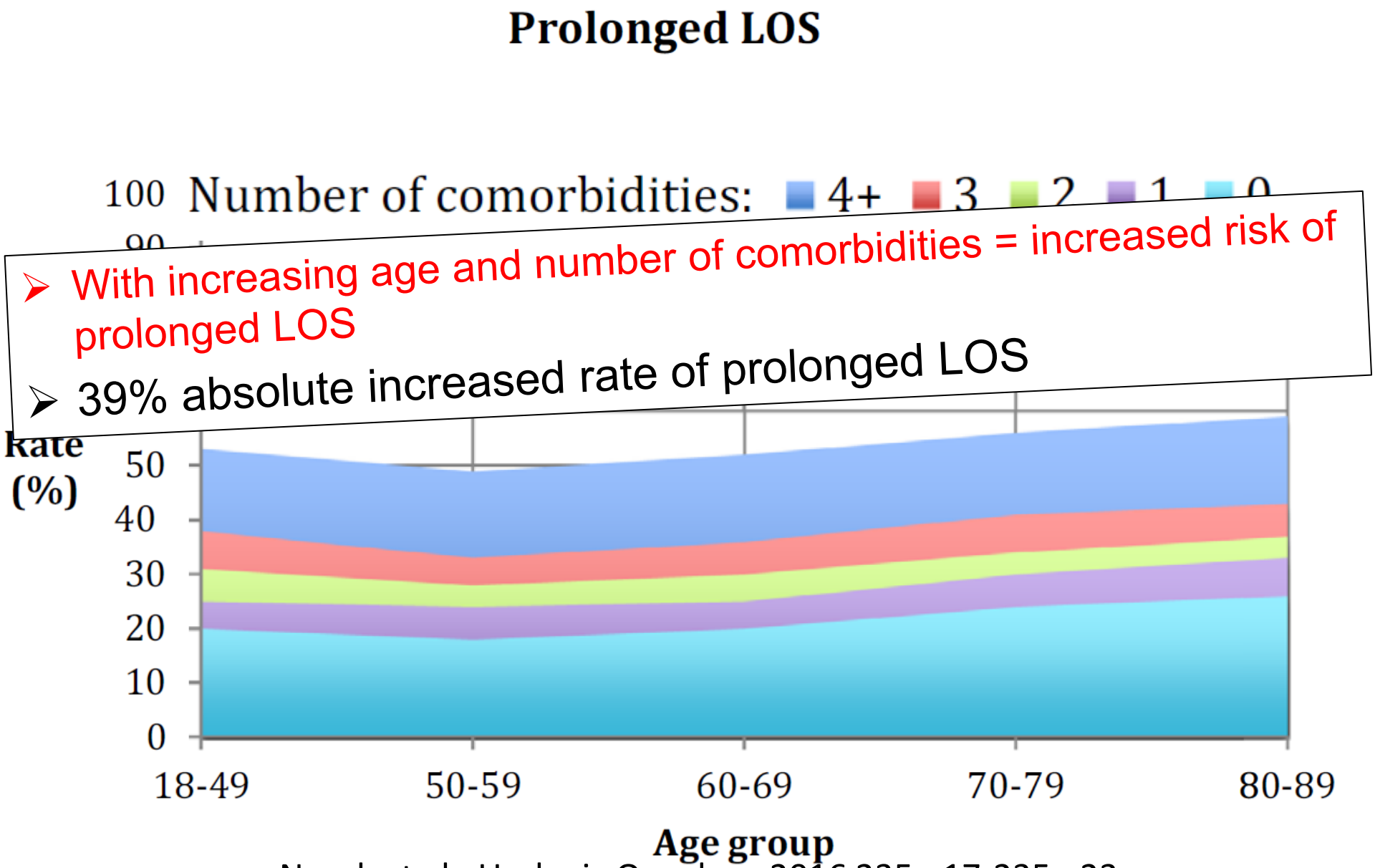
Nayak et al., Urologic Oncology 2016 235.e17-235.e23

Comorbidities and outcome



Nayak et al., Urologic Oncology 2016 235.e17-235.e23

Comorbidities and outcome



- With increasing age and number of comorbidities = increased risk of prolonged LOS
- 39% absolute increased rate of prolonged LOS

Nayak et al., Urologic Oncology 2016 235.e17-235.e23

Risk stratification tools and comorbidities

- Scoring system or model to predict mortality or morbidity
- Described instruments should be easily used in daily practice
- Most of our procedural outcome predictions are based on past performance

- ASA: only preoperative data
- P-POSSUM: pre- intra and postoperative data
- Charlson Comorbidity Index: medical risk adapted for surgical risk stratification

American Society of Anesthesiologists' physical status score

ASA Classification		Examples:
ASA I	A normal healthy patient	Healthy; no smoking, no or very minimal drinking.
ASA II	A patient with mild systemic disease	Smoker; more than minimal drinking; pregnancy; obesity; well controlled diabetes, well controlled hypertension; mild lung disease.
ASA III	A patient with severe systemic disease, not incapacitating	Diabetes, poorly controlled hypertension; distant history of MI, CVA, TIA, cardiac stent; COPD, ESRD; dialysis; active hepatitis; implanted pacemaker; ejection fraction below 40%; congenital metabolic abnormalities.
ASA IV	A patient with severe systemic disease that is a constant threat to life	Recent history of MI, CVA, TIA, cardiac stent; Ongoing cardiac ischemia or severe valve dysfunction; implanted ICD; ejection fraction below 25%.
ASA V	A moribund patient who is not expected to survive without the operation	Ruptured abdominal or thoracic aneurism; intracranial bleed with mass effect; ischemic bowel in the face of significant cardiac pathology..
ASA VI	A patient who has already been declared brain-dead and whose organs are being removed for transplant.	

ASA physical status score and outcome

ASA PS Level	n (%)	30-Day Mortality Rate (%)	30-Day Morbidity Rate (%)	Mean Variable Direct Costs ($)	Mean Length of Stay (Days)
I	997 (16.7)	0.0 ± 0.0	1.7 ± 0.4	1986 ± 53	1.8 ± 0.1
II	3141 (53.4)	0.2 ± 0.1	4.0 ± 0.4	3211 ± 68	3.1 ± 0.1
III	1490 (25.3)	2.2 ± 0.4	11.3 ± 0.8	5384 ± 179	6.0 ± 0.2
IV	230 (3.9)	15.2 ± 2.4	31.7 ± 3.1	18,359 ± 3358	15.3 ± 1.7
V	20 (0.3)	70.0 ± 10.5	40.0 ± 11.2	22,889 ± 4808	16.7 ± 4.3
Total of all cases	5878 (100)	1.5 ± 0.2	6.7 ± 0.3	4214 ± 151	4.1 ± 0.1

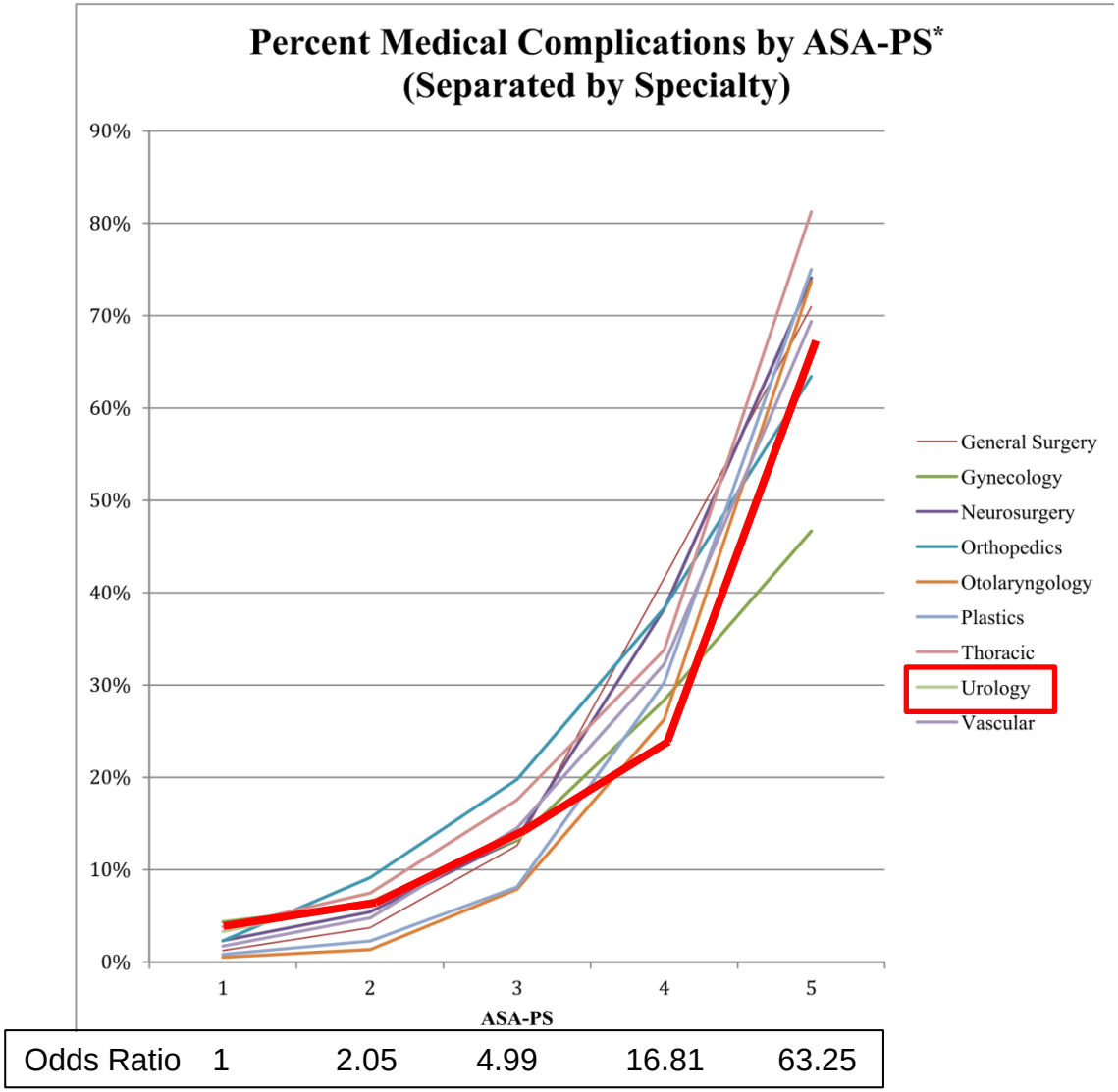
$P < 0.001$ for χ^2 and ANOVA tests of differences in outcome variables across ASA PS levels.

Preoperative Risk Variable(s)	30-Day Mortality (C-index)	30-Day Morbidity (C-index)	Log of Variable Direct Costs (Adjusted R^2)	Log of Length of Stay (Adjusted R^2)
ASA PS alone*	0.889	0.722	0.186	0.233

- ASA score = strong predictor of postoperative outcomes

Davenport et al, Annals of Surgery 2006

ASA physical status score and outcome



Odds Ratio	1	2.05	4.99	16.81	63.25

- ASA score = independently predictive of postoperative complications and mortality

Hackett et al., Int J of Surgery 2015

ASA physical status score and cystectomy outcome

- ASA score has been found to have clinical predictive value for perioperative mortality (90d)
- OR 2.19-3.17

Characteristic	Univariable			Multivariable‡		
	OR	95% CI	*p* value	OR	95% CI	*p* value
Age, yr, cont.	1.062	1.029–1.096	<0.001	1.052	1.015–1.091	**0.005**
ASA score, cont.	2.931	1.778–4.831	**<0.001**	2.274	1.329–3.893	**0.003**
Hospital volume, cont.	0.983	0.972–0.995	**0.007**	0.982	0.969–0.996	**0.009**

- The ASA score can be regarded as the best instrument

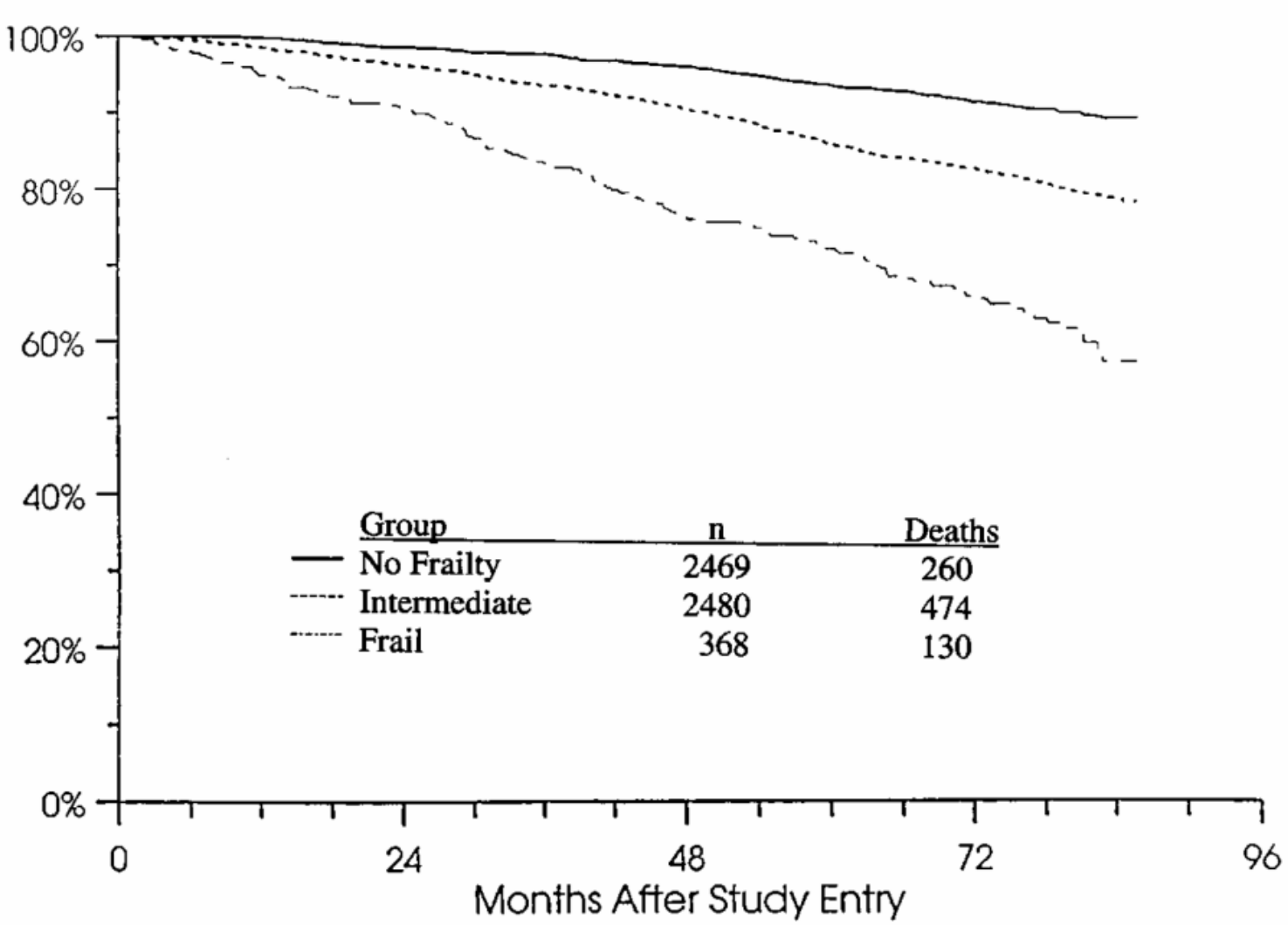
Boorjian et al., J Urology 2013; Mayer et al., BJUI 2012; Aziz et al., European Urology 2013

Risk stratification tools and frailty

- Fatigue: Are you fatigued?
- Resistance: Do you have difficulty walking up 1 flight of steps?
- Aerobic: Are unable to walk at least 1 block?
- Illness: Do you have >5 illness?
- Loss of weight: Have you lost >5% of your weight in the last 6 months?

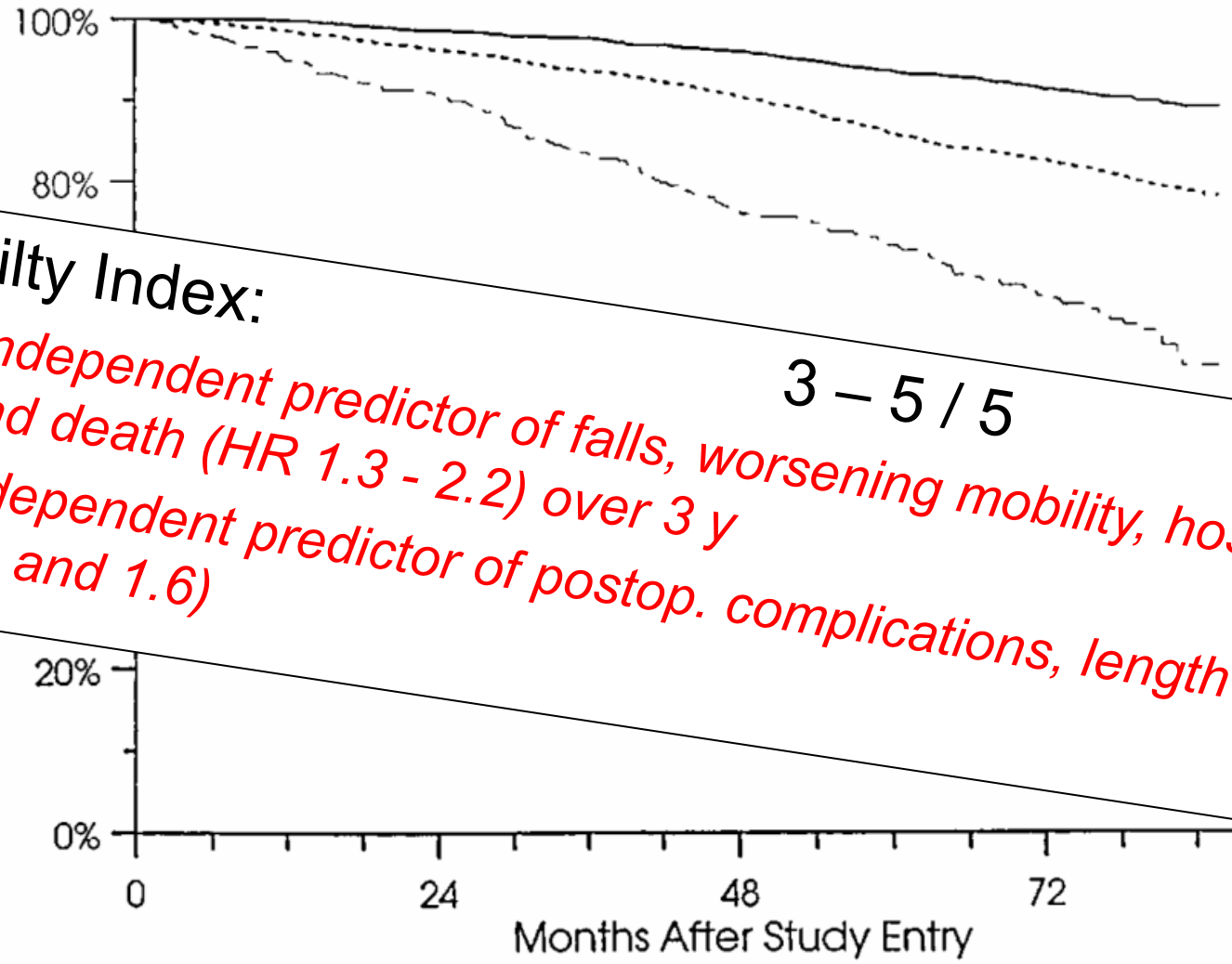
Morley et al., J Nutr Health Aging, 2012

Fried-Hopkins Frailty Index



Fried et al., J. of Gerontology, 2001

Fried-Hopkins Frailty Index



Frailty Index:

3 – 5 / 5

- *Independent predictor of falls, worsening mobility, hospitalisation and death (HR 1.3 - 2.2) over 3 y*
- *Independent predictor of postop. complications, length of stay (OR 2.1 and 1.6)*

Fried et al., J. of Gerontology, 2001

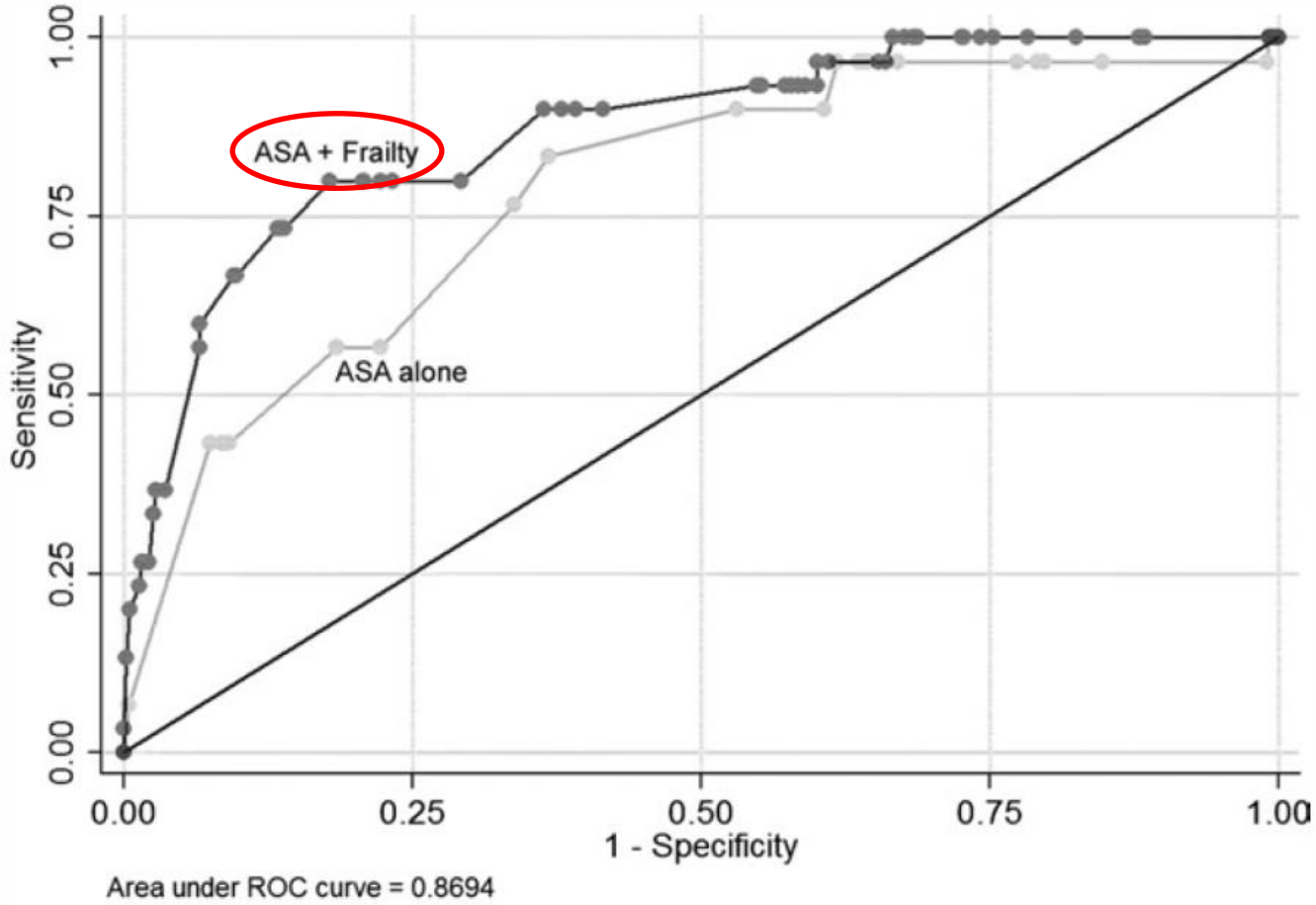
Frailty Index and cystectomy

- Retrospective study 3388 cystectomy patients
- 15 variables for modified FI

	Radical cystectomy					
Frailty Index	0–0.05	0.05–0.10	0.10–0.15	0.15–0.20	>0.20	
30-Day mortality*	2.1%	2.6%	2.4%	3.1%	6.8%	0.005
	21/1008	34/1,330	10/423	11/351	12/176	
Clavien-Dindo IV*	6.6%	9.2%	14.2%	10.5%	17.0%	<0.0005
	73/1,108	122/1,330	60/423	37/351	30/176	
Septic shock/sepsis*	10.6%	13.5%	14.7%	11.7%	13.1%	0.135
	117/1,108	179/1,330	62/423	41/351	23/176	
Ventilator dependent*	1.4%	2.4%	4.7%	3.4%	5.7%	<0.0005
	15/1,108	32/1,330	20/423	12/351	10/176	
Reintubated*	2.1%	2.9%	5.4%	4.3%	6.8%	0.001
	23/1,108	39/1,330	23/423	15/351	12/176	

