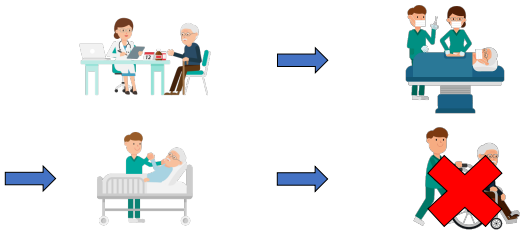
ERAS improves outcomes after cystectomy

Presenter: Justin Collins

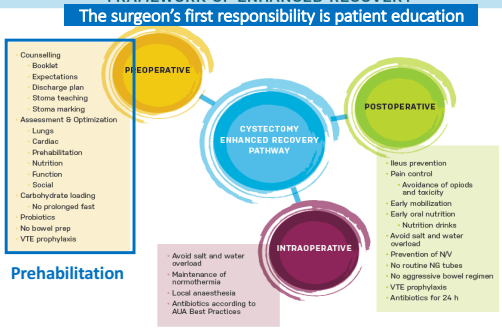
University College London Hospitals NHS Foundation Trust

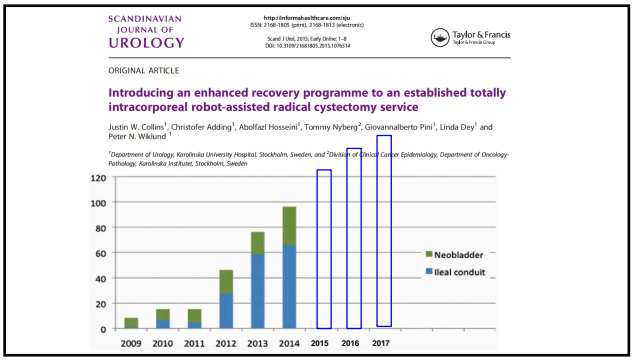
ERAS protocols impact all aspects of patient care from diagnosis through to full recovery



FRAMEWORK OF ENHANCED RECOVERY

The surgeon's first responsibility is patient education





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ORIGINAL ARTICLE

Introducing an enhanced recovery programme to an established totally intracorporeal robot-assisted radical cystectomy service

Justin W. Collins[1], Christofer Adding[1], Abolfazl Hosseini[1], Tommy Nyberg[2], Giovannalberto Pini[1], Linda Dey[1] and Peter N. Wiklund[1]

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Changing patient demographics

Table 1. Patient demographics, indications for surgery and treatment details of patients undergoing totally intracorporeal robot-assisted radical cystectomy (RARC).

	Before implementation of ERP	After implementation of ERP	Statistical significance
No. of patients	86	135	
Male to female ratio	71:15	101:34	NS
Age (years)	66 (59–71)	70 (63–74)	$p < 0.01$
ASA grade			$p < 0.001$
1	26 (30)	16 (12)	
2	41 (48)	54 (40)	
3	18 (21)	63 (47)	NS
4	1 (1)	2 (1)	
BMI (kg/m^2)	26 (23–27)	26 (24–29)	
Preoperative staging			$p < 0.05$
CIS	3 (3)	3 (2)	
Ta	4 (5)	5 (4)	
T1	25 (29)	29 (21)	
T2	45 (52)	67 (50)	
T3	8 (9)	26 (19)	
T4	1 (1)	5 (4)	
Received neoadjuvant chemotherapy*	27/85 (32)	52/134 (39)	NS
Neobladder to ileal conduit ratio	48:38	38:97	$p < 0.001$

Data are shown as *n*, median (interquartile range) or *n* (%).
* Missing data = 1.
ERP = enhanced recovery programme; ASA = American Society of Anesthesiologists; BMI = Body mass index; CIS = Carcinoma *in situ*; NS = Not significant.

Introduction of an ERP specifically designed for RARC

Table 2. List of components in Karolinska's enhanced recovery programme (ERP) for robot-assisted radical cystectomy (RARC).

An ERP after totally intracorporeal RARC focusing on reduced bowel preparation, early feeding and mobilization and analgesic regimens

Outpatient assessment
1. Preoperative counselling and education, verbal and written information offered on operation and urinary diversion options.