Lascano et al., Urologic Oncology, 2015

Frailty is a predictor of surgical outcomes in older patients

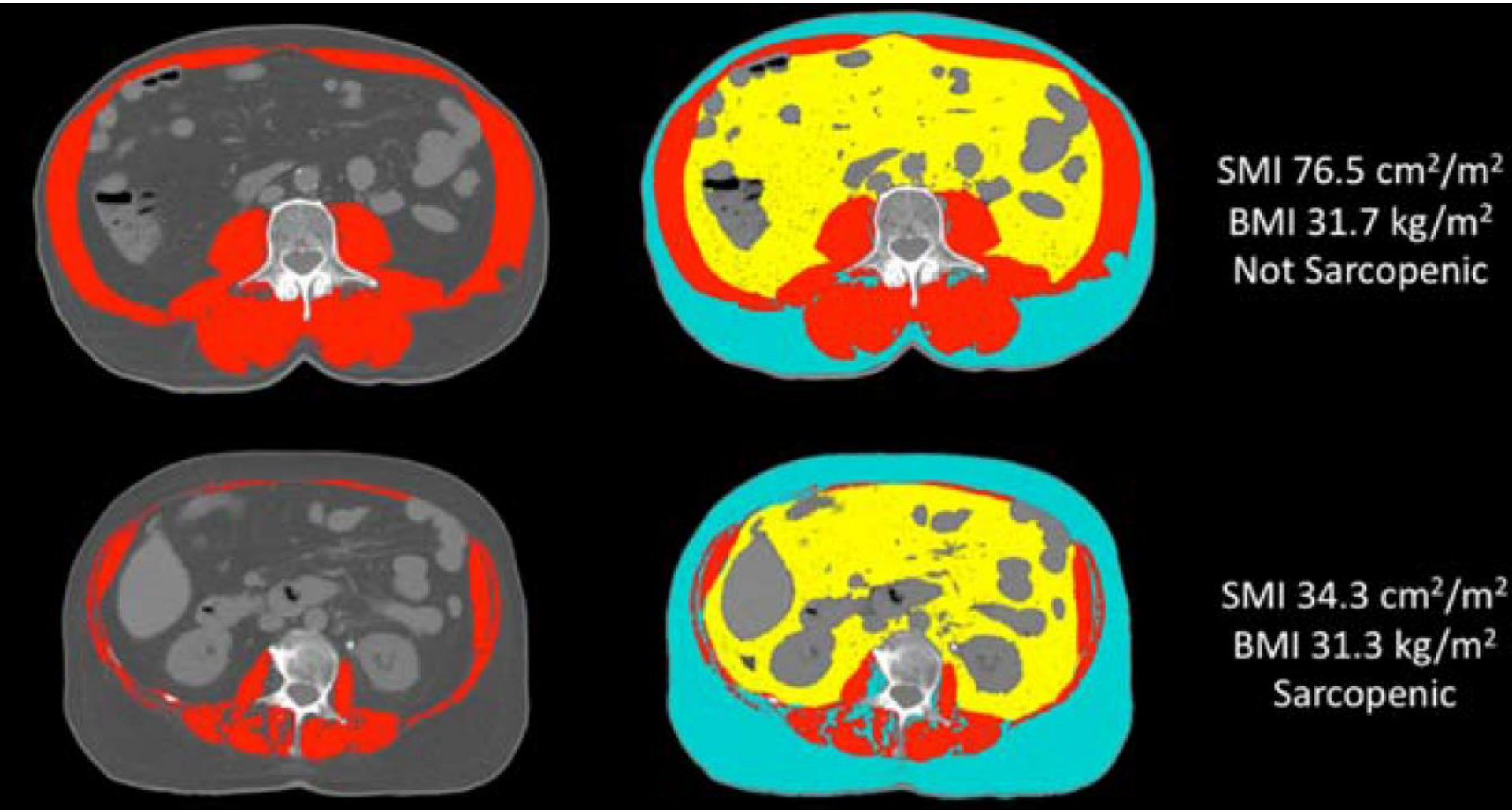


- Significant increase risk of postoperative complications, LOS, and institutionalization
- Improved predictive power of risk index (ASA)

Makari et a., J AM Coll Surg, 2010 & Lascano et al., Urologic Oncology, 2015

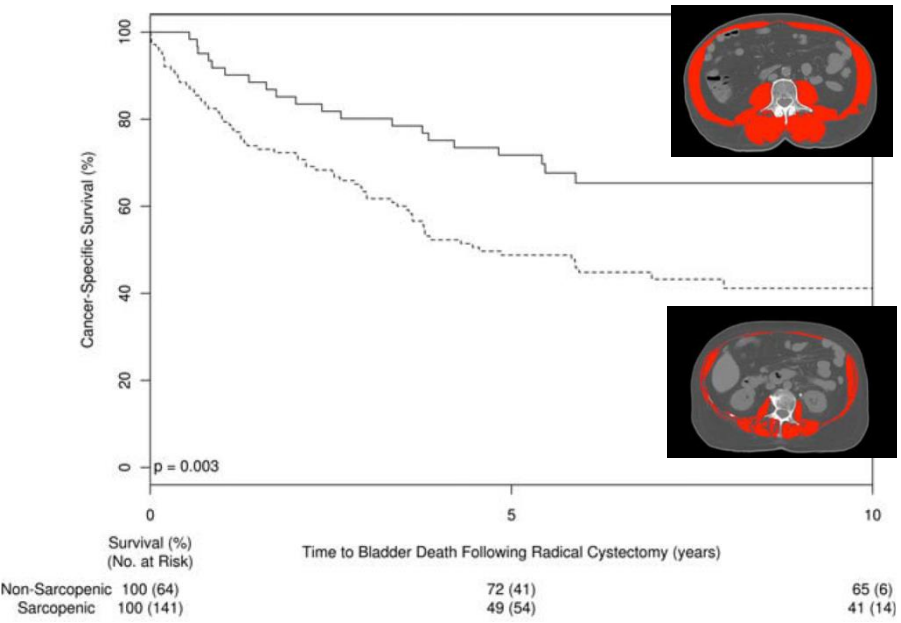
Sarcopenia and cystectomy

Sarcopenia = Severe wasting of skeletal muscle using a skeletal muscle index (SMI) measured on axial CT

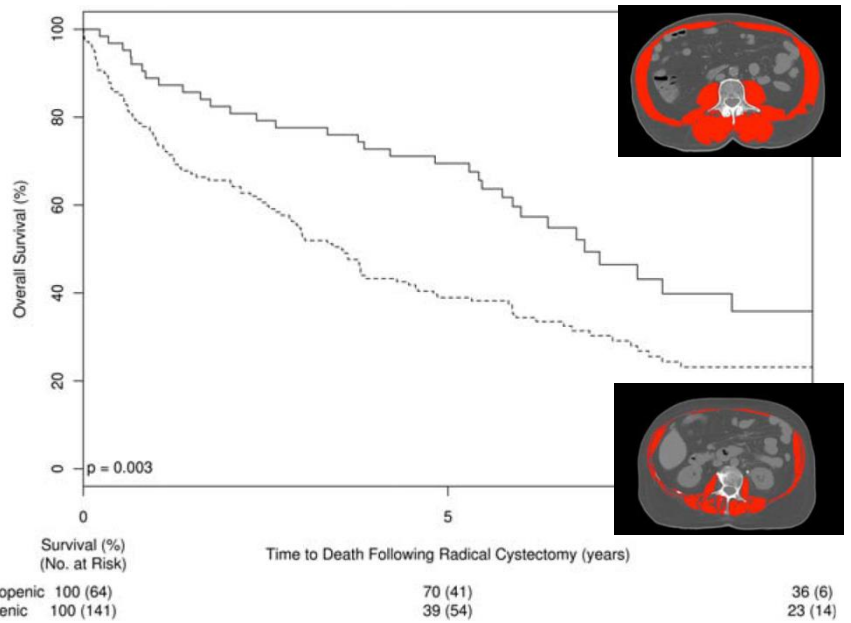


Sarcopenia and cystectomy

Cancer Specific Survival



Overall Survival



Psutka et al., Cancer, 2014

Sarcopenia and cystectomy

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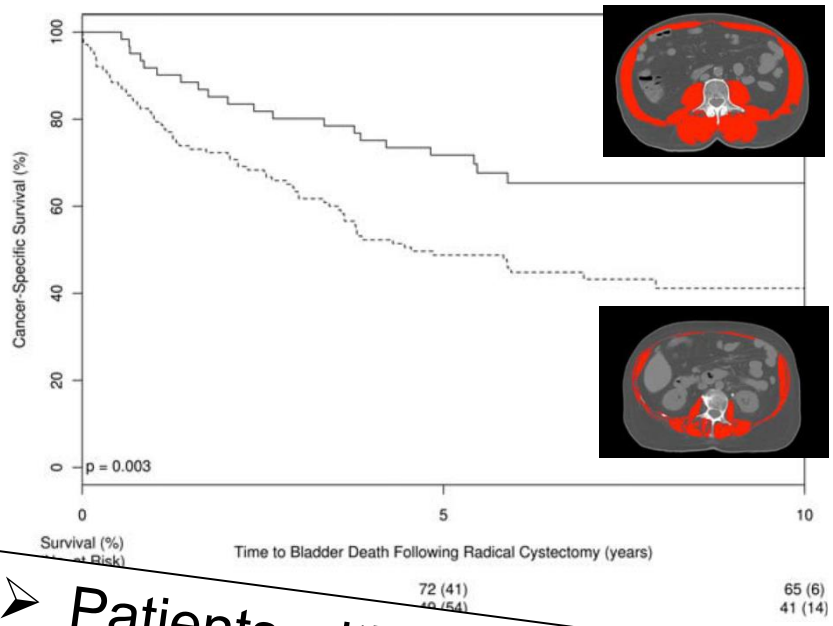

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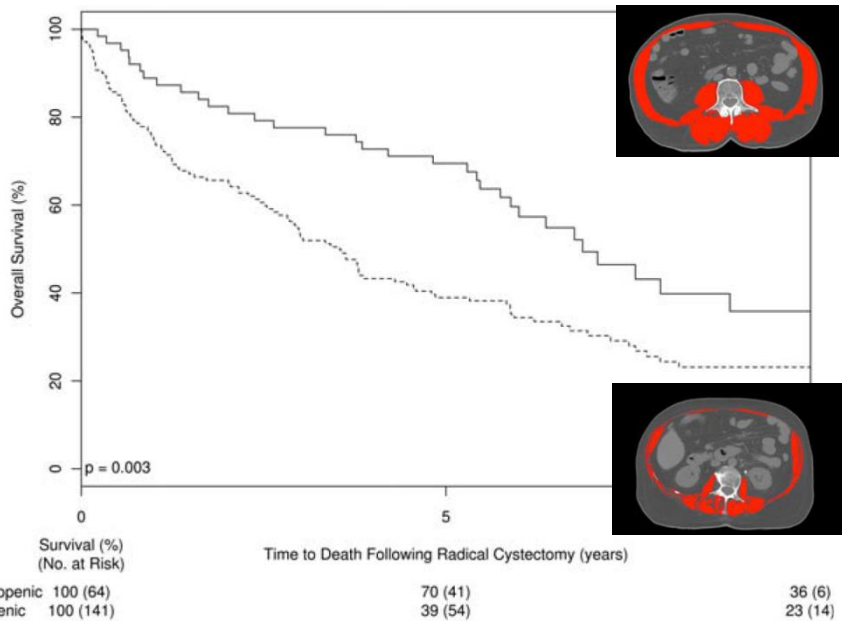


Survival (%)
(No. at Risk)

Non-Sarcopenic	100 (64)	70 (41)	36 (6)
Sarcopenic	100 (141)	39 (54)	23 (14)

- Patients with sarcopenia were older
- Independantly impacted CSS and OS (HR 1.93; 95% CI 1.23-3.00)

Psutka et al., Cancer, 2014

Sarcopenia and cystectomy

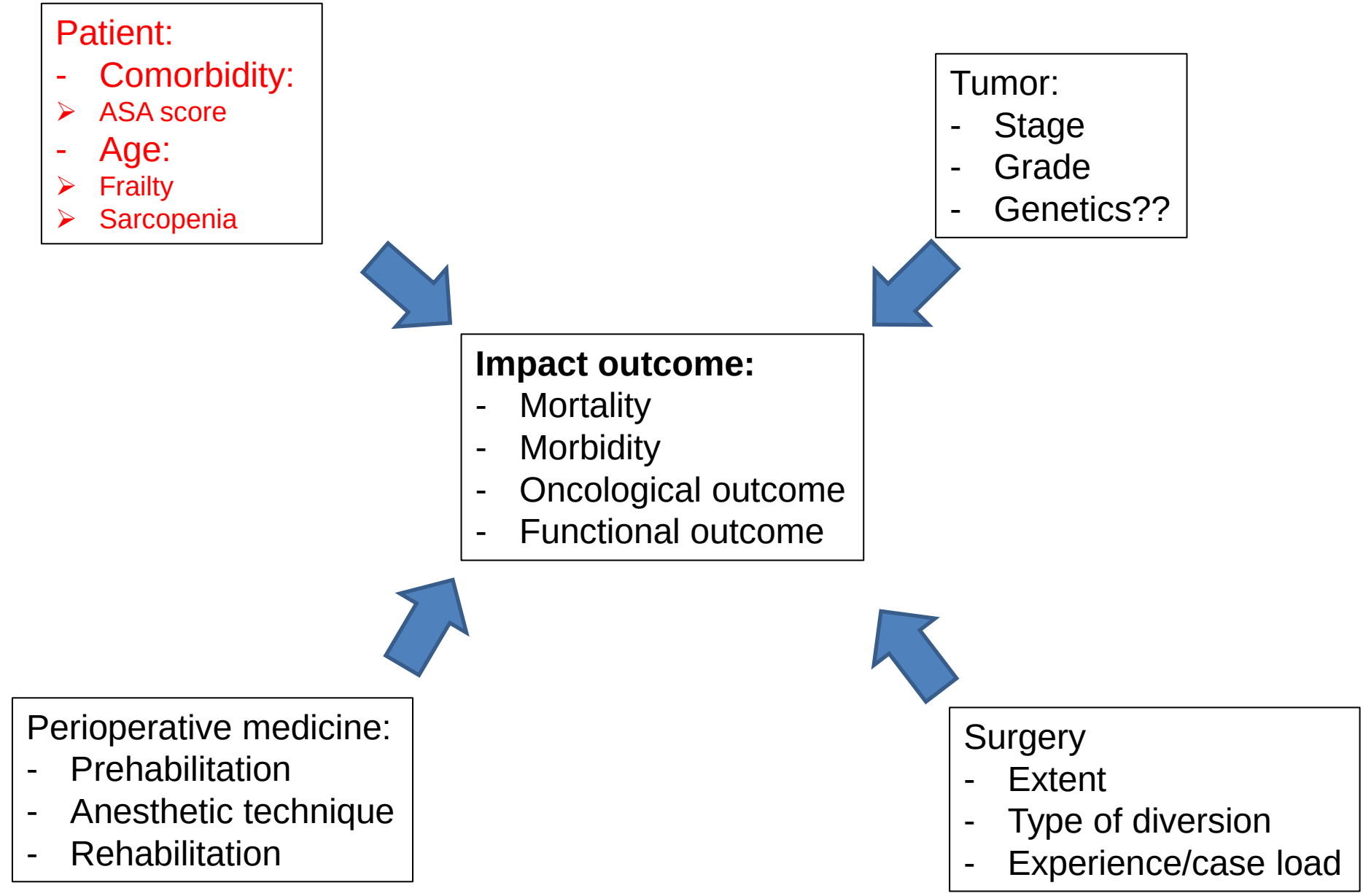
Sarcopenia as a Predictor of Complications and Survival Following Radical Cystectomy

Angela B. Smith,* Allison M. Deal, Hyeon Yu, Brian Boyd, Jonathan Matthews, Eric M. Wallen,† Raj S. Pruthi, Michael E. Woods,‡ Hyman Muss and Matthew E. Nielsen

- Retrospective study
- Single center
- 2008-2011
- 200 patients with bladder cancer

➢ Sarcopenia in women = predictor for major complications

Smith AB et al., J Urology 2014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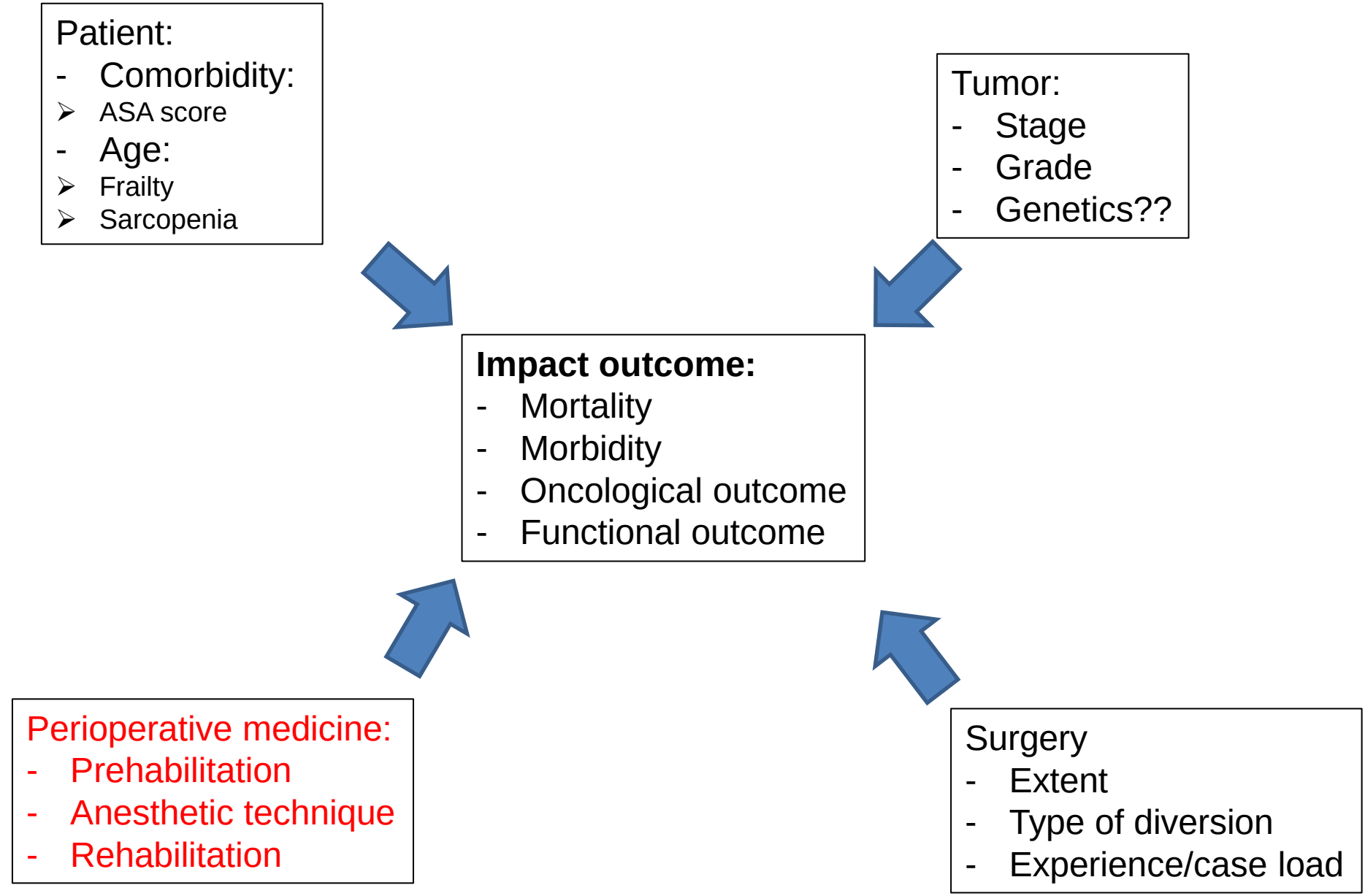
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Preoperative care: Prehabilitation

1. Optimize nutrition as soon as possible

- Oral immune-enhancing nutritional supplement > 5 d preop

Preoperative care: Prehabilitation

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- Oral immune-enhancing nutritional supplement > 5 d preop
- Preoperative carbohydrate loading

Preoperative care: Prehabilitation

1. Optimize nutrition as soon as possible

- Oral immune-enhancing nutritional supplement > 5 d preop
- Preoperative carbohydrate loading
- Bring the patient hydrated to the OR

- ➢ No enteral bowel preparation
- ➢ Starvation: 6 h for solid food and 2 h for clear drinks
- ➢ Oral hydration until 2 h before surgery

Preoperative care: Prehabilitation

2. Improve physical fitness: exercise training

- Preoperative aerobic physical activity (session >10min)
  - ➢ Cardiovascular function can be improved shortly

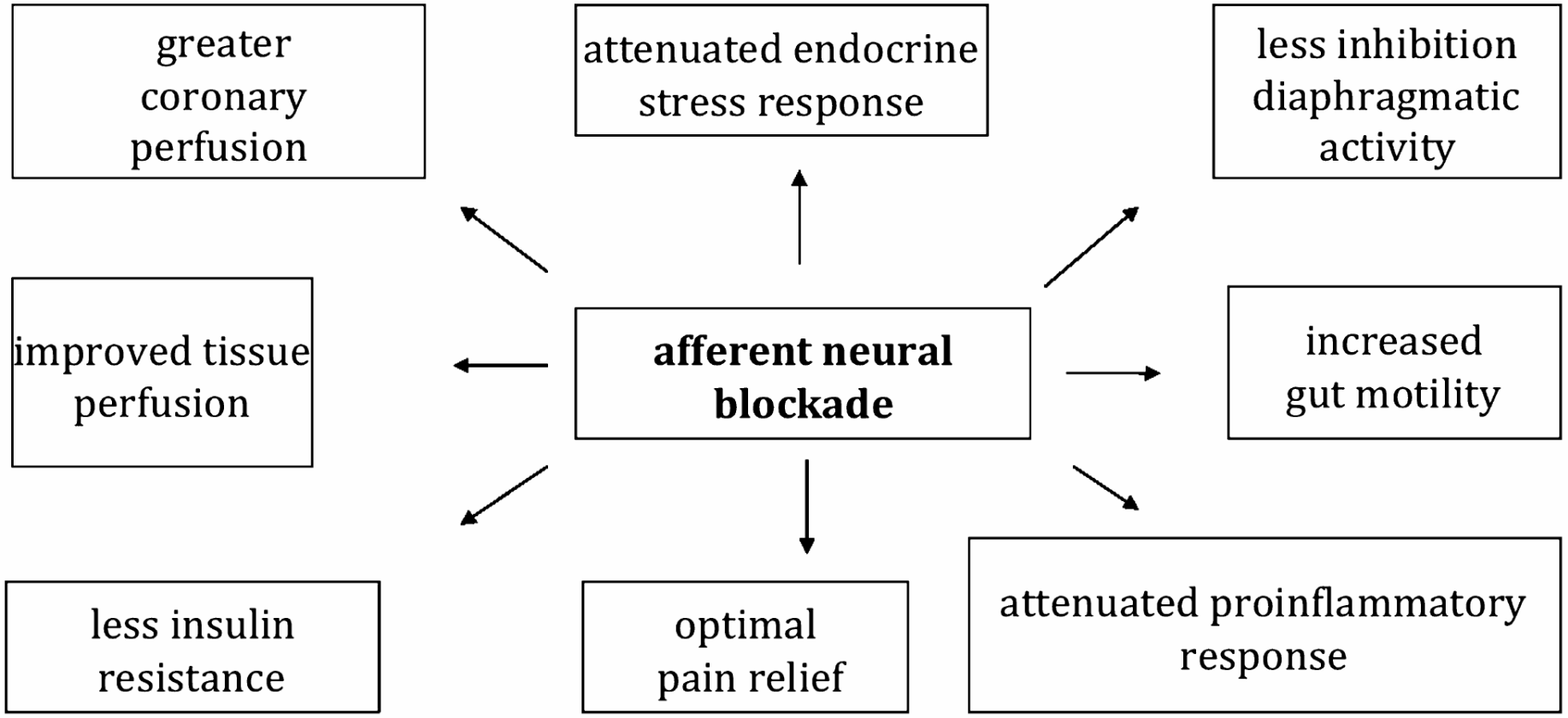
- Inspiratory muscle training (breathing against resistance)
  - ➢ Reduced pulmonary complications (atelectasis)

- Encouraging studies in non-cystectomy population

Prehabilitation starts when cystectomy is decided!