Preparation for surgery
1. Preoperative medical optimization.
2. Seen by stoma nurse specialist. Advice on stoma and/or neobladder care.
3. Cardiopulmonary exercise testing if indicated.
4. Advice and support for cessation of smoking and/or alcohol consumption.
5. Social issues addressed and discharge planning.

Day before radical cystectomy
1. No bowel preparation.
2. Carbohydrate loading (Nutricia preOp®) 4 × 250 ml [19].

Day of radical cystectomy: Day 1
1. Solids up to 6 h and clear fluids up to 2 h preoperatively, including 2 × 250 ml Nutricia preOp® carbohydrate loading [19].
2. Avoidance of long-acting sedatives.
3. Thrombosis prophylaxis. Compression stockings and low molecular weight heparin.
4. Antimicrobial prophylaxis and skin preparation with chlorhexidine–alcohol.
5. Standard anaesthetic protocol to attenuate surgical stress response – intraoperative maintenance of haemodynamic control, central and peripheral oxygenation, muscle relaxation, optimized depth of anaesthesia with central and regional analgesia avoiding opiates with peripheral action.
6. Totally intracorporeal RARC approach [8].
7. Goal-directed fluid management with judicious use of fluid restriction and vasopressors [20].
8. Prevention of hypothermia (Bair Hugger®).
9. Removal of nasogastric tube in recovery.

Day 2–4
1. Prophylactic metoclopramide for prevention of postoperative nausea and vomiting.
2. Chewing gum [18].
3. Unrestricted diet.
4. Drain fluid routinely sent for creatinine on day 2 and drain removed on day 2 if drain fluid indicates serum creatinine levels.
5. Thrombosis prophylaxis. Compression stockings and low molecular weight heparin.
6. Regular analgesia: paracetamol and Targiniq® (oxycodone hydrochloride and naloxone hydrochloride dihydrate) with oxybutinin.
7. Early mobilization with 100 m × 3.
8. Daily nutritional supplements (Fortisip®) with nutrition goal 900 kcal/day.
9. Fluid/electrolyte (30 ml/kg/day).
10. Encourage self-care (catheter care/flushing if neobladder and stoma bag care if ileal conduit).

Day 4 onwards
1. Continue as previously. Increase daily nutritional goal to 1500 kcal/day.
2. Discharge home when criteria met:
—Pain adequately controlled
—Independently mobile
—Competent with neobladder or stoma care
—Bowels opened.

Postdischarge
1. Stents out on day 10 (no stentogram).
2. Removal of clips on day 10.
3. Contact with specialist nurse via telephone.
4. Audit cycle of compliance and outcomes.

Introduction of an ERP specifically designed for RARC

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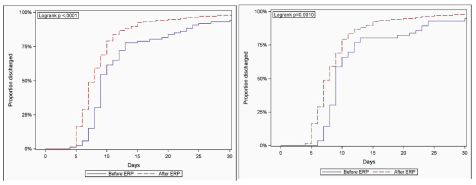
Patient outcomes

Table 3. Patient outcomes with patients categorized into two groups: group A, before implementation of the enhanced recovery programme (ERP); and group B, after implementation of ERP.

	Before implementation of ERP (group A)	After implementation of ERP (group B)	Statistical significance
LOS (days) for all patients	9 (8–13)	8 (6–10)	$p < 0.001$
LOS (days) for ileal conduit	9 (9–22)	8 (6–10)	$p < 0.001$
LOS (days) for neobladder	9 (8–12)	7 (6–10)	$p < 0.01$
Overall LOS			$p < 0.01$
1–10 days	53/86 (62)	107/135 (79)	
11–20 days	19/86 (22)	21/135 (16)	
21–30 days	9/86 (10)	4/135 (3)	
31–40 days	2/86 (2)	3/135 (2)	
≥ 40 days	3/86 (3)	0/135 (0)	
Clavien 30 day complication rate for all patients			NS
None	35 (41)	58 (43)	
Clavien 1–2	30 (35)	51 (38)	
Clavien ≥ 3	21 (24)	26 (19)	
Clavien 30 day complication rate for ileal conduit			$P < 0.05$
None	12 (32)	48 (49)	
Clavien 1–2	13 (34)	32 (33)	
Clavien ≥ 3	13 (34)	17 (18)	
Clavien 30 day complication rate for neobladder			NS
None	23 (48)	10 (26)	
Clavien 1–2	17 (35)	19 (50)	
Clavien ≥ 3	8 (17)	9 (24)	
Readmission rate	25 (29)	44 (33)	NS
90 day mortality rate	2 (2)	3 (3)	NS

Data are shown as median (interquartile range) or *n* (%).
LOS = Length of stay; NS = Not significant.

K-M analysis of length of stay



ERAS Society

Variability in length of stay

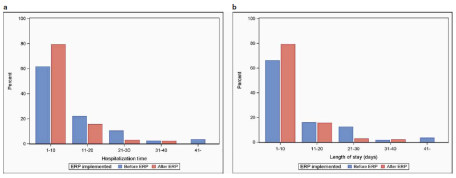


Figure 4. (a) Variability in length of stay before and after implementation of the enhanced recovery programme (ERP); (b) variability in length of stay before and after ERP implementation minus the first 30 cases in the robot-assisted radical cystectomy series.

ERAS Society

Study	Year published	No. patients (No. receiving ERP)	Comparative control group included	Number of ERAS recommendations included	RARC included	Additional elements to ERAS recommendations
Arumainayagam et al [12]	2008	112 (56)	Y	6	N	
Pruthi et al [13]	2010	362 (362)	N (evolved ERP)	7	N	
Shah et al [14]	2011	30 (30)	N	10	Y	
Maffezzini et al [15]	2012	68 (68)	N	6	N	
Mukhtar et al [16]	2013	77 (51)	Y	12	N	
Saar et al [17]	2013	63 (31)	Y	9	Y	
Karl et al [18]	2014	101(62)	RCT (2:1)	5	N	
Dutton et al [19]	2014	165 (165)	N (evolved ERP)	19	N	Rectus sheath analgesia catheter; intra-operative cell salvage; telephone contact given.
Daneshmand et al [20]	2014	110 (110)	Y (historical)	7	N	Para-incisional subfascial catheter
Smith et al [21]	2014	133 (64)	Y		N	Rectus sheath catheter; intra-operative cell salvage24hr ERP telephone helpline.
Guan et al [22]	2014	115 (60)	Y	7	N	Laparoscopic approach.
Curreto et al [23]	2014	31 (31)	N	17	N	
Persson et al [24]	2015	70 (31)	Y	13	Y	
Koupparis al [25]	2015	270 (102)	Y	10	Y	Intracorporeal urinary diversion
Xu et al [26]	2015	205 (124)	Y	17	Y	
Collins et al [27]	2016	221 (135)	Y	20	Y	Intracorporeal urinary diversion

Table 1: Current published series on ERAS protocols for radical cystectomy.

Collins et al, 2016

BJUI International — Robotics and Laparoscopy

Introduction of robot-assisted radical cystectomy within an established enhanced recovery programme

Catherine Miller*,†, Nicholas J. Campain†, Rachel Dbeis†, Mark Daugherty†, Nicholas Batchelor†, Elizabeth Waine† and John S. McGrath†

*Urology Department, Torbay Hospital, Torquay, and †Exeter Surgical Health Services Research Unit, Royal Devon and Exeter NHS Foundation Trust, Exeter, Devon, UK

Robotics and Laparoscopy — BJUI International

Intracorporeal robot-assisted radical cystectomy, together with an enhanced recovery programme, improves postoperative outcomes by aggregating marginal gains

Wei Shen Tan*,†, Mae-Yen Tan‡, Benjamin W. Lamb§, Ashwin Sridhar*,†, Anna Mohammed†, Hilary Baker†, Senthil Nathan*,†, Timothy Briggs†, Melanie Tan‡¶ and John D.Kelly*,†

*Division of Surgery and Interventional Science, University College London, London, UK, †Department of Urology, University College London Hospital, London, UK, ‡School of Medicine, University of Glasgow, Glasgow, UK, §Department of Urology, Peter MacCallum Cancer Centre, Melbourne, Australia, and ¶Department of Anaesthesia and Peri-operative Medicine, University College London, London, UK

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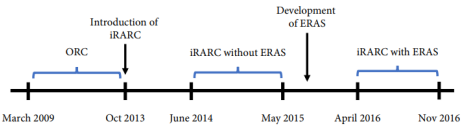
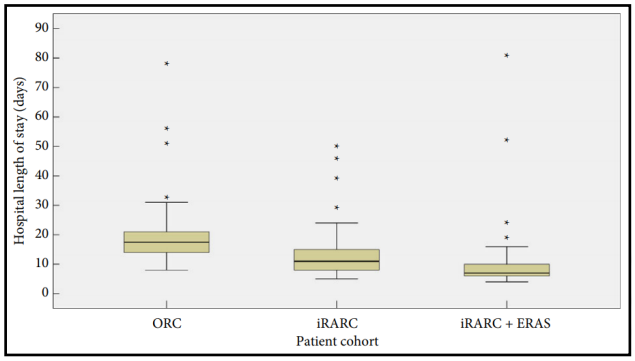
Introduction of iRARC and ERAS.