Jack et al., Best Practice & Research Clinical Anaesthesiology, 2011

Epidural analgesia: Benefit and outcome



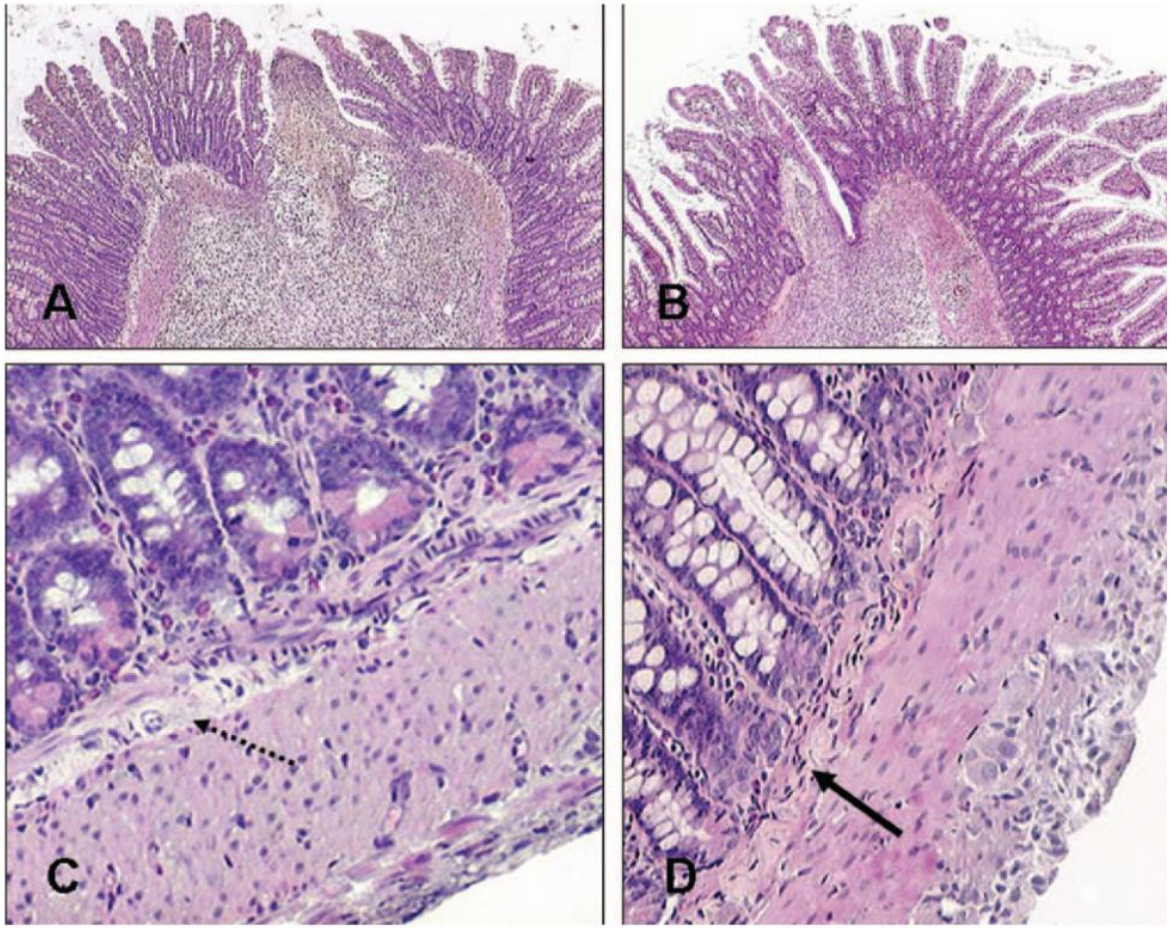
- Enhanced ambulation
- Protective effect

→ Reduces postoperative morbidity (cardiopulmonal, thrombo-embolic, gastrointestinal, LOS)

Carli F, RAPM, 2010

Intraoperative care: Fluid

•Fluid and gastrointestinal function:



Annals of Surgery • Volume 249, Number 2, February 2009

Intraoperative care: Fluid

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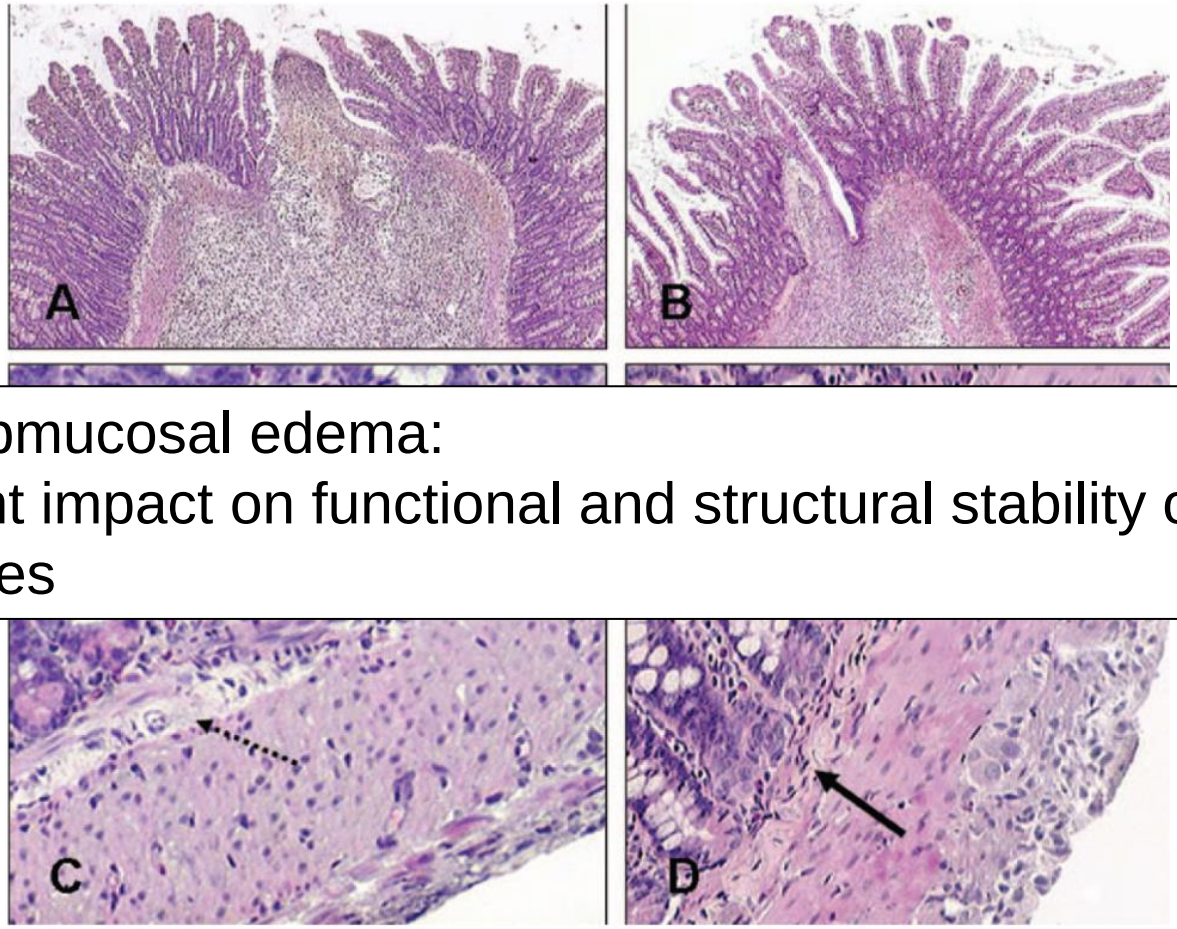
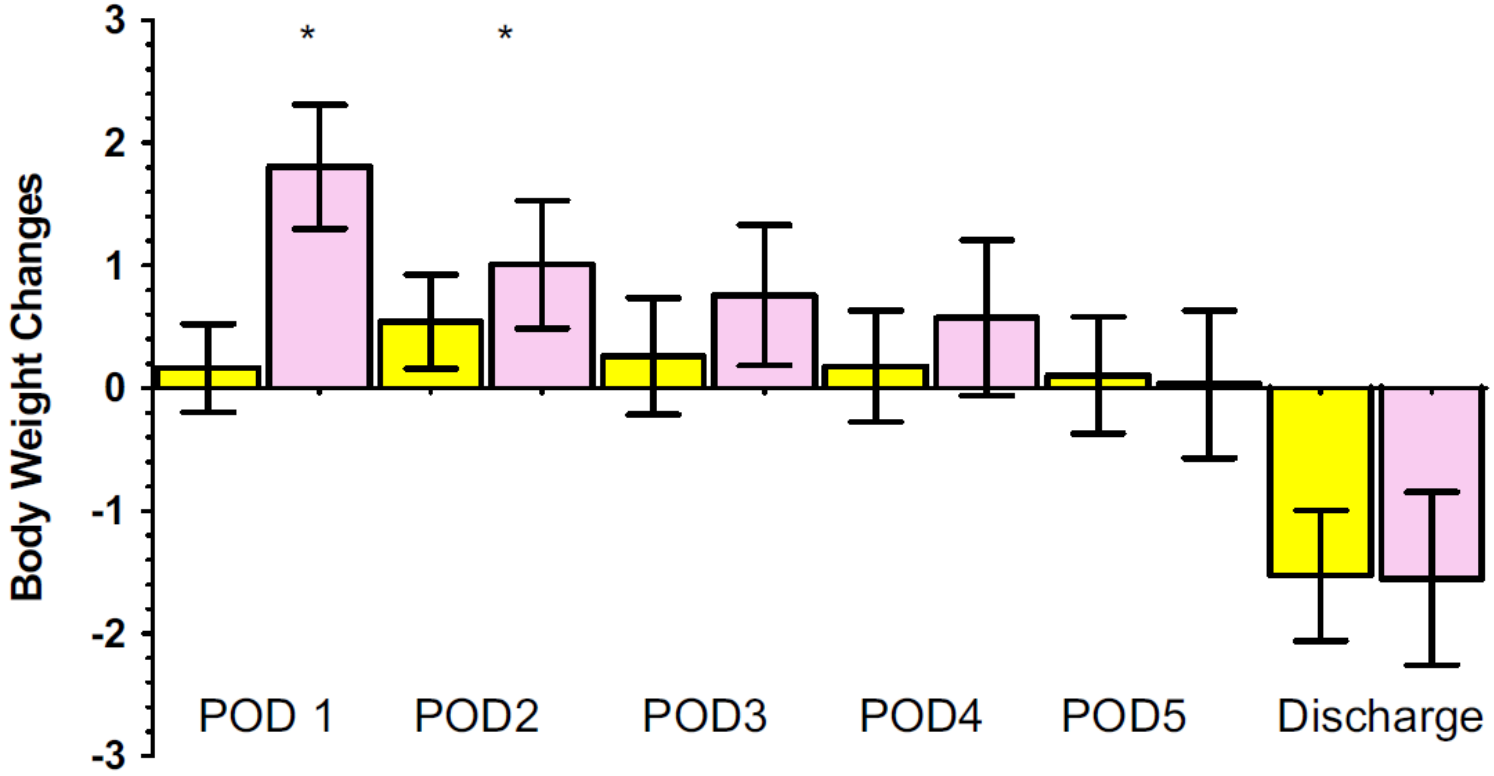


Marked submucosal edema:

➢Significant impact on functional and structural stability of intestinal anastomoses

Annals of Surgery • Volume 249, Number 2, February 2009

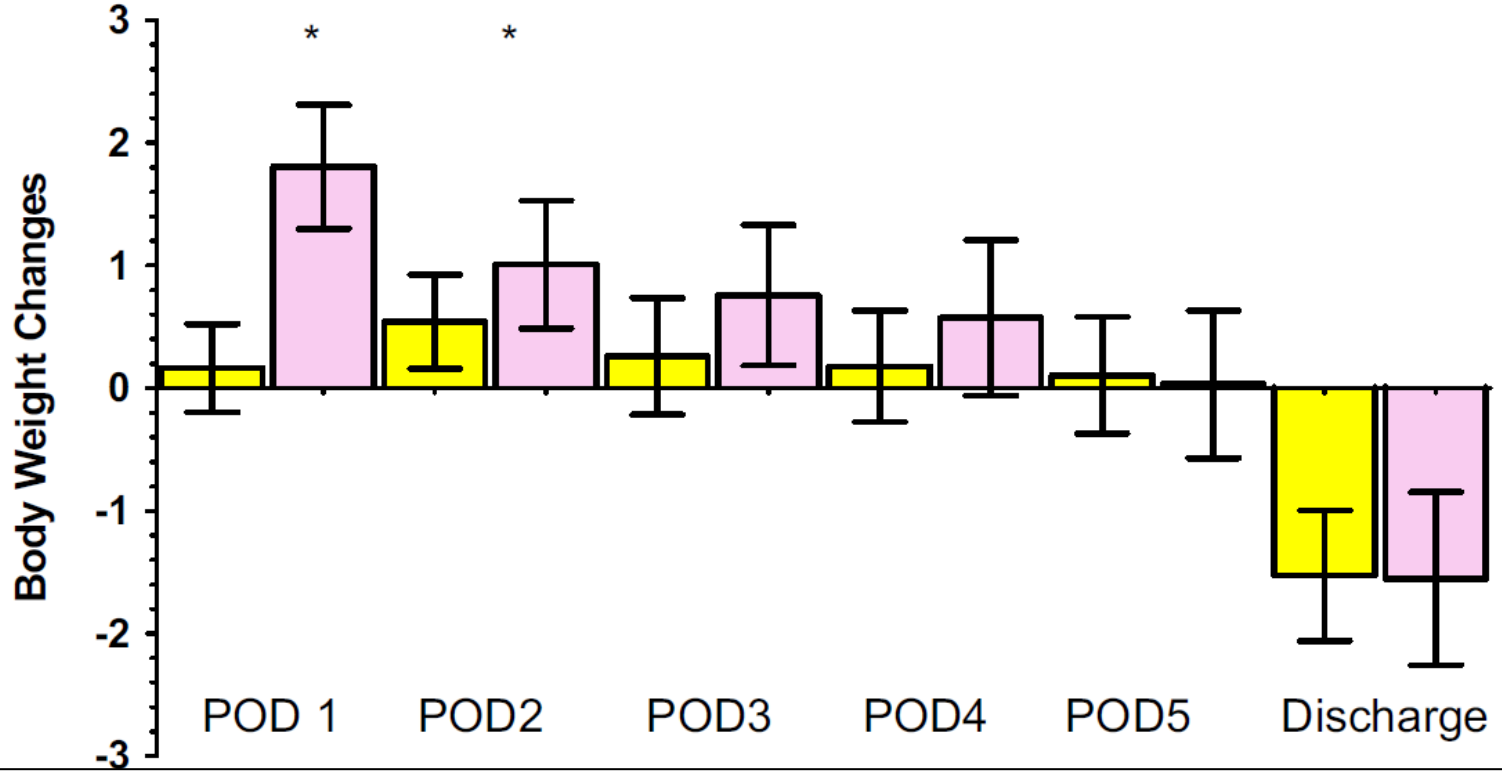
Intraoperative care: Fluid



Postoperative weight-gain (kg) differences presented as the mean with 95% CIs after radical cystectomy and urinary diversion in the 2 groups (yellow: norepinephrine/low-volume group [$n = 83$] and purple: control group [$n = 83$] with liberal fluid administration) ($^{*}P < 0.05$, POD = postoperative day).

Wuethrich & Burkhard, Urologic Oncology 2015

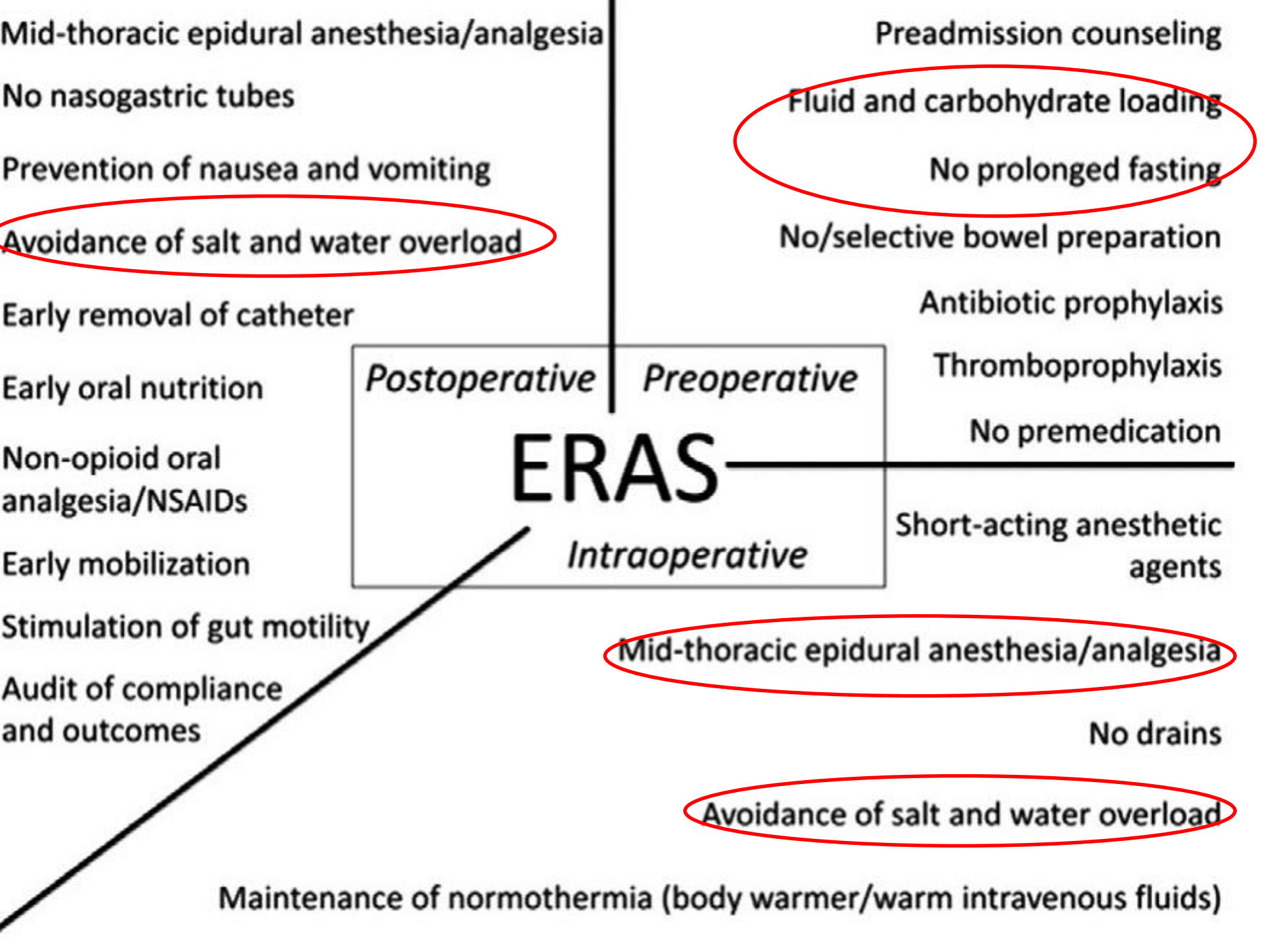
Intraoperative care: Fluid



- Weight gain: later return of bowel function, prolonged LOS (Lobo et al. ,Lancet 2002; Wuethrich et al. Anesthesiology 2014)
- Intravenous fluid: maintenance 1-1.5 ml/kg/h
- «Hang salt by default» is irrational (NaCl 0.9%), use «physiologic» balanced solution

Appropriate fluid and appropriate volume!

Wuethrich & Burkhard, Urologic Oncology 2015


Mid-thoracic epidural anesthesia/analgesia
No nasogastric tubes
Prevention of nausea and vomiting
Avoidance of salt and water overload
Early removal of catheter
Early oral nutrition
Non-opioid oral analgesia/NSAIDs
Early mobilization
Stimulation of gut motility
Audit of compliance and outcomes
Postoperative
Preoperative
ERAS
Intraoperative
Preadmission counseling
Fluid and carbohydrate loading
No prolonged fasting
No/selective bowel preparation
Antibiotic prophylaxis
Thromboprophylaxis
No premedication
Short-acting anesthetic agents
Mid-thoracic epidural anesthesia/analgesia
No drains
Avoidance of salt and water overload
Maintenance of normothermia (body warmer/warm intravenous fluids)

Perioperative Anemia

- Prevalence in patients with cancer 30-90%
- Ethiology multifactorial:

1. Preoperative: bone marrow suppression
2. Intraoperative: surgical blood loss, dilutional
3. Postoperative: poor bone marrow regenerative response, inflammatory response to surgery

Blood transfusion is associated with an increased risk of cancer recurrence and mortality.

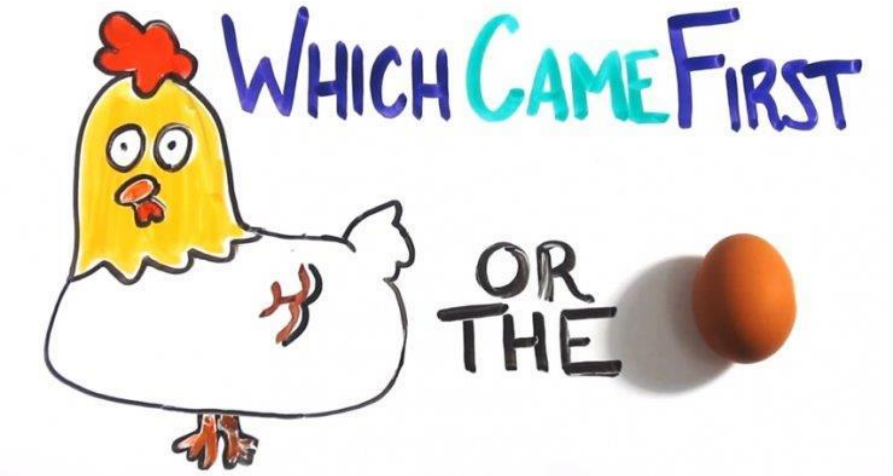
Blood transfusion is associated with an increased risk of postoperative infection.