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	Present study	Kouppanis et al. [10]	Miller et al. [9]	Collins et al. [19]
Number of ERAS cases and technique	50 iRARC	102 iRARC	114 eiRARC	135 iRARC
Age, mean	66	68	67	70
ASA ≥III, %	46	26		48
Continent diversion, %	22	11	15	28
Median LOS, days	7	8	7	8
30-day complication, %	38	31	54	57
30-day major complication, %	12	9	18	19
30-day readmission, %	12	3	18	
90-day complication, %	42			
90-day major complication, %	12			
90-day readmission, %	12			
Key ERAS features				
No bowel prep	Yes	Yes	Yes	Yes
Carbohydrate loading	Yes	Not specified	Yes	Yes
Goal directed i.v. fluids	Yes	Not specified	Yes	Yes
Spinal anaesthesia	Yes	Epidural	Rectus sheath catheter ± PCA	Yes
Remove nasogastric tube immediately after surgery	Yes	Not specified	Yes	Yes
Drain use	Yes	Not specified	No	Yes
Prokinetic agents	Yes	Yes	Yes	Yes
Chewing gum	Yes	Not specified	Not specified	Yes
VTE prophylaxis	Yes	Yes	Yes	Yes
Early mobilization	Yes	Yes	Yes	Yes
Removal of stents	Day 10	Not specified	Day 5	Day 10

ASA, American Society of Anesthesiologists; ERAS, enhanced recovery after surgery; iRARC, minimally invasive robot-assisted radical cystectomy with intracorporeal urinary diversion; LOS, length of hospital stay. PCA, patient-controlled analgesia; VTE, venous thromboembolism

BJA

British Journal of Anaesthesia, 115 (4): 560–8 (2015)

doi: 10.1093/bja/aev105
Advance Access Publication Date: 29 April 2015
Clinical Practice

CLINICAL PRACTICE

Enhanced recovery from surgery in the UK: an audit of the enhanced recovery partnership programme 2009–2012†

J. C. Simpson[1], S. R. Moonesinghe[1,2], M. P. W. Grocott[1,2,3], M. Kuper[4], A. McMeeking[5], C. M. Oliver[1,2], M. J. Galsworthy[1,2], and M. G. Mythen[1,*] on behalf of the National Enhanced Recovery Partnership Advisory Board‡

[1]The Surgical Outcomes Research Centre (SOuRCe), University College London Hospitals NIHR Biomedical Research Centre, London, UK, [2]National Institute of Academic Anaesthesia Health Services Research Centre, Royal College of Anaesthetists, London, UK, [3]Anaesthesia and Critical Care Research Unit, University Hospitals Southampton; Integrative Physiology and Critical Illness Group, University of Southampton and University Hospital Southampton, University of Southampton NIHR Respiratory Biomedical Research Unit, Southampton, UK, [4]Homerton Hospital, Homerton Row, London, UK, and [5]National Cancer Action Team, NHS, London, UK

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Abstract

Background: The UK Department of Health Enhanced Recovery Partnership Programme collected data on 24 513 surgical patients in the UK from 2009–2012. Enhanced Recovery is an approach to major elective surgery aimed at minimizing perioperative stress for the patient. Previous studies have shown Enhanced Recovery to be associated with reduced hospital length of stay and perioperative morbidity.

Methods: In this national clinical audit, National Health Service hospitals in the UK were invited to submit patient-level data. The data regarding length of stay and compliance with each element of Enhanced Recovery protocols for colorectal, orthopaedic, urological and gynaecological surgery patients were analysed. The relationship between Enhanced Recovery protocol compliance and length of stay was measured.

Results: From 16 267 patients from 61 hospital trusts, three out of four surgical specialties showed Enhanced Recovery, compliance being weakly associated with shorter length of stay (correlation coefficients −0.18, −0.14, −0.25 in colorectal, orthopaedics and gynaecology respectively). At a cut-off of 80% compliance, good compliance was associated with two, one and three day reductions in median length of stay respectively in colorectal, orthopaedic and urological surgeries, with no saving in gynaecology.

Conclusions: This study is the largest assessment of the relationship between Enhanced Recovery protocol compliance and outcome in four surgical specialties. The data suggest that higher compliance with an Enhanced Recovery protocol has a weak association with shorter length of stay. This suggests that changes in process, resulting from highly protocolised pathways, may be as important in reducing perioperative length of stay as any individual element of Enhanced Recovery protocols in isolation.

Key words: anesthesia; general surgery; perioperative care

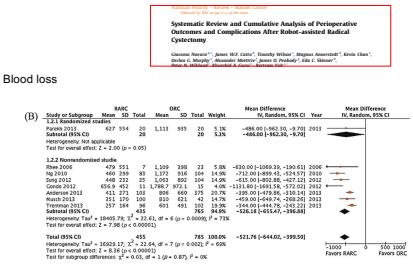
Standardisation

- Understanding of complex surgery
- Promotes consistent feedback/guidance
- Comparisons on quality and benchmarking
- Identify 'what went wrong' and 'what went well'
- Enables comparison
- Used in professional sport and the aviation industry

Potential of a RARC approach

Systematic Review and Cumulative Analysis of Perioperative Outcomes and Complications After Robot-assisted Radical Cystectomy

Blood loss



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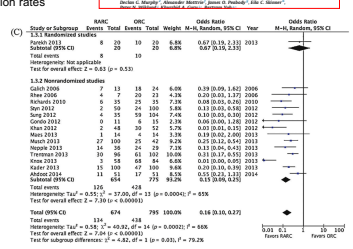
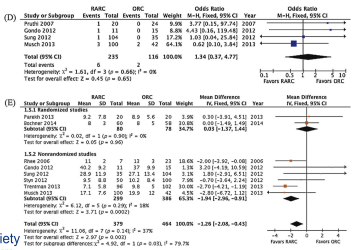
Transfusion rates



ERAS Society

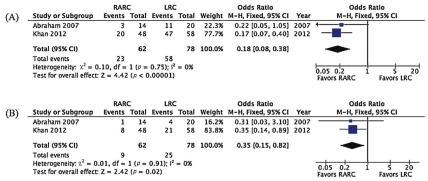
Intra-operative complications



LOS

ERAS Society

A). 30d and B). Grade 3 complications



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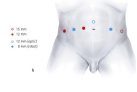
Standardised Robot assisted radical cystectomy



Surgery in Motion

Robot-assisted Radical Cystectomy: Description of an Evolved Approach to Radical Cystectomy

Justin W. Collins [1,], Stavros Tyritzis [1], Tommy Nyberg, Martin Schumacher, Oscar Laurin, Dinyar Khazaeli, Christofer Adding, Martin N. Jonsson, Abolfazl Hosseini, N. Peter Wiklund [*]*