Morgan et al. Urol Oncol 2013; Linder et al., Eur Urol 2013;
Cata et al., J Blood Transfusion 2016; Liu et al., Can J Urol 2016

Perioperative Anemia

Patients requiring blood transfusion:

- Older
- Female > male
- More advanced disease (pT ≥3)
- More comorbidities (ASA ≥3, CCI >3)
- Preoperative anemia



Morgan et al. Urol Oncol 2013; Linder et al., Eur Urol 2013

Perioperative Anemia

Treat severe to moderate perioperative anemia:

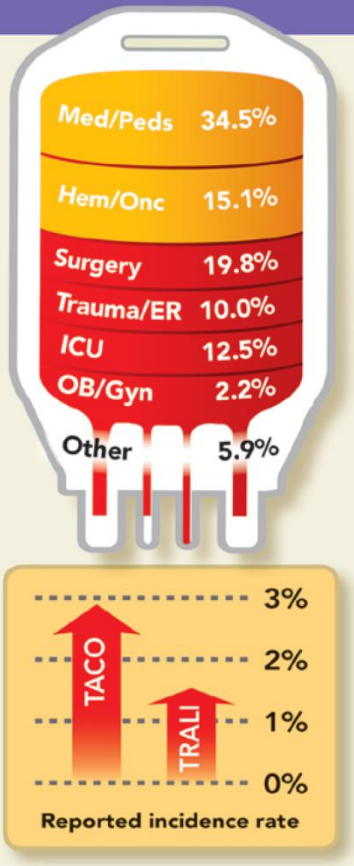
- Tumor patients tolerate anemia less than general population

- Frail patients are at high risk: Hb < 8 g/dl
  → Increased risk of cardiac event, pneumonia
  → 16-fold increase in mortality
  → Delay in administering erythrocytes is directly related to mortality

Musallam et al., Lancet, 2011 and Mackenzie CF et al., Anesthesia-Analgesia, 2010

Perioperative Transfusion: A Complicated Story

Each year approximately **21 million** blood components are transfused in the United States.*



Anesthesiologists may be involved in up to **50%** of decisions to transfuse.*

TACO

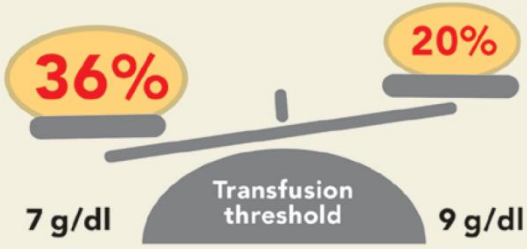
Transfusion-associated circulatory overload has been reported at 1 in 13,843* but perioperatively may affect **1 in 33**.[1]

TRALI

Similarly, while reported at 1 in 63,940,* transfusion-associated lung injury in the postop period may affect **1 in 71**.[2]

Major Complications

Despite the higher incidence recently reported, a **restrictive transfusion** approach had nearly **2x** as many **serious complications** for major cancer surgery.[3]



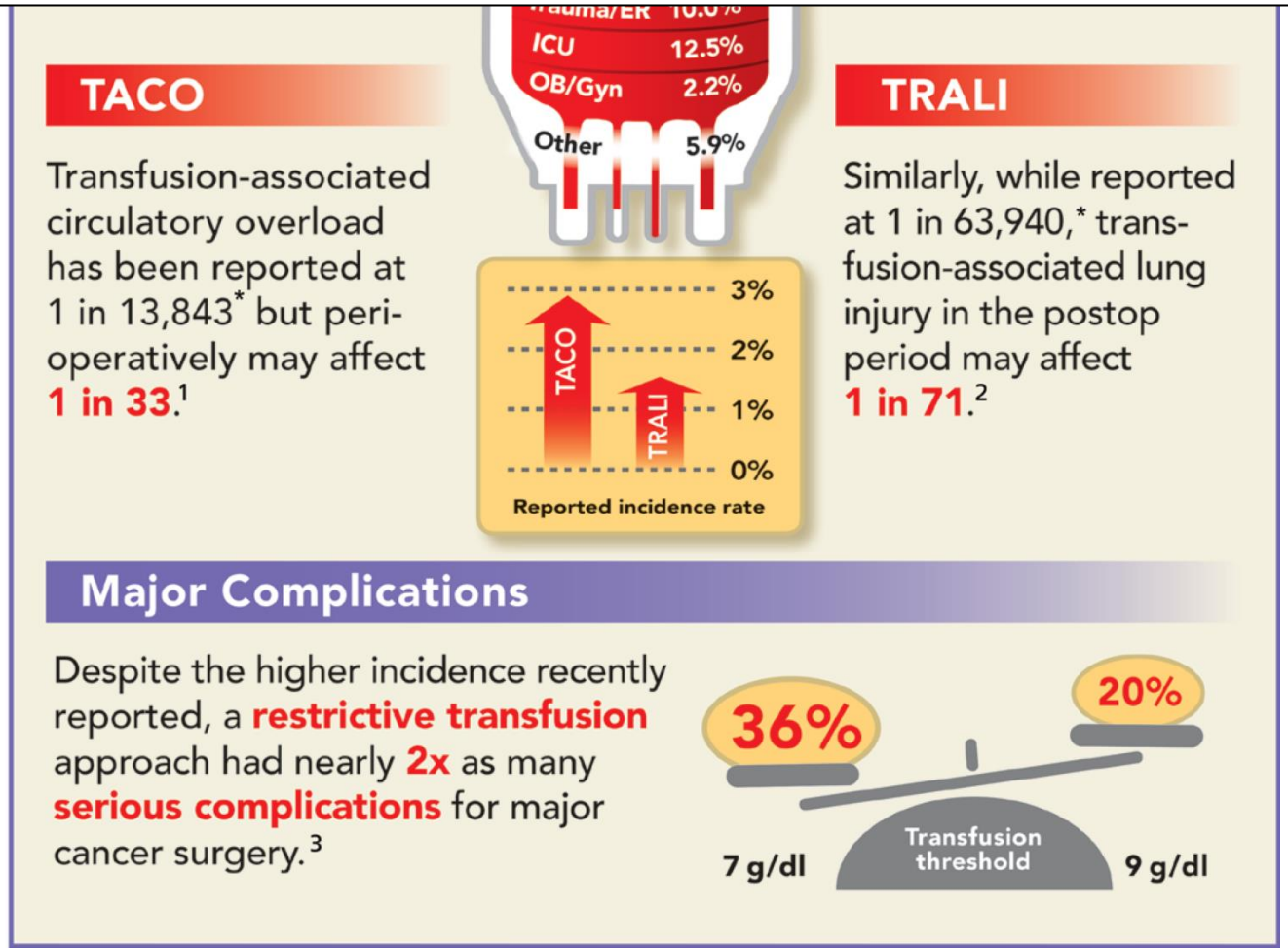
Wanderer JP, Anesthesiology, October 2014; Almeida et al., Anesthesiology, 2015

Balance between

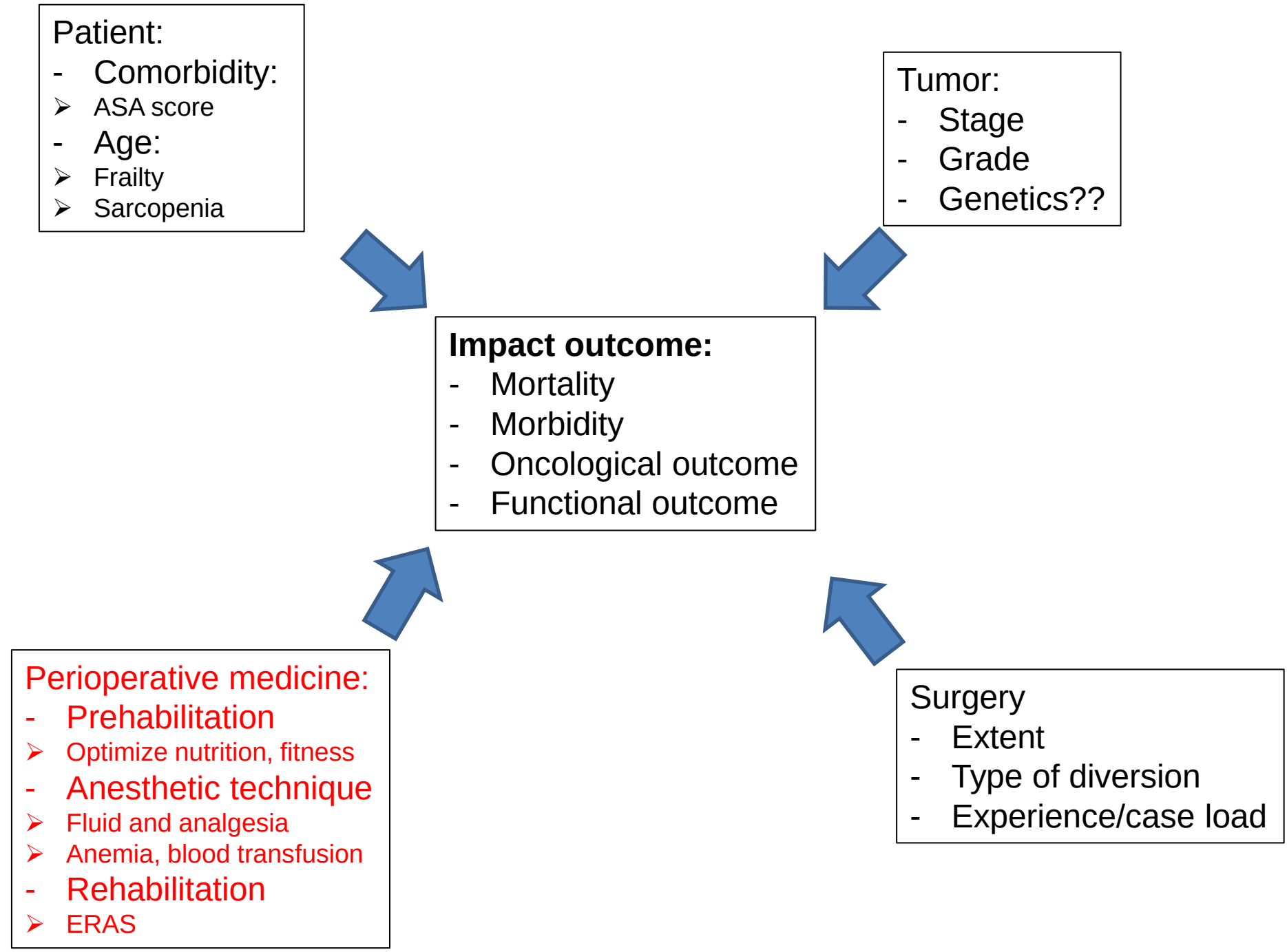
«long term» benefit from a restrictive blood transfusion strategy

Vs

«short term» benefit on morbidity of blood transfusion.



Wanderer JP, Anesthesiology, October 2014; Almeida et al., Anesthesiology, 2015


Patient:
- Comorbidity:
➢ ASA score
- Age:
➢ Frailty
➢ Sarcopenia
Tumor:
- Stage
- Grade
- Genetics??
Impact outcome:
- Mortality
- Morbidity
- Oncological outcome
- Functional outcome
Perioperative medicine:
- Prehabilitation
➢ Optimize nutrition, fitness
- Anesthetic technique
➢ Fluid and analgesia
➢ Anemia, blood transfusion
- Rehabilitation
➢ ERAS
Surgery
- Extent
- Type of diversion
- Experience/case load

Patient:
- Comorbidity:
  - ASA score

Tumor:

Risk assessment for postoperative outcome in cystectomy patients should be **simple and easy accessible**:

- Age
- Frailty
- Sarcopenia
- ASA score
- Perioperative anemia and blood transfusion

Past performance is not always a good indicator of future performance!

Perioperative medicine:
- Prehabilitation
  - Optimize nutrition, fitness
- Anesthetic technique
  - Fluid and analgesia
  - Anemia, blood transfusion
- Rehabilitation
  - ERAS

Surgery
- Extent
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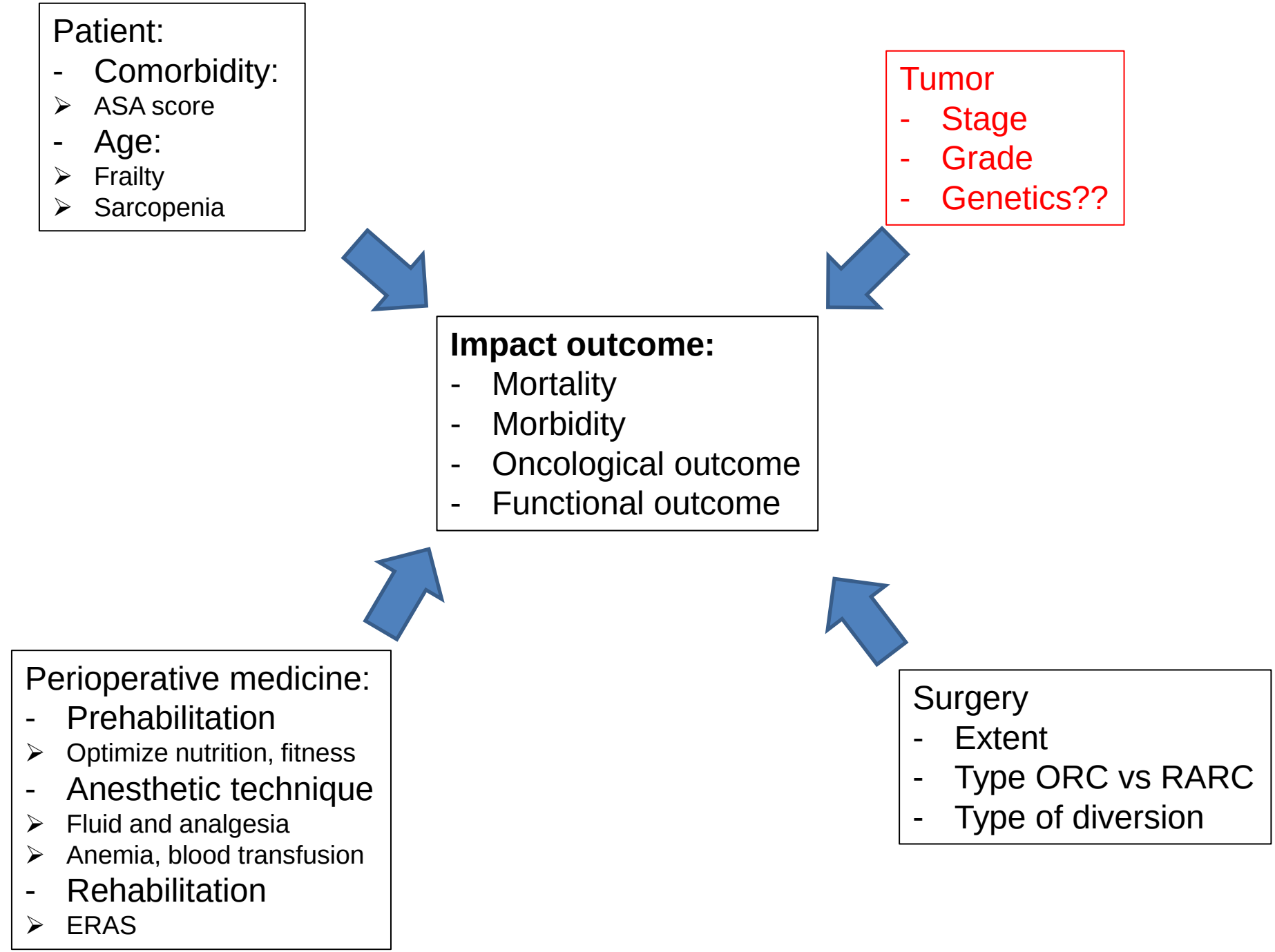
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- Rehabilitation
➢ ERAS
Surgery
- Extent
- Type ORC vs RARC
- Type of diversion

Radical Cystectomy for Urothelial Carcinoma of the Bladder Without Neoadjuvant or Adjuvant Therapy: Long-Term Results in 1100 Patients

Richard E. Hautmann [a,*], *Robert C. de Petriconi* [a], *Christina Pfeiffer* [b], *Bjoern G. Volkmer* [a,b]

[a] *Department of Urology, University of Ulm, Ulm, Germany;* [b] *Department of Urology, Klinikum Kassel, Kassel, Germany*

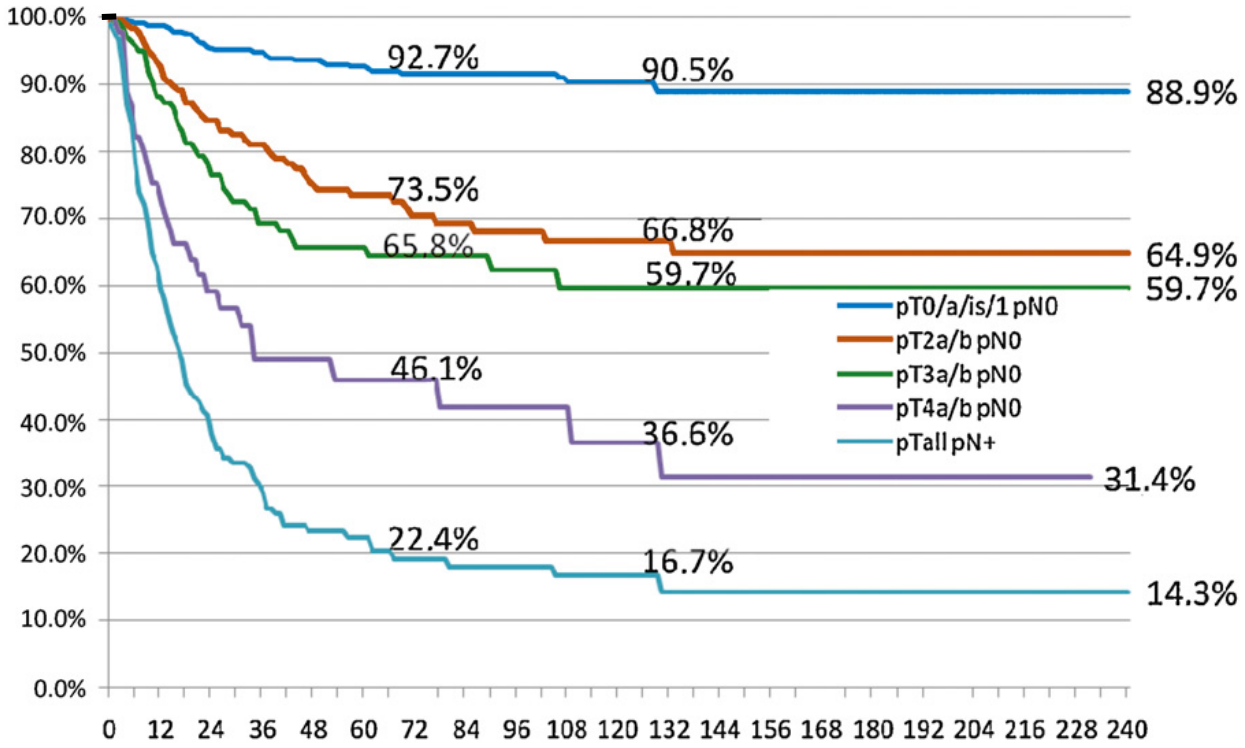

Fig. 2 – Disease-specific survival rates according to the tumor stage of the cystectomy specimen.

Radical Cystectomy for Urothelial Carcinoma of the Bladder Without Neoadjuvant or Adjuvant Therapy: Long-Term Results in 1100 Patients

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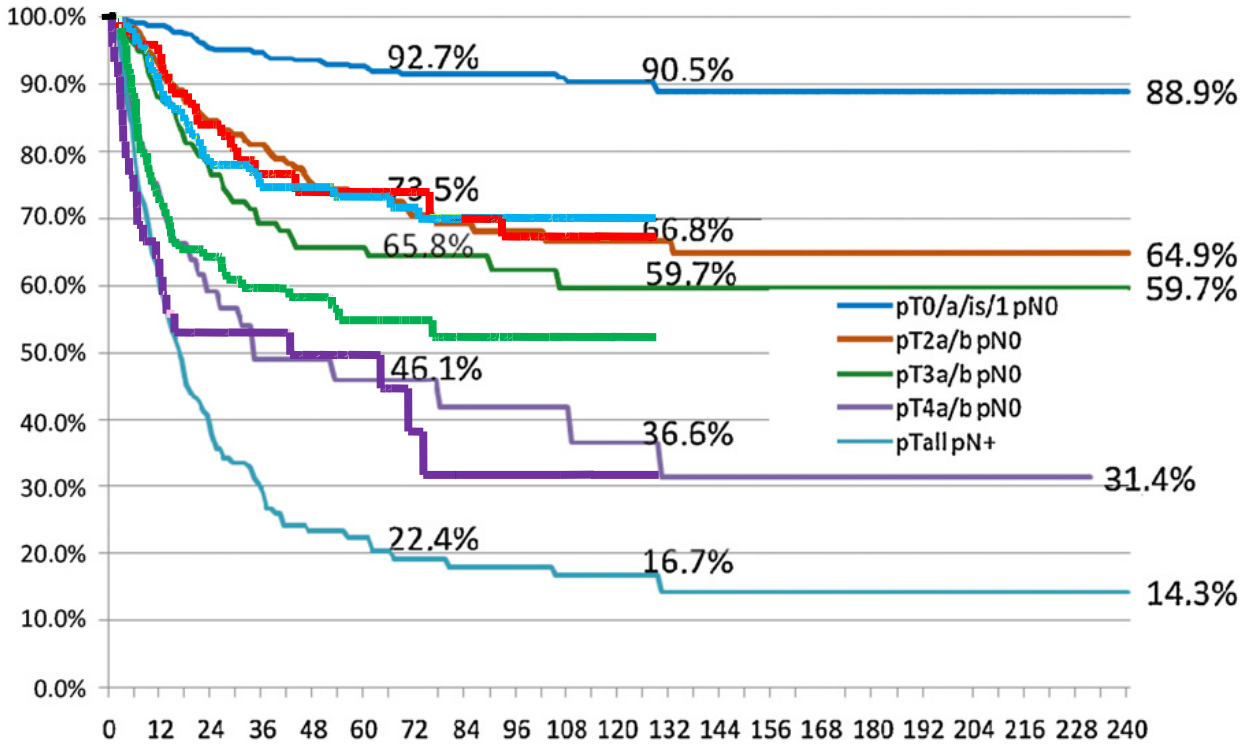
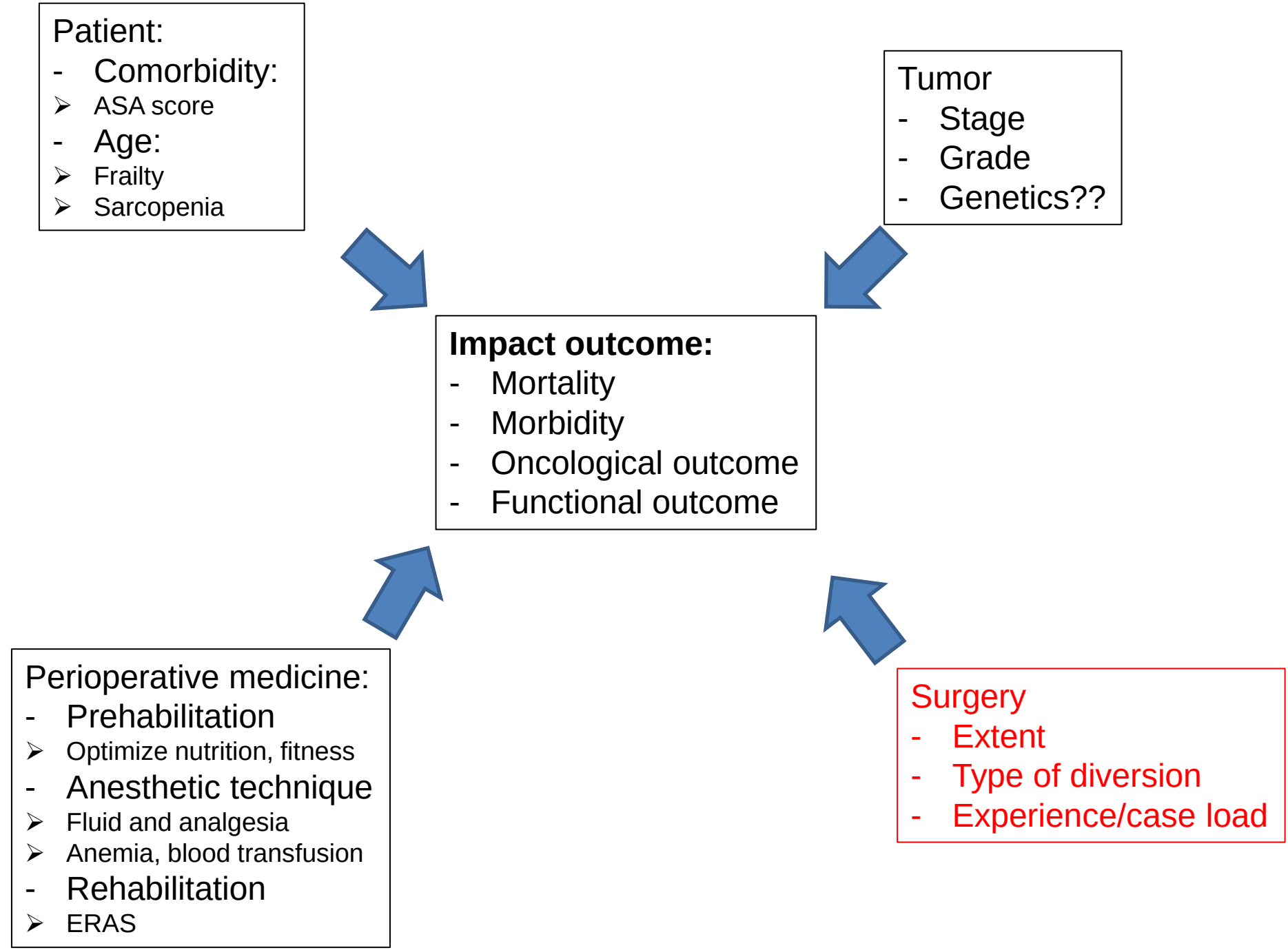


pT1pN0 (n = 75)
pT2pN0 (n = 125)
pT3pN0 (n = 120)
pT4pN0 (n = 46)

Fig. 2 – Disease-specific survival rates according to the tumor stage of the cystectomy specimen.


Patient:
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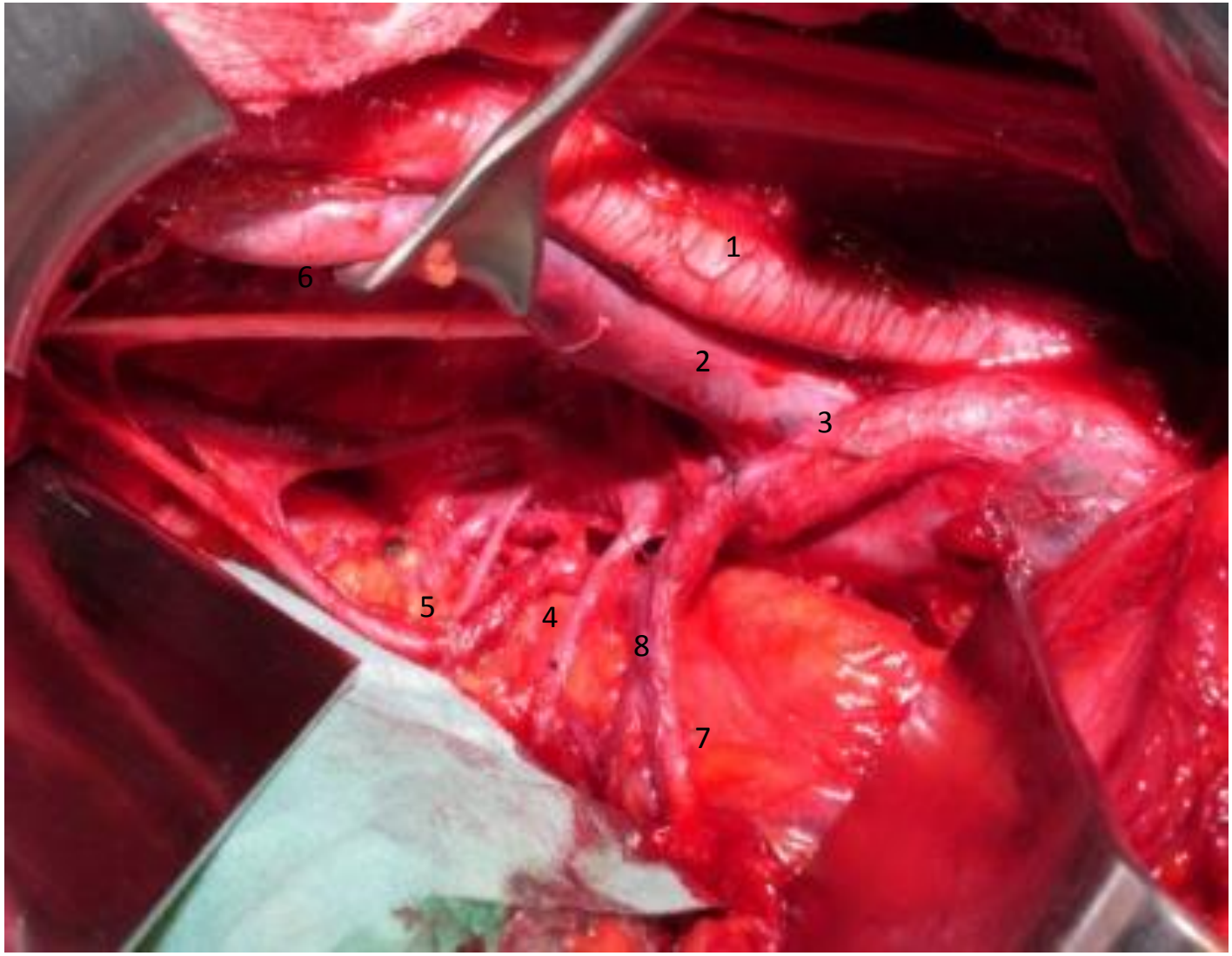
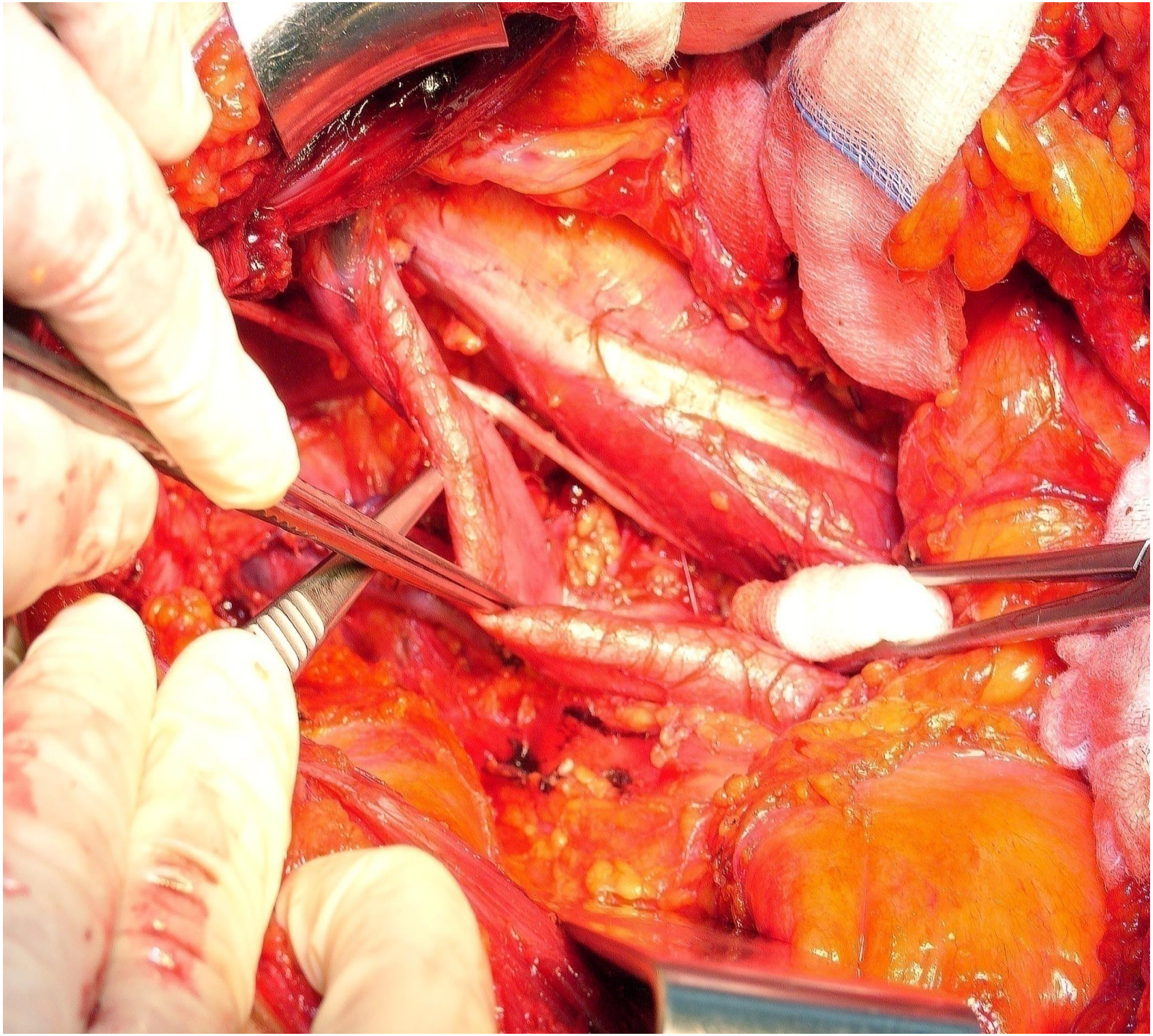
Surgery
- Extent
- Type of diversion
- Experience/case load

Lymph node dissection

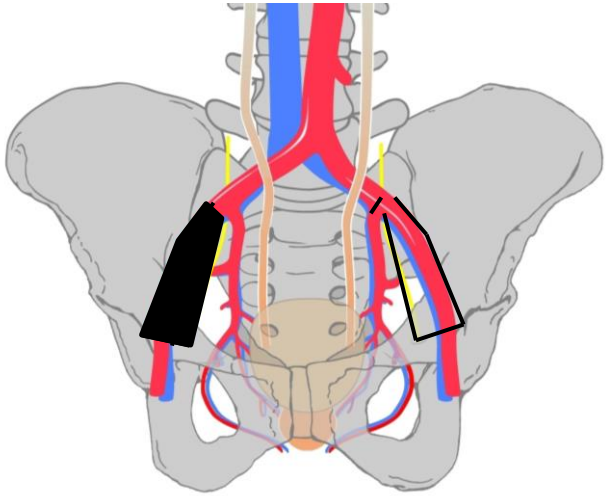


1.) Right external iliac artery
2.) Right external iliac vein
3.) Right internal iliac artery
4.) Right superior vesical artery
5.) Right obturator artery
6.) Right obturator nerve
7.) Urinray bladder
8.) Right medial umbilical ligament

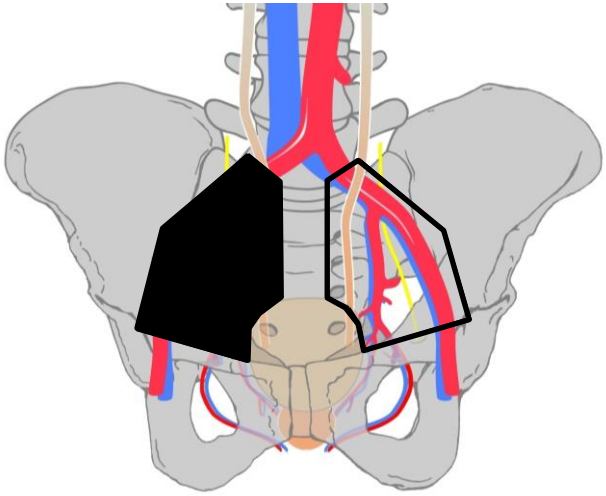


PLND templates

Limited PLND



Extended PLND



Incidence of Positive Nodes at Histology limited vs extended PLND

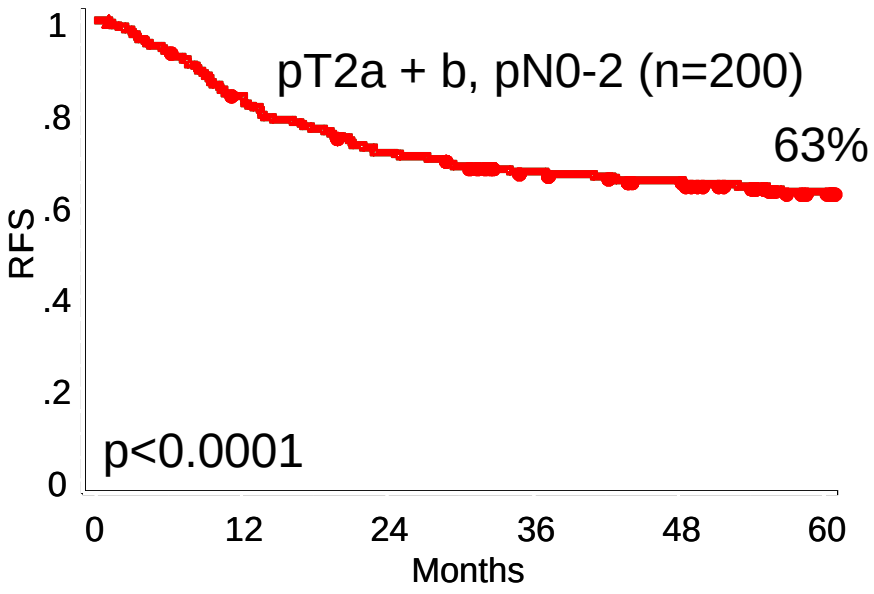
Stage	Template	Pts with pos nodes / total n pts	%
pT**2** N0M0	Limited	15/200	**7.5%**
pT**2** N0M0	Extended	24/150	**16 %**
pT**3** N0M0	Limited	29/136	**21 %**
pT**3** N0M0	Extended	59/172	**34 %**

Dhar N., Studer U.E. et al., J. Urol 179: 873-878, 2008

Recurrence free survival of pT2 pN_{0-2} & pT3 pN_{0-2}

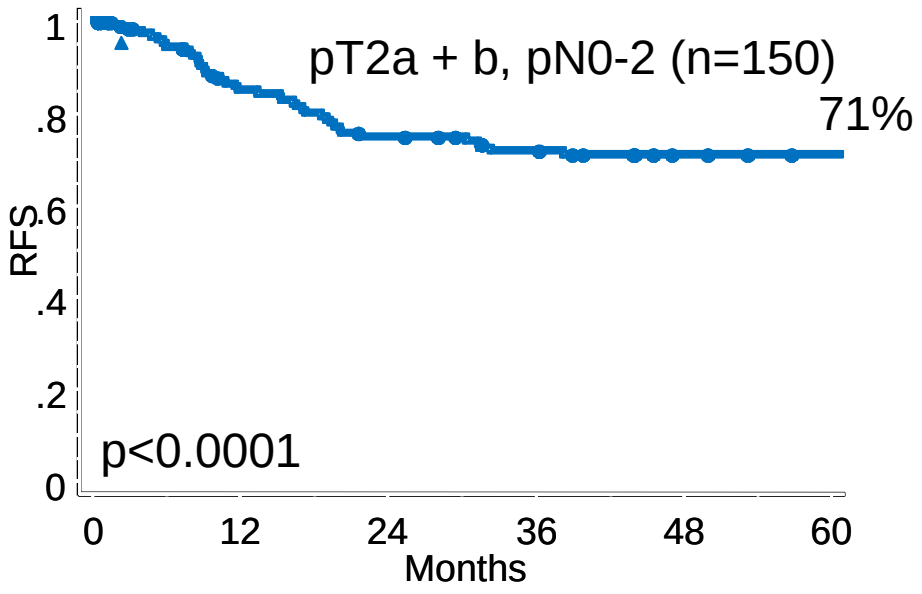
Limited PLND

CC Patients



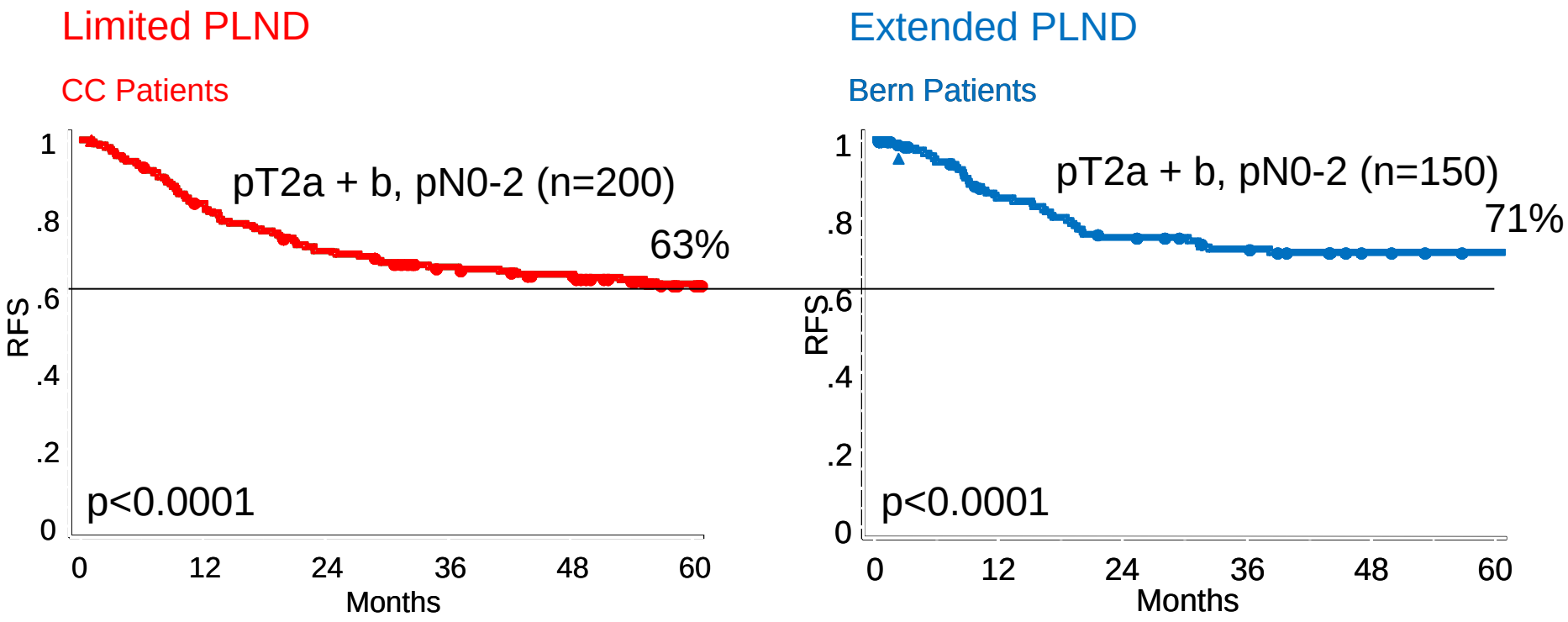
Extended PLND

Bern Patients



Dhar N., Studer U.E. et al., J. Urol 179: 873-878, 2008

Recurrence free survival of pT2 pN_{0-2} & pT3 pN_{0-2}



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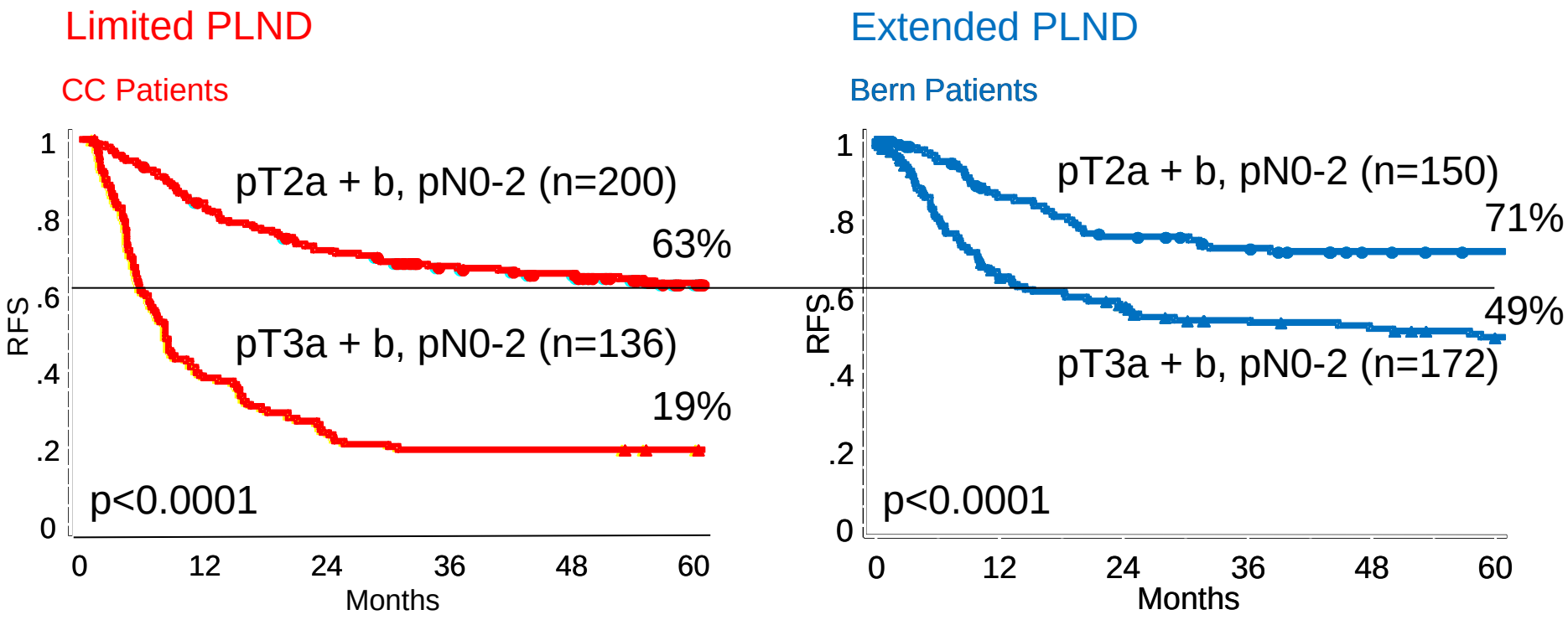
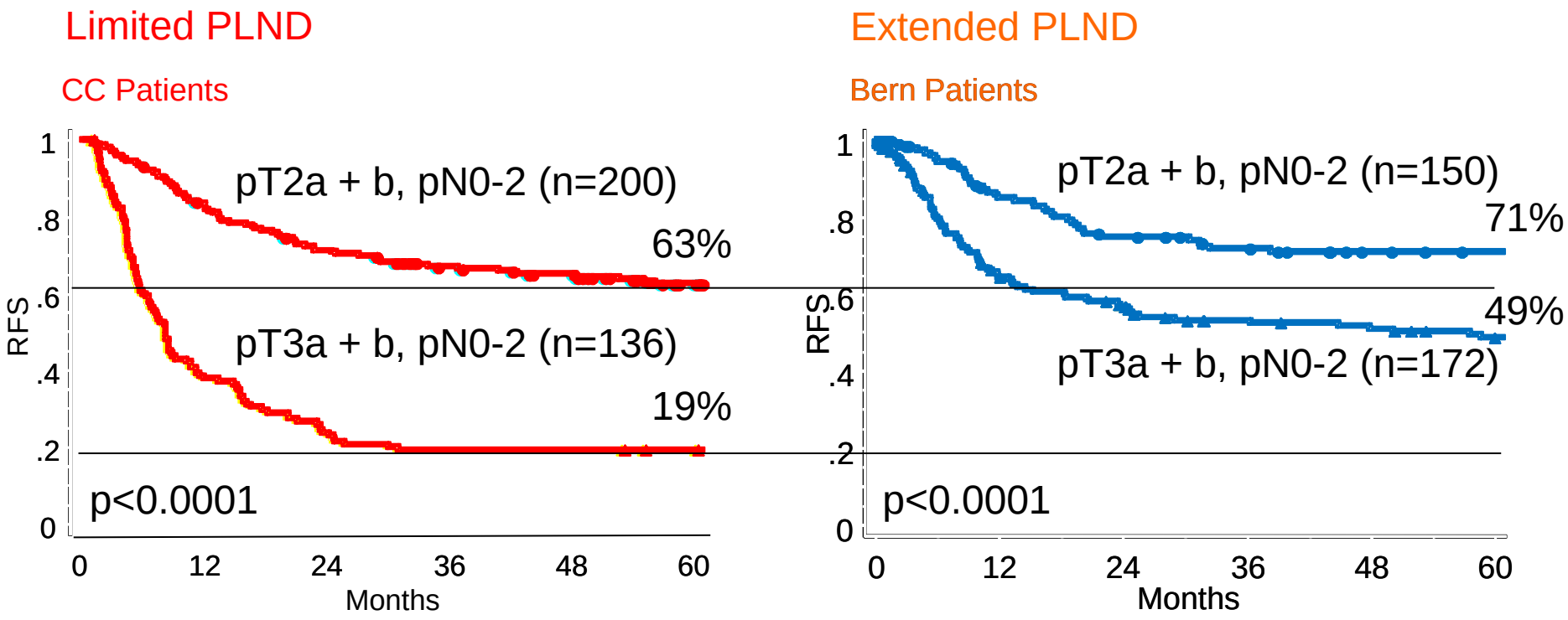
Recurrence free survival of pT2 pN_{0-2} & pT3 pN_{0-2}