Karolinska University Hospital, Stockholm, Sweden

Table 1 – Avoiding complications during robot-assisted radical cystectomy

Stage of operation	Complications to avoid	Evolved technique
Patient selection	Inappropriate case selection for RARC	Avoid patients with decreased pulmonary compliance who cannot tolerate the Trendelenburg position. Avoid previous extensive abdominal surgery and patients with bulky disease.
1: Port placement	Trauma to bowel adhesions	First port placed with Hasson technique. Camera port secured with purse string suture to prevent air leakage.
	Leakage from port sites	
2: Dissection of ureters	Ureteric strictures	Maintain adequate periureteral tissue on the mobilized ureters.
3. Development of anterior rectal space	Rectal injury	Good surgical planes; stay anterior to rectal fat.
4. Development of lateral pelvic space	Injury to the obturator nerve In elderly patients, atherosclerotic external iliac vessels may be tortuous in the pelvis.	Avoid injury to the obturator nerve by identifying it early in the dissection. If transected, it should be repaired with tension-free end-to-end anastomosis using 8.0 Prolene interrupted sutures. Tortuous vessels should be identified.
5b (male). Nerve-sparing dissection	PSM on the prostate	Review imaging prior to operation. Intrafascial dissection can be used for T2 prostate tumours.
5 (female). Mobilisation of bladder and transection of urethra	Urethrovaginal or vesicovaginal fistula	With both organ-sparing and non–organ-sparing approaches, to avoid the potential of a vesicovaginal fistula, make sure that the vaginal closure is not aligned with the cut urethra when an orthotopic neobladder is planned.
6. Bladder take-down	Injury to the inferior epigastric vessels. Bleeding from the DVC	Avoid inferior epigastric vessels. Increase pneumoperitoneum to 20 mmHg prior to dissection. Then, oversew with 3.0 V-Loc or Biosyn suture.
7. PLND	Damage to collapsed walls of the iliac and hypogastric veins	Careful dissection. If veins are damaged, a small cut is often controlled with pressure with or without Surgicel. Suturing a cut vein may result in a tear and a larger hole in the vein.
8a. Removing the specimen	Ruptured specimen bag	Specimen is removed through an extended camera port in men, vagina in women. Make sure the incision is large enough. The specimen can be removed under direct vision, with the camera placed in a 15-mm hybrid port.
	Damage to the mesentery of the ileal conduit	
8b. Formation of the ileal conduit	Leakage from uretero-ileal anastomoses	The camera can be placed through a 15-mm hybrid port after removal of the specimen to verify that the mesentery is not malrotated and anastomoses are not under tension.
		Single J stents, with the end of the stent brought through the stoma, prevents temporary occlusion at the level of the abdominal wall caused by postoperative oedema.
		The ileal stoma should be formed after removal of the specimen and decompression of pneumoperitoneum.

RARC = robot-assisted radical cystectomy; PSM = positive surgical margin; DVC = dorsal vein complex; PLND = pelvic lymph node dissection.

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European Association of Urology

EUROPEAN UROLOGY

Review – Bladder Cancer

Enhanced Recovery After Robot-assisted Radical Cystectomy: EAU Robotic Urology Section Scientific Working Group Consensus View

Justin W. Collins [a], Hiten Patel [b], Christofer Adding [a], Magnus Annerstedt [c], Prokar Dasgupta [d], Shamim M. Khan [d], Walter Artibani [e], Richard Gaston [f], Thierry Piechaud [f], James W. Catto [g], Anthony Koupparis [h], Edward Rowe [a], Matthew Perry [i], Rami Issa [i], John McGrath [i], John Kelly [k], Martin Schumacher [l], Carl Wijburg [m], Abdullah E. Canda [n], Meviana D. Balbay [o], Karel Decaestecker [p], Christian Schwentner [q], Arnulf Stenzl [q], Sebastian Edeling [r], Sasa Pokupić [r], Michael Stockle [s], Stefan Siemer [s], Rafael Sanchez-Salas [t], Xavier Cathelineau [t], Robin Weston [u], Mark Johnson [v], Fredrik D'Hondt [w], Alexander Mottrie [w], Abolfazl Hosseini [a], Peter N. Wiklund [a,]*

Treatment of Non-Metastatic Muscle-Invasive Bladder Cancer: AUA/ASCO/ASTRO/SUO Guideline

Sam S. Chang, Bernard H. Bochner, Roger Chou, Robert Dreicer, Ashish M. Kamat, Seth P. Lerner, Yair Lotan, Joshua J. Meeks, Jeff M. Michalski, Todd M. Morgan, Diane Z. Quale, Jonathan E. Rosenberg, Anthony L. Zietman and Jeffrey M. Holzbeierlein

From the American Urological Association Education and Research, Inc., Linthicum, Maryland; American Society of Clinical Oncology, Alexandria, Virginia; American Society for Radiation Oncology, Arlington, Virginia; and Society of Urologic Oncology, Inc., Schaumburg, Illinois

Abbreviations and Acronyms

AC = adjuvant chemotherapy
AHRQ = Agency for Healthcare Research and Quality
ASCO = American Society of Clinical Oncology
ASTRO = American Society for Radiation Oncology
AUA = American Urological Association

Purpose: This multidisciplinary, evidence-based guideline for clinically non-metastatic muscle-invasi and surveillance of muscl

Materials and Methods: for Healthcare Research the authors and consulti Evidence-based statemer or C and were designate tions with additional sta Expert Opinions.