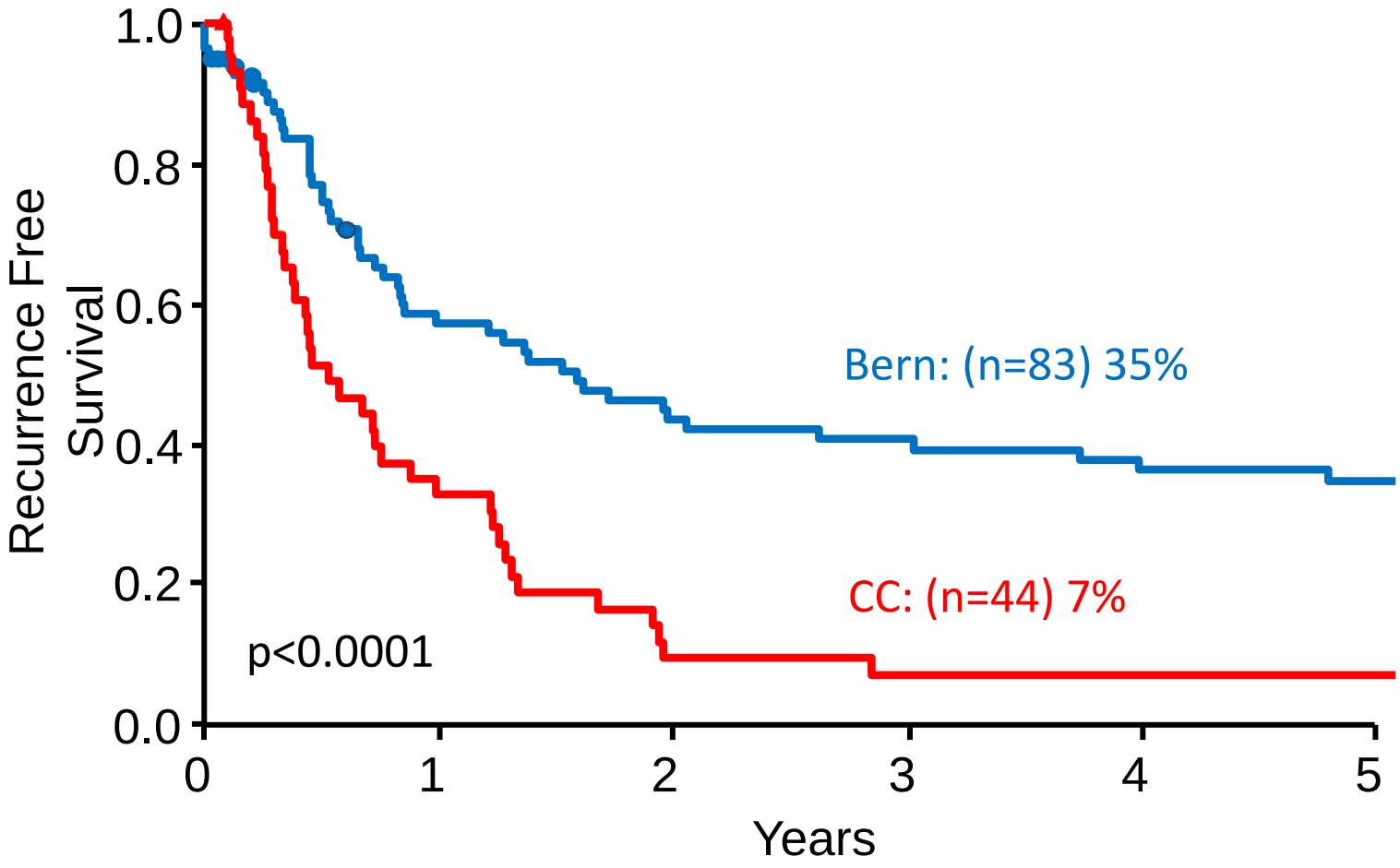
Dhar N., Studer U.E. et al., J. Urol 179: 873-878, 2008

Recurrence free survival of pT2 pN_{0-2} & pT3 pN_{0-2}



Dhar N., Studer U.E. et al., J. Urol 179: 873-878, 2008

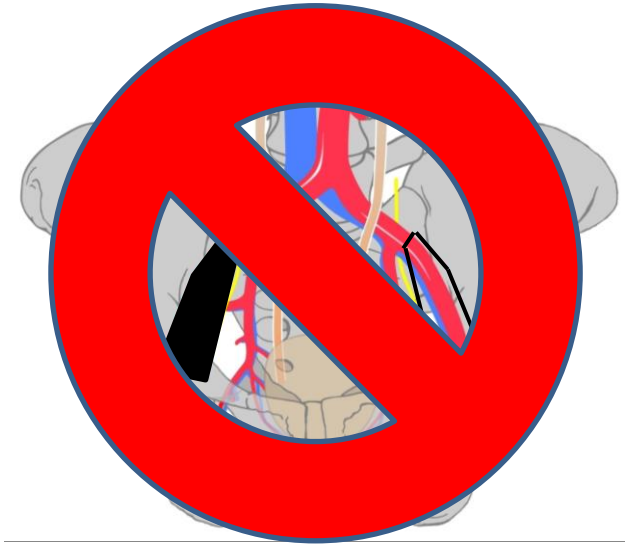
Recurrence Free Survival for pT_{any} pN+



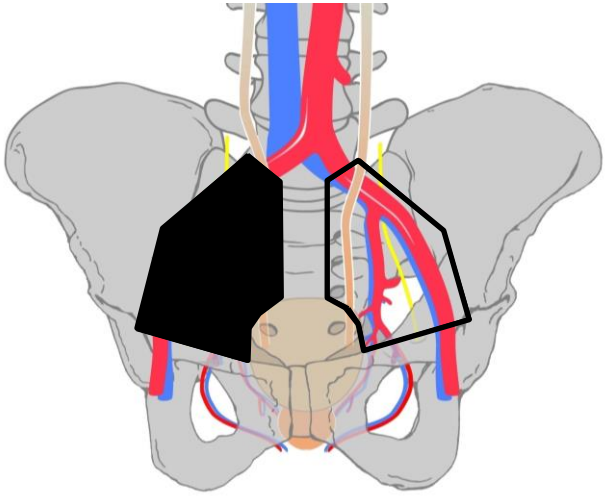
Dhar N., Studer U.E. et al., J. Urol 179: 873-878, 2008

PLND templates

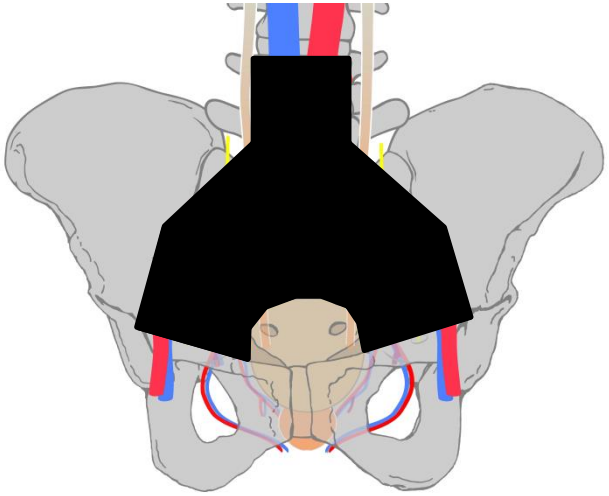
Limited PLND



Extended PLND



Super extended PLND

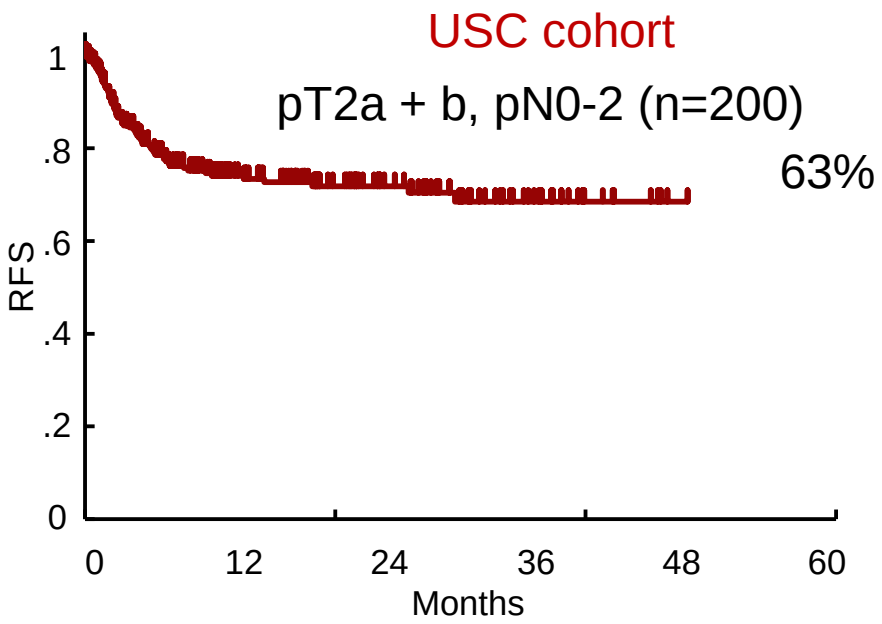


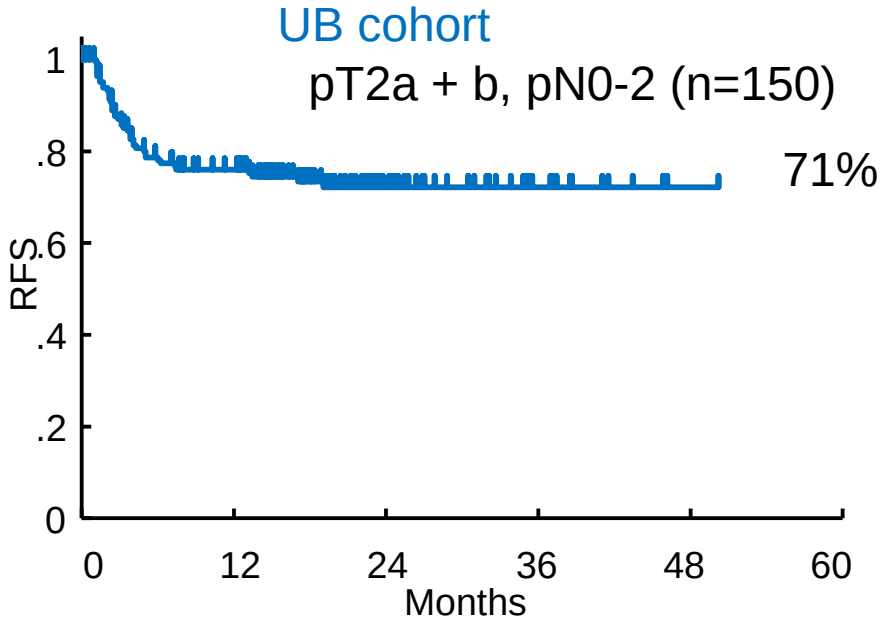
Incidence of Positive Nodes at Histology extended vs super extended PLND (IMA)

Stage	Institution Template	Pts with pos nodes / total n pts	%
pT2 N0M0	Bern Extended	26/169	**15 %**
pT2 N0M0	USC Super Extended	57/253	**23 %**
pT3 N0M0	Bern Extended	88/236	**37 %**
pT3 N0M0	USC Super Extended	138/301	**46 %**

Zehnder P et al., J. Urology 2011

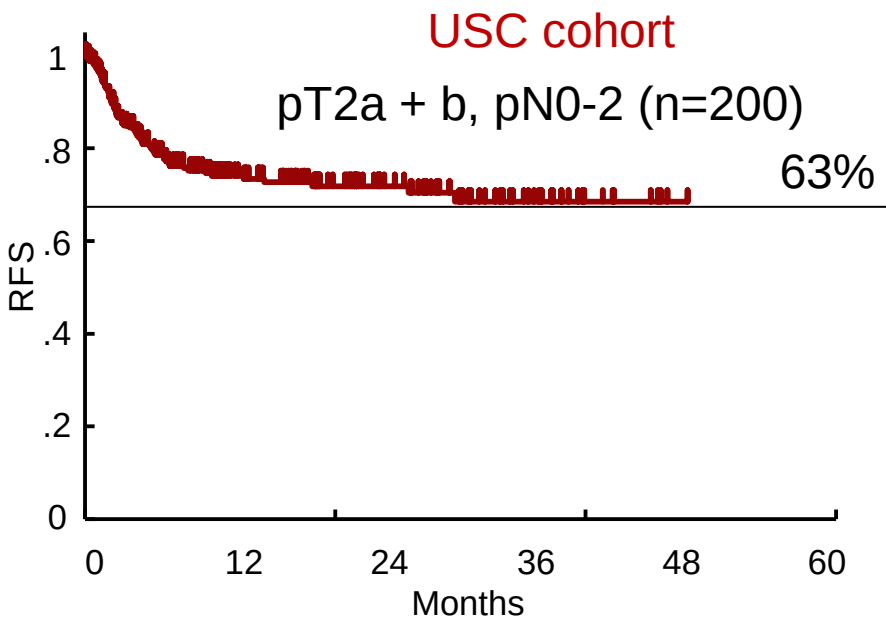
Recurrence free survival of pT2 pN_{0-2} & pT3 pN_{0-2}

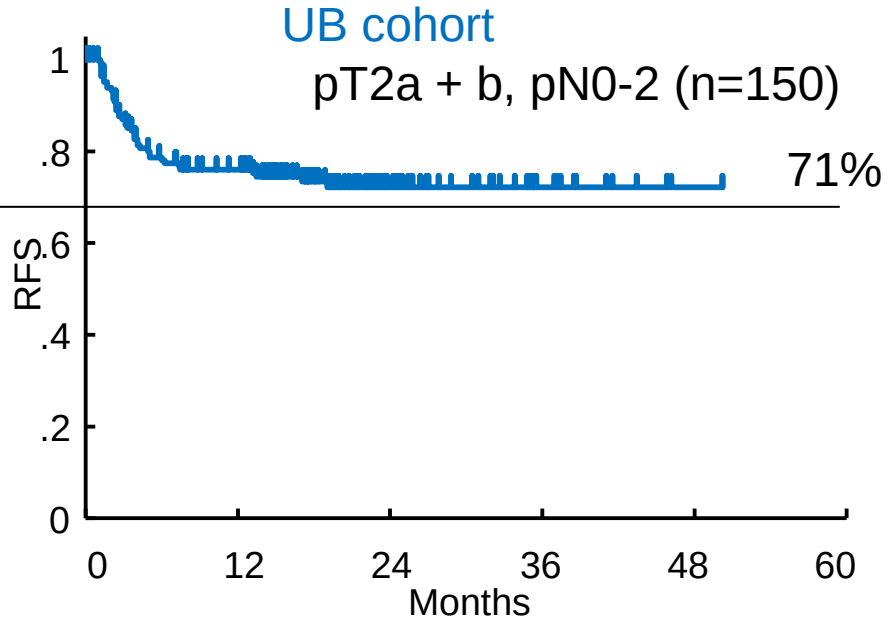




	± standard error			UB, % ± standard error	
	5y	10y	p-value	5y	10y
pT2 pN0-2	75 ± 3	72 ± 3	p = 0.91	76 ± 3	72 ± 4

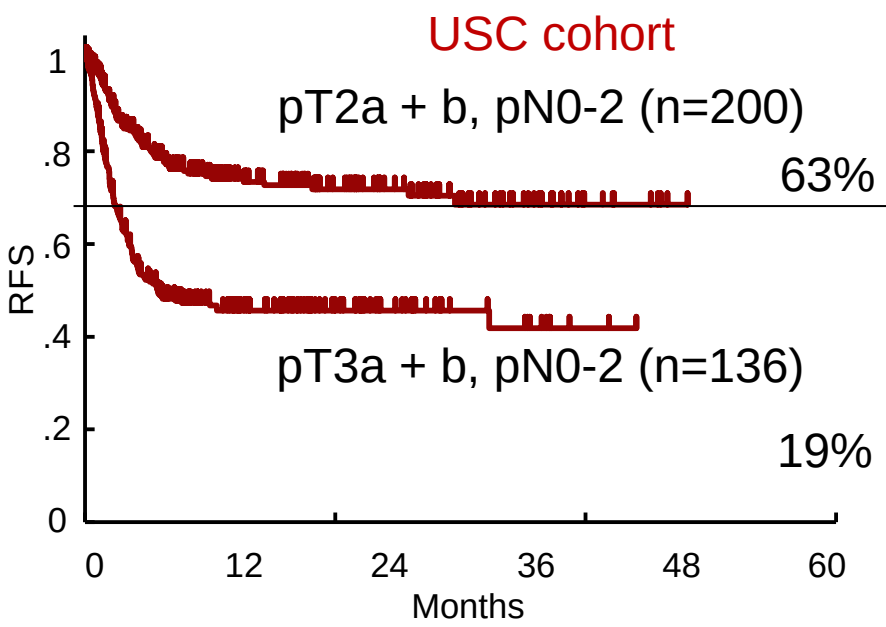
Recurrence free survival of pT2 pN_{0-2} & pT3 pN_{0-2}

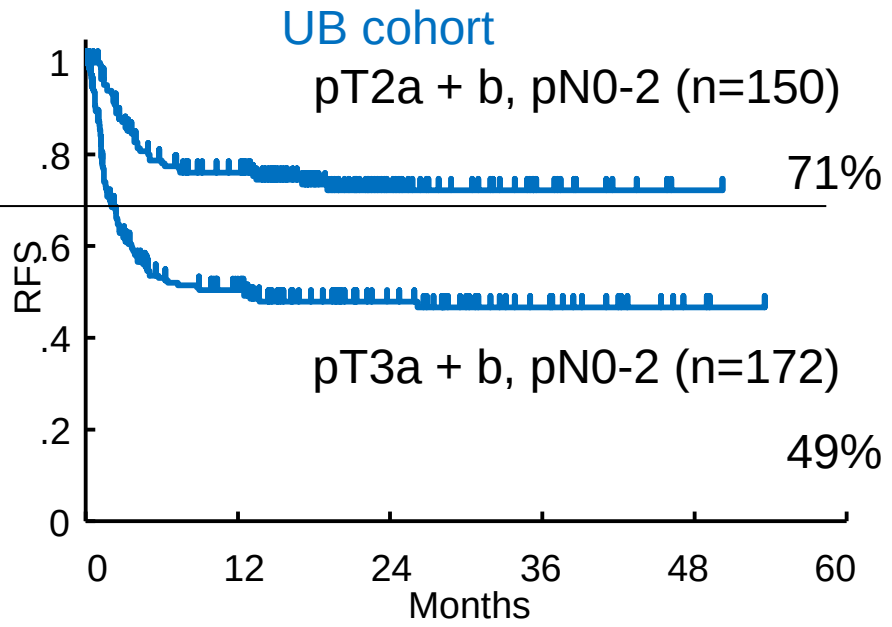




	± standard error			UB, % ± standard error	
	5y	10y	p-value	5y	10y
pT2 pN0-2	75 ± 3	72 ± 3	p = 0.91	76 ± 3	72 ± 4

Recurrence free survival of pT2 pN_{0-2} & pT3 pN_{0-2}





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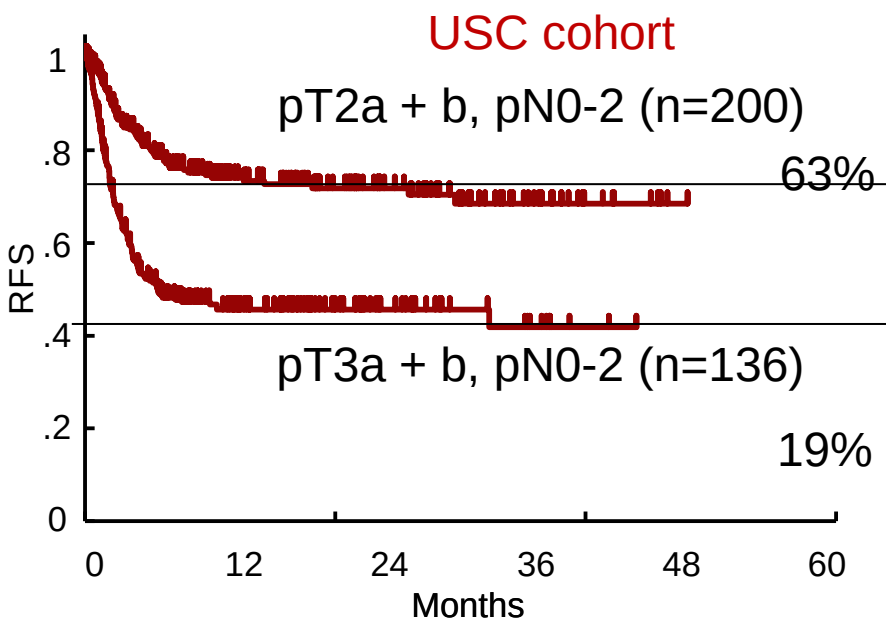
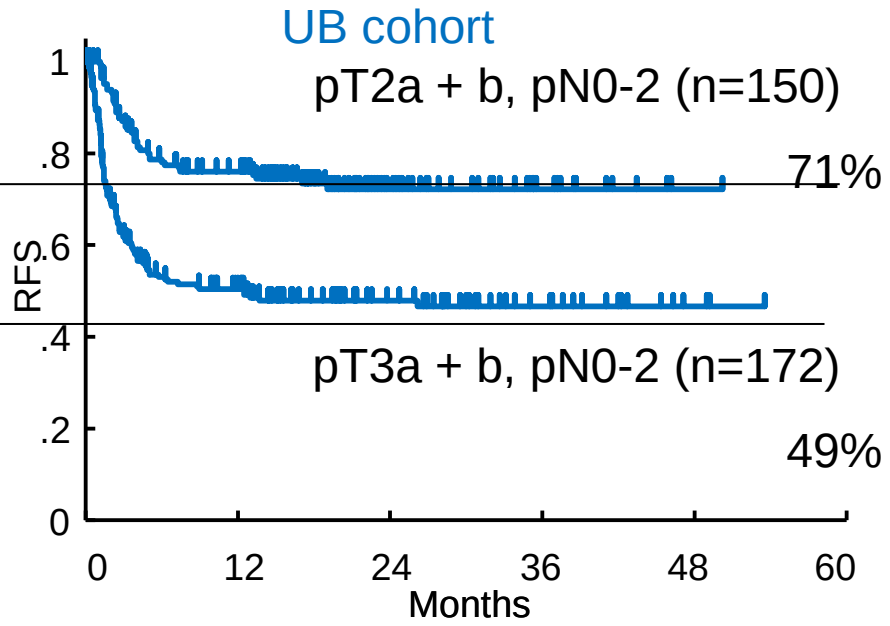
	5y	10y	p-value	5y	10y
pT2 pN0-2	75 ± 3	72 ± 3	p = 0.91	76 ± 3	72 ± 4
pT3 pN0-2	47 ± 3	46 ± 5	p = 0.83	50 ± 3	48 ± 4

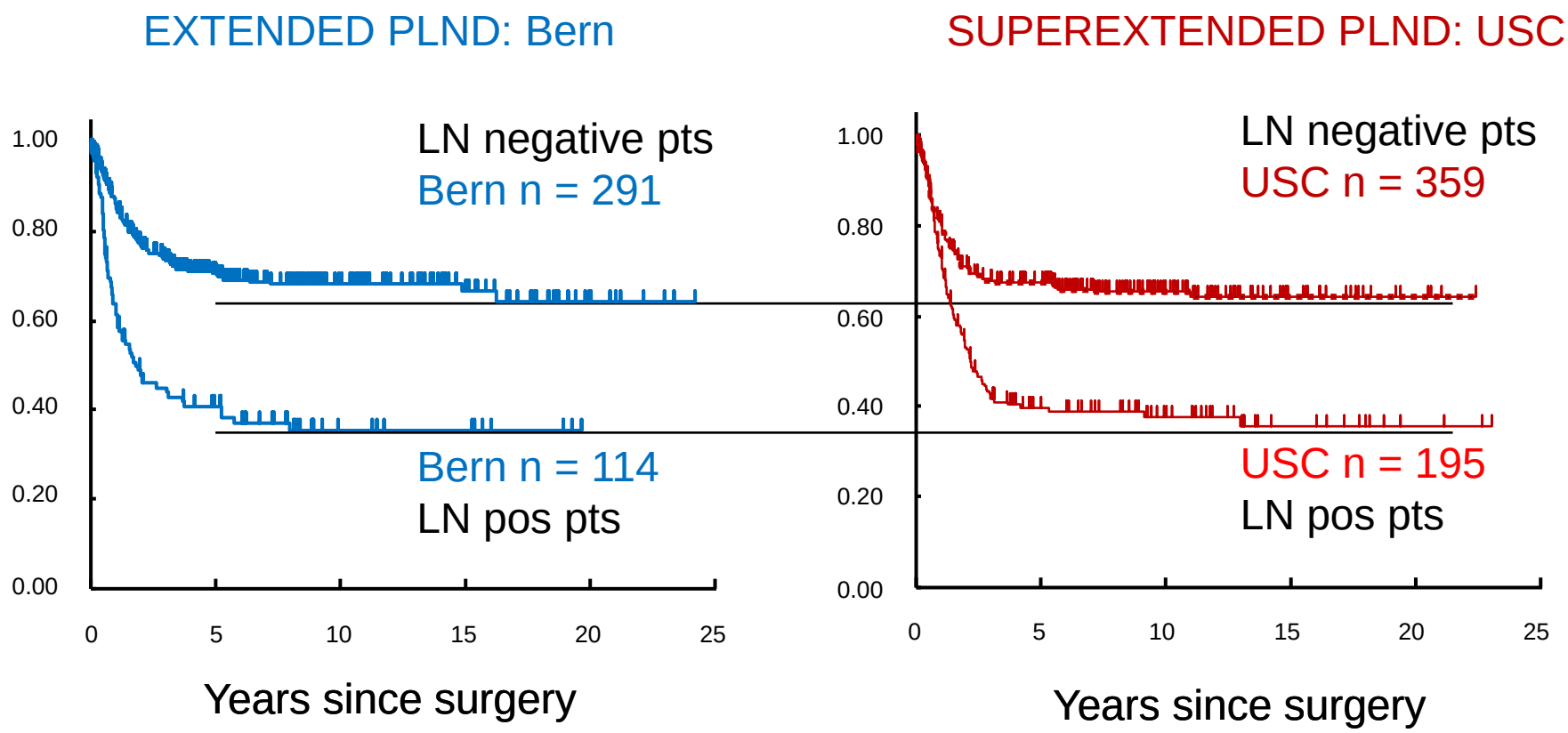
Recurrence free survival of pT2 pN_{0-2} & pT3 pN_{0-2}





	± standard error			UB, % ± standard error	
	5y	10y	p-value	5y	10y
pT2 pN0-2	75 ± 3	72 ± 3	p = 0.91	76 ± 3	72 ± 4
pT3 pN0-2	47 ± 3	46 ± 5	p = 0.83	50 ± 3	48 ± 4

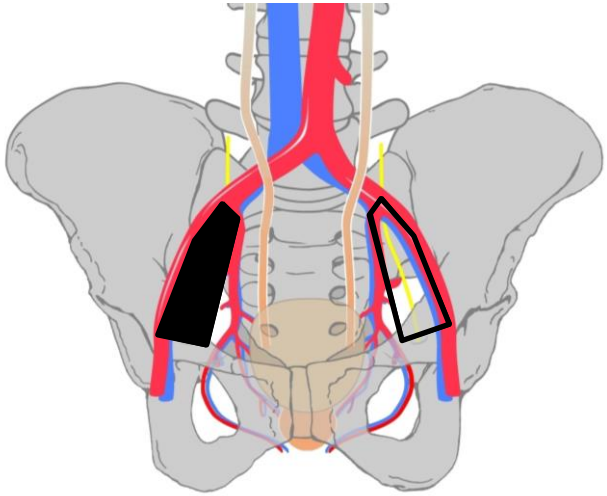
Recurrence-free survival according to nodal status



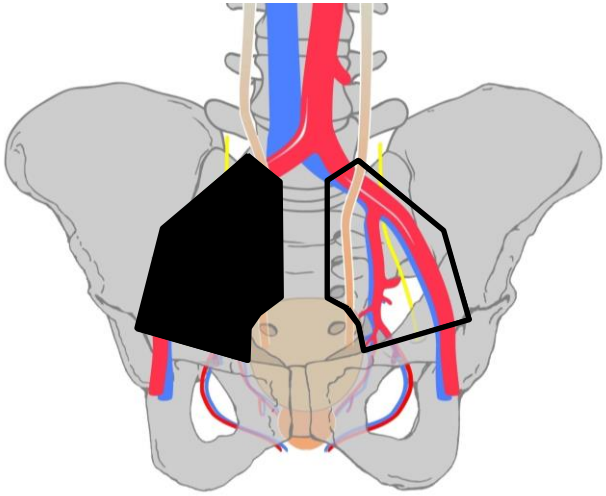
Zehnder P et al., J. Urology 2011

PLND templates

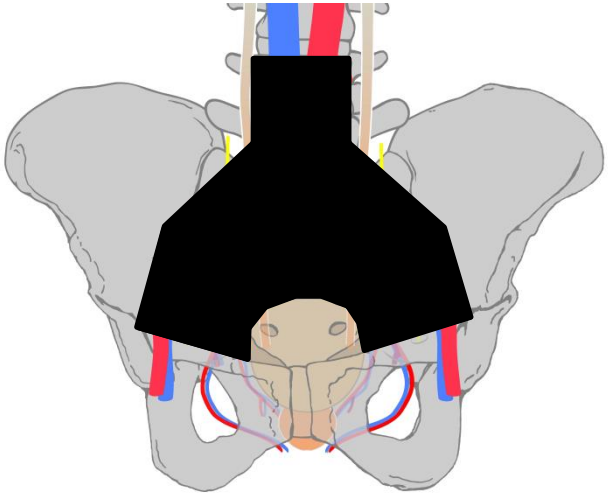
Limited PLND



Extended PLND

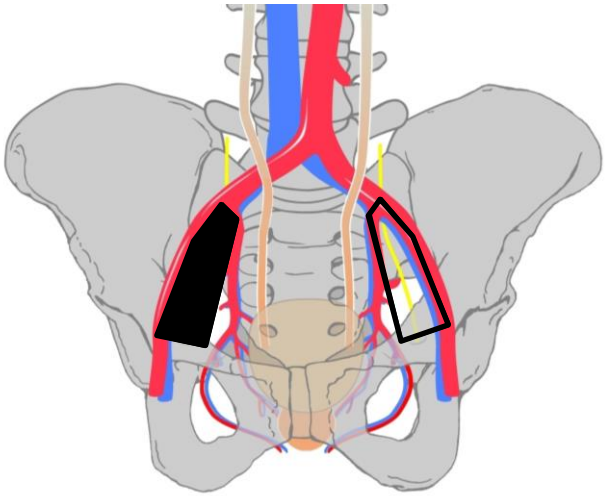


Super extended PLND

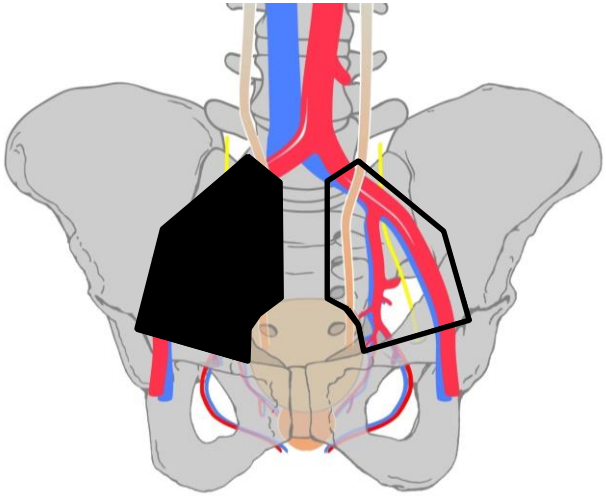


Limited versus extended pelvic lymphadenectomy in patients with bladder cancer undergoing radical cystectomy: Survival results from a prospective, randomized trial

Limited PLND

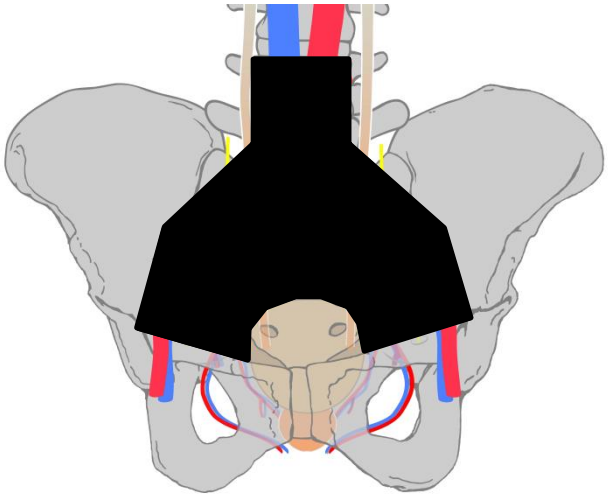


Extended PLND



Limited PLND!

Super extended PLND



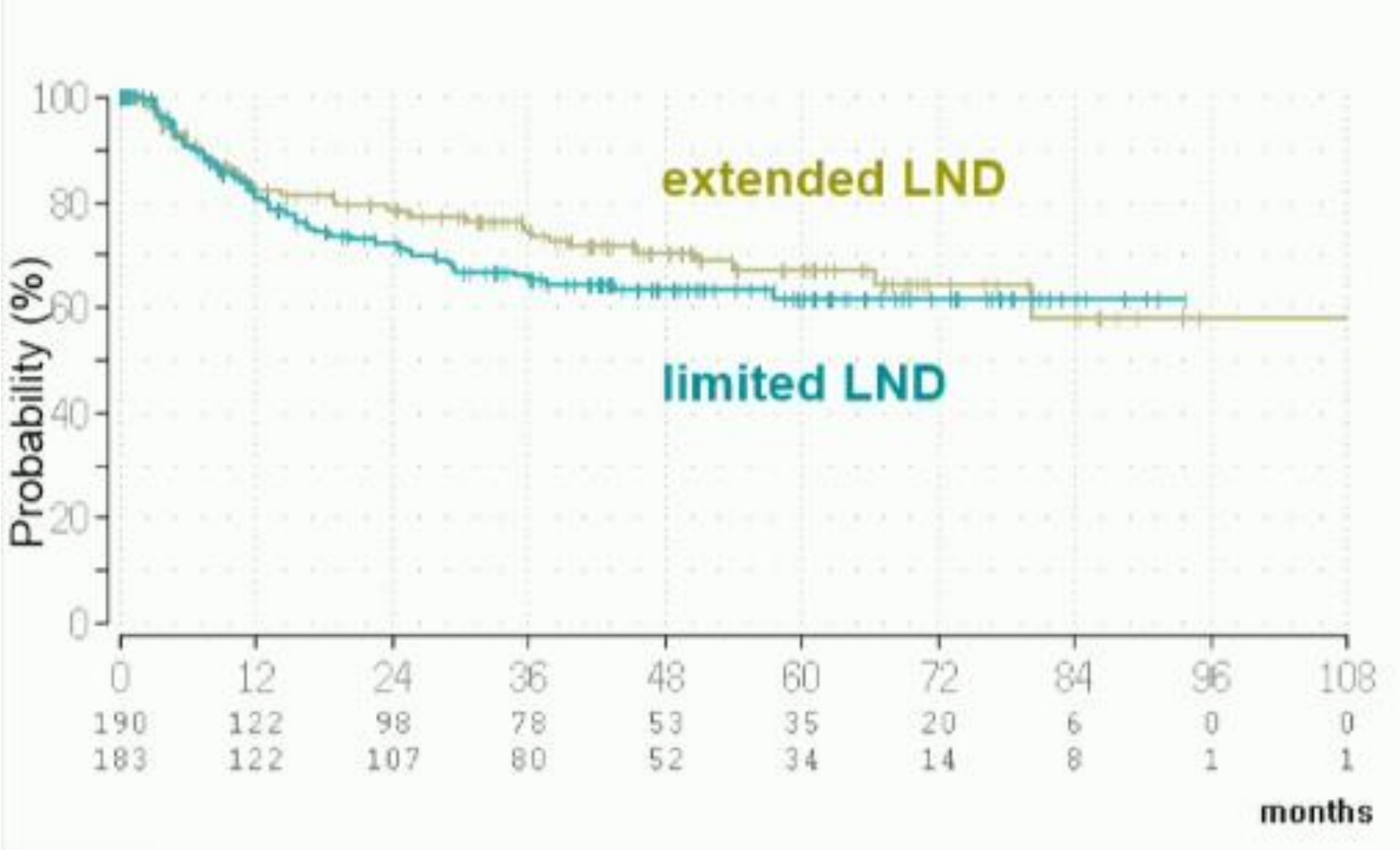
Extended PLND!

Gschwend J ASCO 2016

	Limited LND	Extended LND	p-value	Total
Intention-to-treat, pts.	190	183		373
Gender, pts. (%)				
male	152 (80)	139 (76)	p=0.38	291 (78)
female	38 (20)	44 (24)	p=0.38	82 (22)
Age, years				
median	68.2	67.1	p=0.36	67.9
range	40.3-87.2	39.5-88.7		39.5-88.7
Removed lymph nodes				
median	19	31	**p<0.01**	24
range	2-66	0-122		0-122
pN-status, pts. (%)				
pN0	138 (72.6)	146 (79.8)	p=0.12	284 (76.1)
pN+	52 (27.4)	37 (20.2)	p=0.12	89 (23.9)
pN1	14 (7.4)	12 (6.6)	p=0.64	26 (7.0)
pN2	38 (20.0)	25 (13.7)	p=0.64	63 (16.9)
pT-status, pts. (%)				
pT1	23 (12.1)	31 (16.9)	p=0.19	54 (14.5)
pT2	77 (40.5)	83 (45.4)	p=0.35	160 (42.9)
pT3	65 (34.2)	58 (31.7)	p=0.66	123 (33.0)
pT4	25 (13.2)	11 (6.0)	**p=0.02**	36 (9.7)
Adjuvant chemotherapy, pts. (%)	29 (15.3)	23 (12.6)	p=0.46	52 (13.9)

Gschwend J ASCO 2016

Recurrence free survival



Gschwend J ASCO 2016

Complications

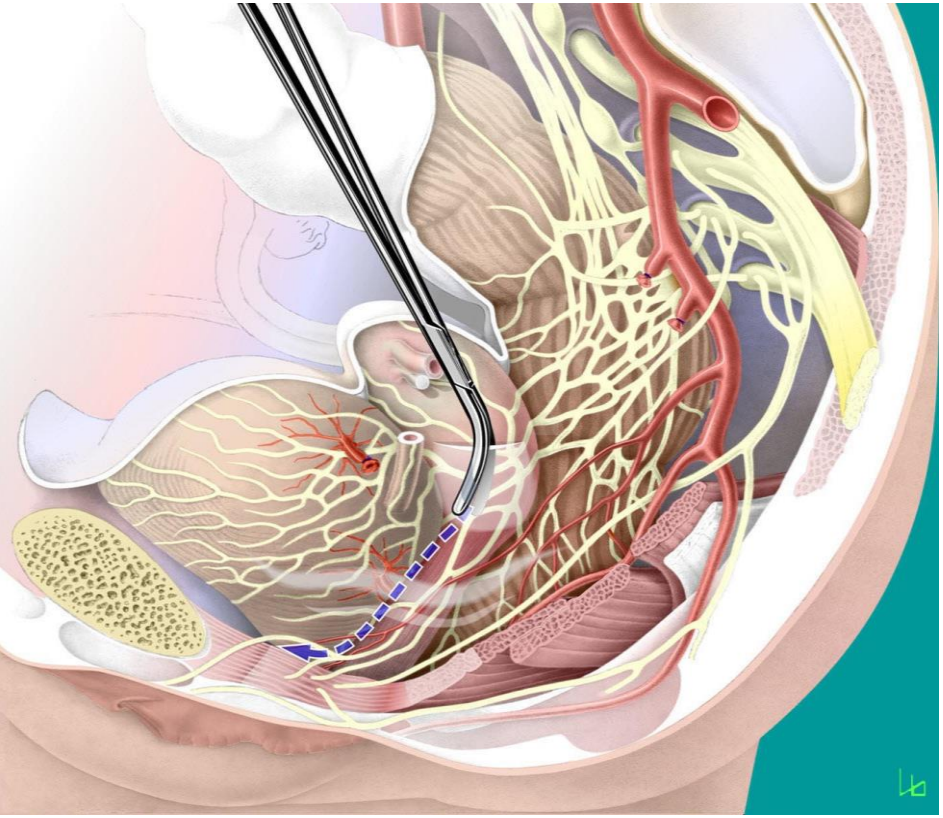
Patients (%)	Limited LND n=190	Extended LND n=183	p-value 2-sided
30d major complications (≥Clavien 3)	49 (25.8)	49 (26.8)	p = 0.91
Lymphocele requiring intervention (Clavien 3a/b)	7(3.7)	17 (9.3)	p = 0.03
90d major complications (≥Clavien 3)	50 (26.3)	54 (29.5)	p = 0.28

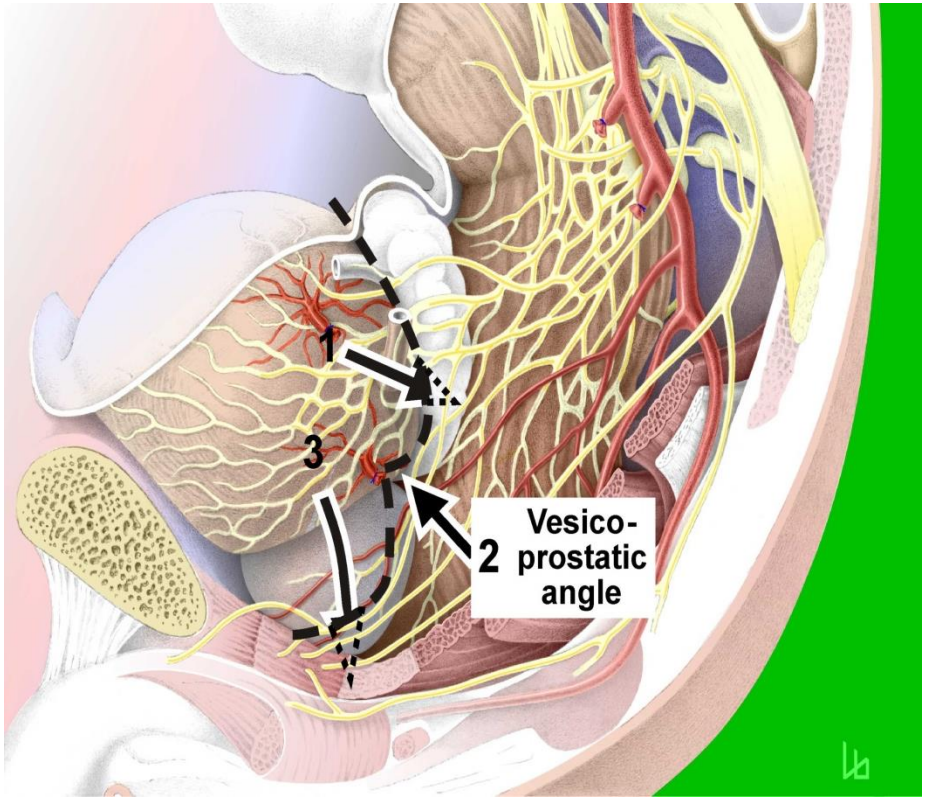
30 day mortality rate 1.9% (7/373)

90 day mortality rate 4.0% (15/373)

Gschwend J ASCO 2016

Nerve sparing cystectomy





Degree of Preservation of the Neurovascular Bundles During Radical Prostatectomy Urinary Continence 1 Year after Surgery.

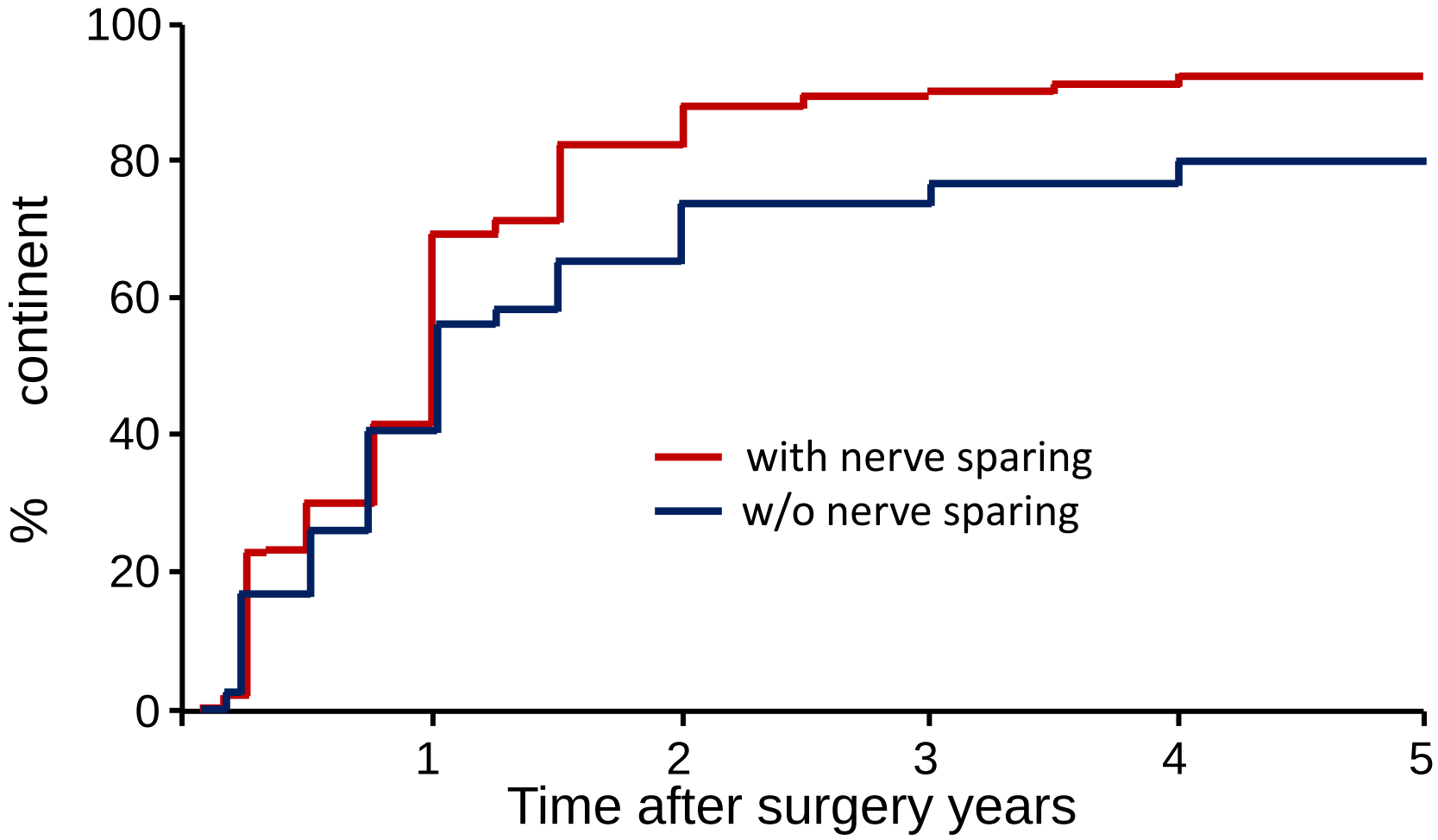
Design, setting, and participants: More than 100 surgeons in 14 centers prospectively collected data …. , data were available for 3379 men.

Results and limitations: A strong association was found between the degree of bundle preservation and urinary incontinence 1 yr after surgery…...
For the men in the six groups, ordered according to the degree of preservation, we obtained the following relative risks (95% confidence interval [CI]): 1.07 (0.63–1.83), 1.19 (0.77–1.85), 1.56 (0.99–2.45), 1.78 (1.13–2.81), 2.27 (1.45–3.53), and 2.37 (1.52–3.69). In the latter group, no preservation of any of the bundles was performed. The pattern was similar for preoperatively impotent men and for elderly men….

Conclusions: We found that the degree of preservation of the two neurovascular bundles during radical prostatectomy predicts the rate of urinary incontinence 1 yr after the operation….