Results: For the first tim

6. Samanic C, Kogevinas M, Dosemeci M et al: Smoking and bladder cancer in Spain: effects of tobacco type, timing, environmental tobacco smoke, and gender. Cancer Epidemiol Biomarkers Prev 2006; **15**: 1348.

7. Abern MR, Dude AM, Tolzian M et al: The characteristics of bladder cancer after radiotherapy for prostate cancer. Urol Oncol 2013; **31**: 1629.

8. Rothman N, Garcia-Closas M, Chatterjee N et al: A multi-stage genome-wide association study of bladder cancer identifies multiple susceptibility loci. Nat Genet 2010; **42**: 978.

19. Shabsigh A, Korets R, Vora KC et al: Defining early morbidity of radical cystectomy for patients with bladder cancer using a standardized reporting methodology. Eur Urol 2009; **55**: 164.

20. Lowrance WT, Rumohr JA, Chang SS et al: Contemporary open radical cystectomy: analysis of perioperative outcomes. J Urol 2008; **179**: 1227.

21. Collins JW, Patel H, Adding C et al: Enhanced recovery after robot-assisted radical cystectomy: EAU Robotic Urology Section Scientific Working Group consensus view. Eur Urol 2016; **70**: 849.

Consensus view on an ERP for patients undergoing RARC

Outpatient assessment	**Day 2–4**
Preoperative counselling and education. Verbal and written information supplied on operation and urinary diversion options and planned ERP	1. Prevention of postoperative nausea and vomiting: regular antiemetics may be of benefit (metoclopramide)
Preparation for surgery	2. Chewing gum [73]
1. Preoperative medical optimisation	3. Unrestricted diet
2. Preoperative nutritional optimisation	4. Drain fluid routinely sent for creatinine day 2 and drain removed day 2 if drain fluid indicates serum creatinine levels
3. Seen by stoma nurse specialist; advice on stoma and neobladder care	5. Thrombosis prophylaxis: compression stockings and low molecular weight heparin
4. Cardiopulmonary exercise testing if indicated	6. Regular analgesia: standardised polypharmacologic opioid-sparing analgesia to include paracetamol
5. Advice and support for cessation of smoking	7. Early mobilisation
6. Social issues addressed and discharge planning	8. Daily nutritional supplements with nutrition goal 900 kcal/d
Day before radical cystectomy	9. Fluid/electrolyte (30 ml/kg per day)
1. No bowel preparation	10. Encourage self-care (catheter careflushing if neobladder and stoma bag care if ileal conduit)
2. Carbohydrate loading [28,46]	**Day 4 onwards**
Day of radical cystectomy: day 1	1. Continue as previous; increase daily nutritional goal to 1500 kcal/d
1. Solids up to 6 h and clear fluids up to 2 h preoperative including carbohydrate loading [28,46]	2. Discharge home when criteria met:
2. Avoidance of long-acting sedatives	*Pain adequately controlled*
3. Thrombosis prophylaxis: compression stockings and low molecular weight heparin	*Independently mobile*
4. Limited antimicrobial prophylaxis and skin preparation with chlorhexidine-alcohol (or equivalent solution)	*Regular diet/normal bowel function*
5. Standard anaesthetic protocol to attenuate surgical stress response: intraoperative maintenance of haemodynamic control, central and peripheral oxygenation, muscle relaxation, optimised depth of anaesthesia with spinal and appropriate analgesia avoiding opiates with peripheral action	*Competent with neobladder or stoma care*
6. RARC approach	**Postdischarge**
7. Goal-directed fluid management with judicious use of fluid restriction [59]	1. Stents out day 10 (no stentogram)
8. Prevention of hypothermia (Bair Hugger; 3M Medical, Diegem, Belgium)	2. Removal of clips at day 10
9. Removal of nasogastric tube in recovery	3. Contact with specialist nurse via telephone
	4. Audit cycle of compliance and outcomes

ERP = enhanced recovery program; RARC = robot-assisted radical cystectomy.