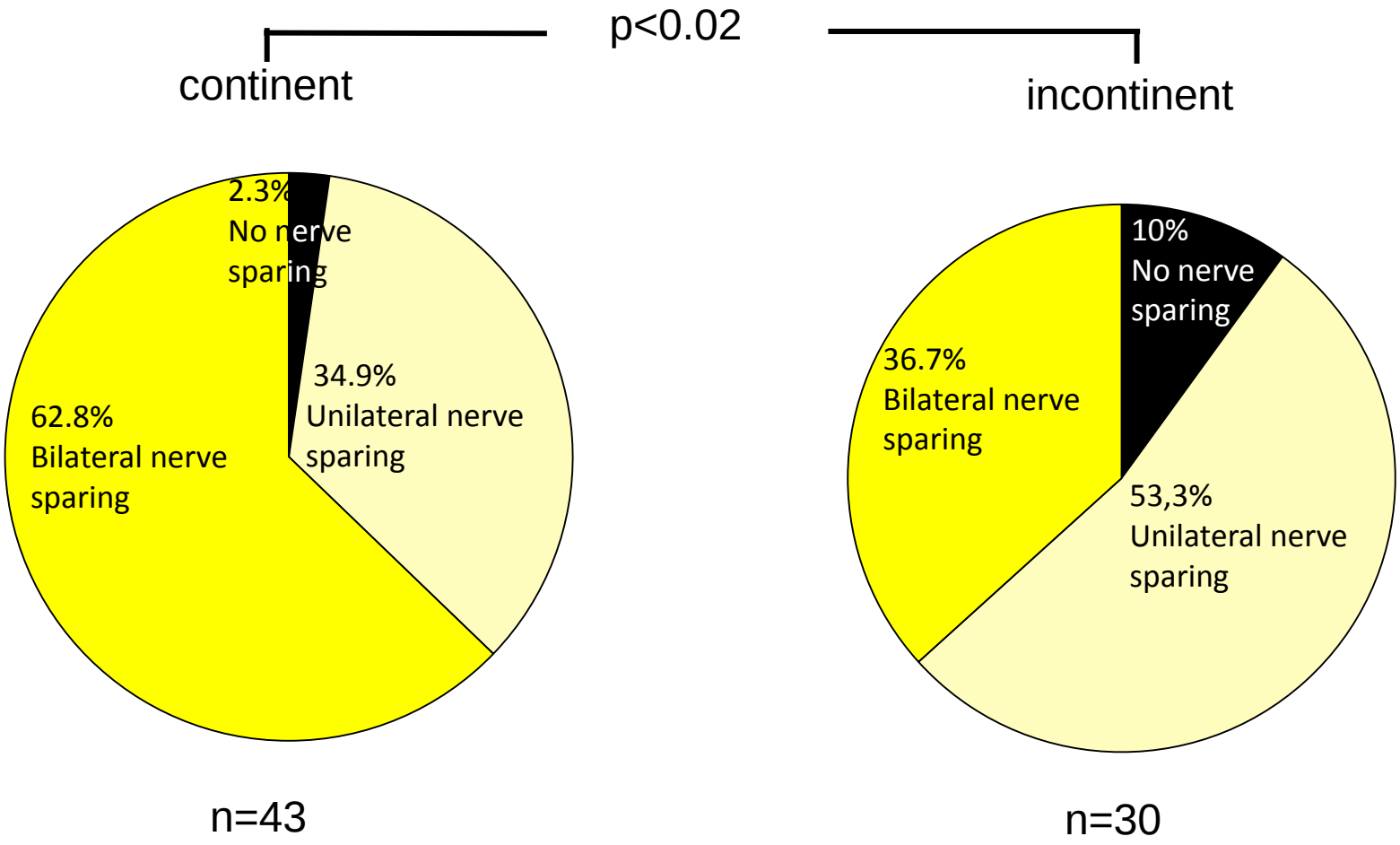
Steineck G., Bjartell A.,et al, Eur Urol; 67:559-568. 2015

Nighttime continence and attempted nerve sparing cystectomy in males



Kessler, Studer et al., J. Urology 2004

Continence and attempted nerve sparing cystectomy in females



Gross et al., Europ Urol 2015

Type of diversion: High grade complications

- cutaneous ureterostomy: 11/138 = 8%
- ileal conduit: 35/217 = 16%
- orthotopic neobladder: 19/112 = 14%

- Mortality: 1.7%

De Nunzio et al ., EJSO 2013

Type of diversion: High grade complications

Patient's characteristics according to the different type of urinary diversions.

	Ureterocutanesostomy	Ileal conduit	Orthotopic neobladder	*p*
Patients	138	217	113	
Age (yrs)	75.5 (35–89)	71 (47–86)	63 (36–77)	0.001
BMI (kg/m^2)	24.6 (23–28)	26.4 (22–46)	25 (27–40)	0.237
Preoperative hemoglobin level (g/dl)	11.6 (9–13)	12.7 (9–17)	13.2 (10–17)	0.008
Hydronephrosis (%)	42 30%	42 19%	14 12%	0.002
Diabetes mellitus	29 21%	42 19%	17 15%	0.485
Hypertension	100 72%	129 59%	49 43%	0.001
Ischemic heart disease	40 29%	41 19%	12 11%	0.001
Chronic renal failure	20 15%	12 6%	3 3%	0.001
ASA score				0.001
I	9	23	17	
II	46	89	60	
III	67 49%	95 44%	33 29%	
IV	16 12%	10 5%	2 2%	
Tumor size (cm)	5 (1–10)	4 (1–12)	4 (1–7)	0.191
2010 TNM path. T stage				0.008
T1 or less	14	34	16	
T2	32	39	32	
T3–T4	88	126	50	
CIS	4	18	14	
2010 TNM path. N0	84	152	80	0.064
Operative time (min)	189 (95–600)	300 (95–720)	290 (105–720)	0.001
Estimated blood loss (cc)	1340 (500–2000)	1600 (500–1713)	1140 (1100/1365)	0.644
Length of stay (days)	12 (6–119)	13 (6–60)	14 (6–35)	0.036

Data presented as median (range).

De Nunzio et al ., EJSO 2013

Complication	IC (n = 178)	OBS (n = 35)	UCST (n = 11)	P value
From postoperative day 0–30				
0	91 (51%)	19 (54%)	5 (45%)	0.002
1	12 (7%)	0 (0%)	0 (0%)	
2	38 (21%)	11 (31%)	1 (9%)	
3a	14 (8%)	4 (11%)	2 (18%)	
3b	9 (5%)	1 (3%)	0 (0%)	
4	2 (1%)	0 (0%)	0 (0%)	
4d	6 (3%)	0 (0%)	3 (27%)	
5	6 (3%)	0 (0%)	0 (0%)	
From postoperative day 31–90				
0	139 (78%)	28 (80%)	10 (91%)	0.239
1	5 (3%)	2 (6%)	0 (0%)	
2	9 (5%)	1 (3%)	0 (0%)	
3a	3 (2%)	3 (9%)	0 (0%)	
3b	3 (2%)	0 (0%)	0 (0%)	
4	0 (0%)	1 (3%)	0 (0%)	
4d	2 (1%)	0 (0%)	0 (0%)	
5	17 (10%)	0 (0%)	1 (9%)	
Overall postoperative complications postoperative day 0–90				
0	77 (43%)	16 (46%)	4 (36%)	0.001
1	11 (6%)	2 (6%)	0 (0%)	
2	42 (24%)	9 (26%)	1 (9%)	
3a	11 (6%)	6 (17%)	2 (18%)	
3b	10 (6%)	1 (3%)	0 (0%)	
4	1 (0.6%)	1 (3%)	0 (0%)	
4d	5 (3%)	0 (0%)	3 (27%)	
5	21 (12%)	0 (0%)	1 (9%)	

28%

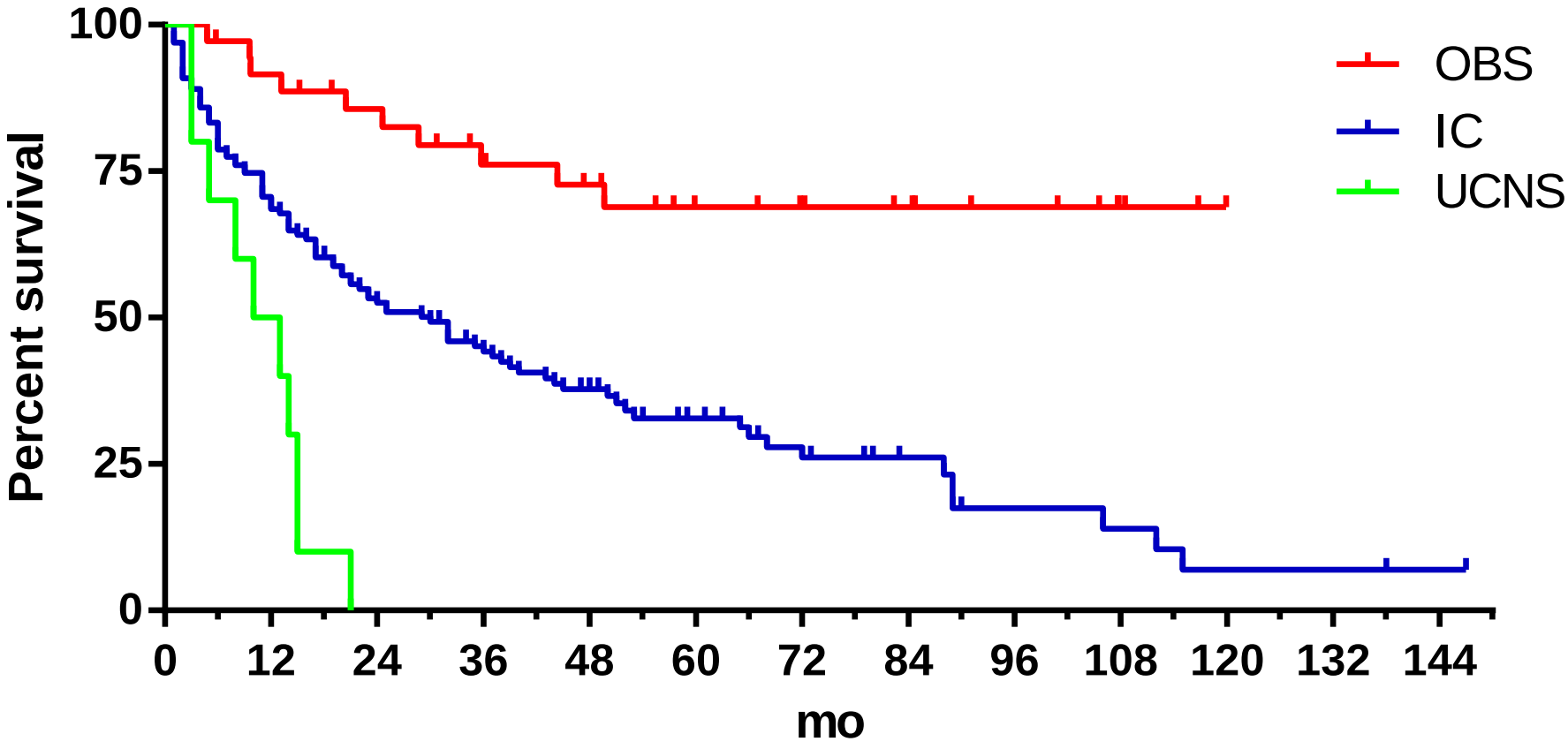
23%

45%

If patients had more than 1 complication in the same category, only 1 complication was counted (the most relevant).

De Nunzio et al ., EJSO 2013

Cytectomy elderly patients > 75 yrs



Wuethrich et al ., Urol Oncol 2015

Cytectomy elderly patients > 75 yrs

	Overall (n = 224)	IC (n = 178)	OBS (n = 35)	UCST (n = 11)	P value
Age, y	79.2 [75.1–91.6]	79.8 [75.1–91.6]	76.3 [75.1–80.9]	83.8 [75.3–89.1]	<0.0001
Sex (male/female)	153/71 (68%/32%)	118/60 (66%/34%)	29/6 (83%/17%)	6/5 (55%/45%)	0.092
ASA					<0.0001
2	68 (33.3%)	48 (27%)	19 (54.3%)	1 (9.1%)	
3	151 (67.4%)	128 (71.9%)	16 (45.7%)	7 (63.6%)	
4	5 (2.3%)	2 (1.1)	0 (0%)	3 (27.3%)	
P-POSSUM	47 [32–70]	48 [32–70]	42 [34–60]	48 [33–67]	<0.0001
CCIaa	5 [3–14]	6 [3–14]	4 [3–10]	6 [5–8]	<0.0001
BMI, kg/m^2	25.1 [13.8–41.0]	25.3 [13.8–41.0]	24.0 [19.4–31.6]	25.5 [17.0–36.2]	0.472
Previous radiotherapy (no/yes)	211/13 (94%/6%)	166/12 (93%/7%)	34/1 (97%/3%)	11/0 (100%/0%)	0.333
Coronary disease (no/yes)	171/53 (76%/24%)	130/48 (73%/27%)	32/3 (91%/9%)	9/2 (82%/18%)	0.059
Diabetes mellitus (no/yes)	192/32 (86%/14%)	150/28 (84%/16%)	32/3 (91%/9%)	10/1 (91%/9%)	0.530
Preop anemia (no/yes)	98/126 (44%/56%)	73/105 (41%/59%)	21/14 (60%/40%)	4/7 (36%/64%)	0.097
Glasgow prognostic score					0.108
0	100 (44.8%)	77 (43%)	20 (57%)	3 (30%)	
1	84 (37.7%)	66 (37%)	14 (40%)	4 (40%)	
2	39 (17.5%)	35 (20%)	1 (3%)	3 (30%)	
Neoadjuvant. chemotherapy (no/yes)	209/15 (93%/7%)	163/15 (92%/8%)	34/1 (97%/3%)	11/0 (100%/0%)	0.323
Preop renal insufficiency (no/yes)	188/36 (84%/16%)	149/29 (84%/16%)	34/1 (97%/3%)	5/6 (56%/54%)	0.001
Preop creatinin value, µmol/l	95 [41–851]	98 [41–443]	79 [43–130]	140 [77–851]	<0.0001

Wuethrich et al ., Urol Oncol 2015

The Influence of Volume and Experience on Individual Surgical Performance

A Systematic Review

Mahiben Maruthappu, MA, BM, BCh,† Barnabas J. Gilbert, BA,* Majd A. El-Harasis, BSc,† Myura Nagendran, BM, BCh,† Peter McCulloch, MD, FRCSed,‡ Antoine Duclos, MD, PhD,§ and Matthew J. Carty, MD¶*

TABLE 2. Case Volume

Domain	No. (%)
Experience measure	
Cases	45 (78.9)
Cases and years of experience	6 (10.5)
Studies showing positive correlation between case volume and health outcomes	44 (86.3)
Studies investigating impact of annual case volume on health outcomes	14 (24.6)
Studies showing no association between annual case volume and outcomes for experienced surgeons	6 (42.9)

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TABLE 2. Case Volume

Domain	
Ex	
	14 (24.6)
ng no association tween annual case volume and outcomes for experienced surgeons	6 (42.9)

Conclusions:
Increasing surgical case volume and years of practice are associated with improved performance, in a procedure-specific manner.
Performance may deteriorate toward the end of a surgeon's career.

BMJ

RESEARCH

The volume-mortality relation for radical cystectomy in England: retrospective analysis of hospital episode statistics

Erik K Mayer, specialist registrar in urology and clinical lecturer in surgery,[1,2] Alex Bottle, lecturer,[3] Ara W Darzi, professor of surgery,[1] Thanos Athanasiou, clinical reader in surgery,[1] Justin A Vale, consultant urological surgeon[2]

Conclusions:

The relation between case volume and mortality after radical cystectomy for bladder cancer became evident only after adjustment for structural and process of care factors, including staffing levels of nurses and junior doctors, in addition to case mix.

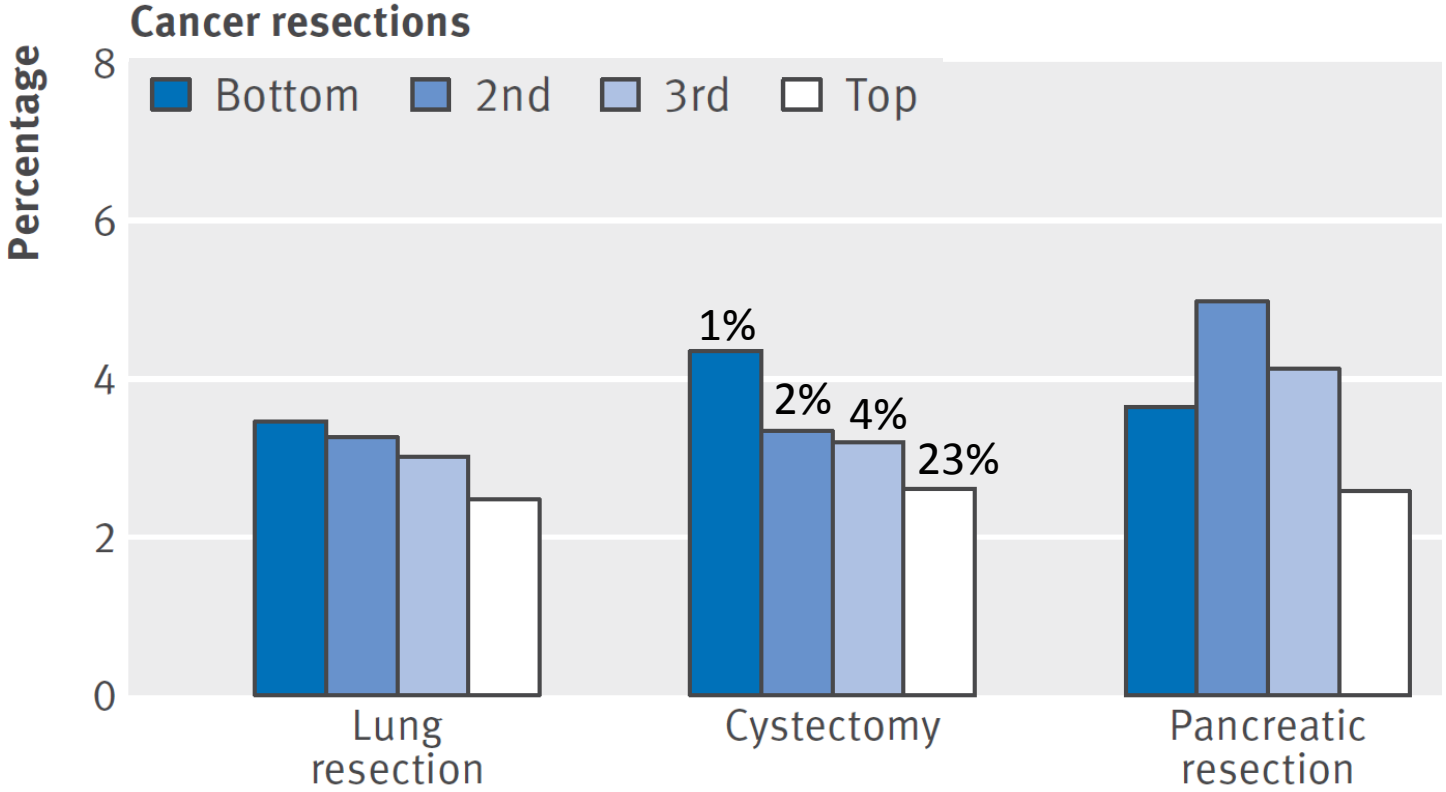
Outcomes other than mortality, such as functional morbidity and disease recurrence may ultimately influence towards centralising care.

BMJ 2010

Surgeon specialization and operative mortality in United States: retrospective analysis

Nikhil R Sahni,[1,2] Maurice Dalton,[3] David M Cutler,[1,3] John D Birkmeyer,[4,5] Amitabh Chandra[3,6]

Risk adjusted and volume adjusted 30 day operative mortality rate



	Lung resection	Cystectomy	Pancreatic resection
Surgeons	3616	3319	1612
Patients	85 966	18 438	10 191
P value	0.02	0.02	0.38

BMJ 2016

Surgeon specialization and operative mortality in United States: retrospective analysis

Nikhil R Sahni,[1,2] Maurice Dalton,[3] David M Cutler,[1,3] John D Birkmeyer,[4,5] Amitabh Chandra[3,6]

A statistically significant relative risk reduction in operative mortality was observed between the bottom and top quarters of surgeon specialization for six procedures

The relative risk reduction in operative mortality due to surgeon specialization was greater than that due to procedure specific volume for five procedures

The observed specialization-outcomes relation suggests a new, easily measured metric of surgeons' quality that builds on the volume-outcomes relation to inform the way healthcare is organized and delivered

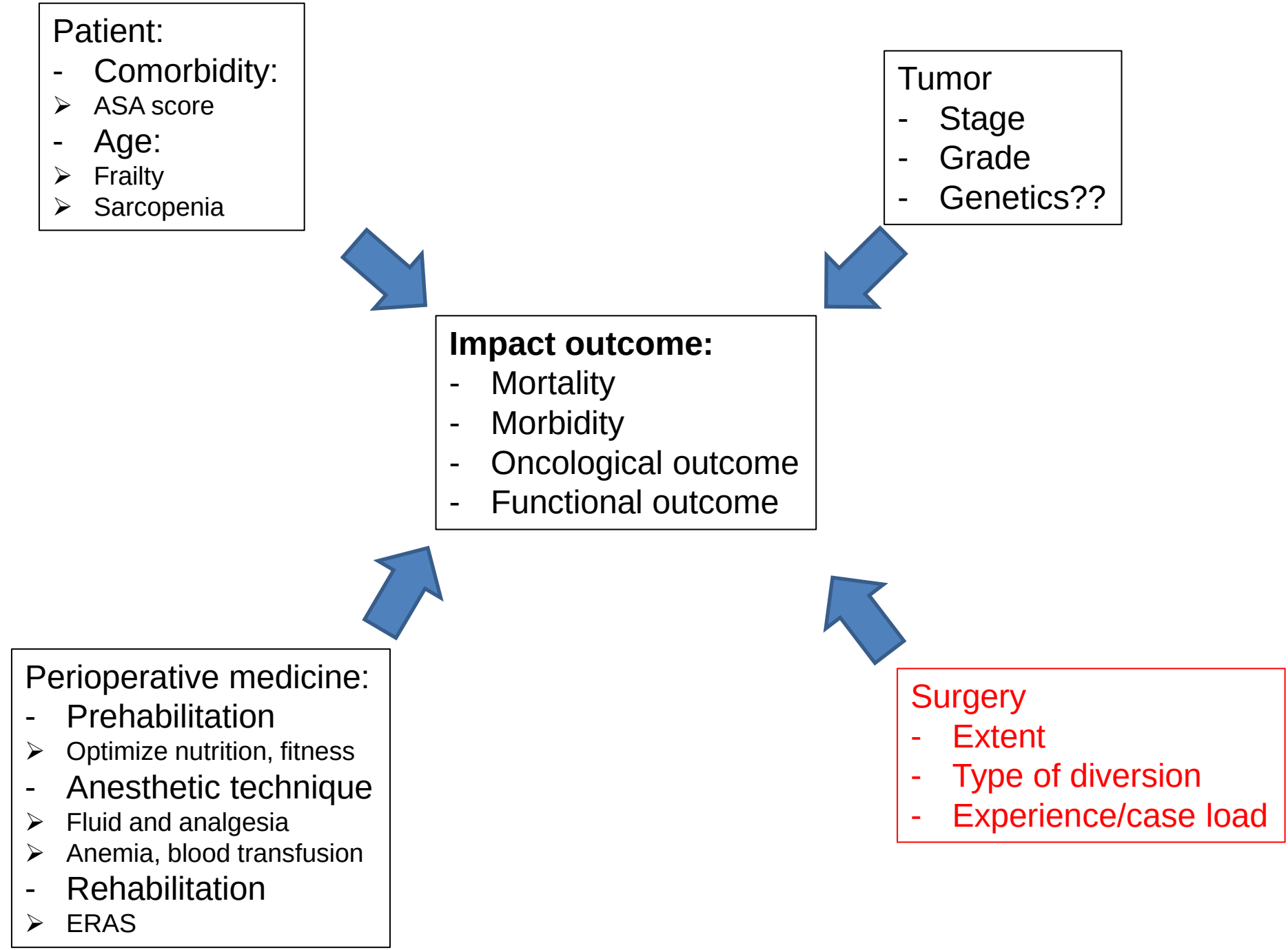
BMJ 2016

Repetition of tasks has been shown to improve mortality and could be manifested in surgeons as muscle memory and dexterity.

Reduced mortality has been linked to performance of the same procedure under varying patient related circumstances, allowing a surgeon to transfer relevant knowledge and skills between patients.

Furthermore, focusing on a single procedure reduces the cognitive demands of switching tasks.

These potential mechanisms might result from both greater volume for a specific procedure (for example, task repetition) and from less total operative volume across all procedures (for example, academic research).


Patient:
- Comorbidity:
➢ ASA score
- Age:
➢ Frailty
➢ Sarcopenia
Tumor
- Stage
- Grade
- Genetics??
Impact outcome:
- Mortality
- Morbidity
- Oncological outcome
- Functional outcome
Perioperative medicine:
- Prehabilitation
➢ Optimize nutrition, fitness
- Anesthetic technique
➢ Fluid and analgesia
➢ Anemia, blood transfusion
- Rehabilitation
➢ ERAS
Surgery
- Extent
- Type of diversion
- Experience/case load

Short term outcome (complications / mortality):

- Age
- Frailty
- Sarcopenia
- ASA score
- Perioperative anemia and blood transfusion
- Surgeon specialisation

Long term outcome (survival / functional):

- Sarcopenia
- Perioperative blood transfusion
- Type of surgery (PLND, nerve sparing)
- Surgical volume / specialisation