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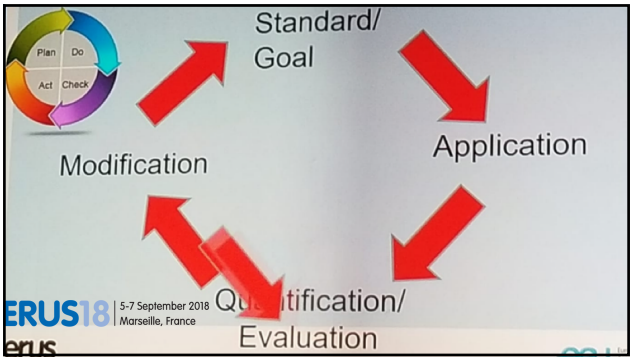
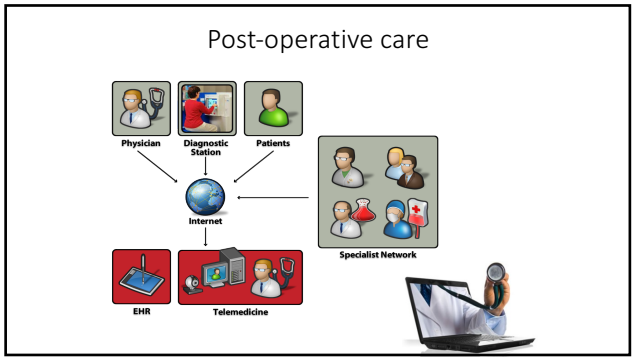
Auditing outcome data

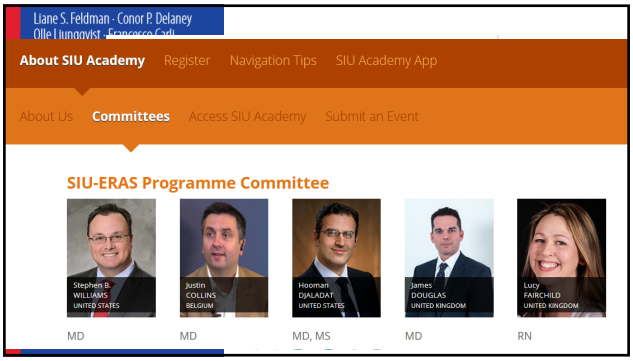
Table 4 – Auditing outcome data: a standardised template

Recommended reporting elements for ERP	ERP-specific details:
Patient-specific details:	Tabular reporting of all elements included from guidelines and any additional elements
Admission date	Clearly explain all ERP elements including specific algorithms and pathways used in care pathway where applicable, for example:
Comorbidities (ASA grade)	Medications/concentrations used
BMI	Antibiotic prophylaxis
Preoperative staging (TNM)	Analgesia escalation strategies
Administration of neoadjuvant chemotherapy Y/N	Intravenous infusion rates and criteria for goal-directed therapy
Smoker preoperatively Y/N	Drain placement algorithms
Given guidance to help quit smoking Y/N	Epidural (if used)/regional level, single injection vs infusion/catheter placement
Continued to smoke postoperatively Y/N	Report compliance for all elements named in ERP.
Operation details:	When failure of an ERP element occurs, it should be reported and reason for failure explained including adverse events related to an ERP element
RARC and diversion type (ileal conduit or orthotopic neobladder, extracorporeal or intracorporeal)	Discharge criteria should be reported. If a substitute for LOS such as "readiness for discharge" is used, there should be a report of actual LOS and a listing of reasons for nonmedical extension of hospitalisation
Pathologic staging (TNM)	
LOS in days (date of admission to date of actual discharge)	
Readmission Y/N (date of readmission)	
30- and 90-d complications (Clavien-Dindo classification [87])	

ASA = American Society of Anesthesiologists; BMI = body mass index; ERP = enhanced recovery program; LOS = length of stay; N = no; RARC = robot-assisted radical cystectomy; Y = yes.

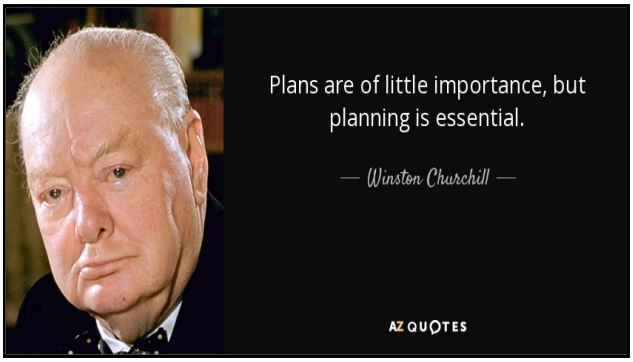


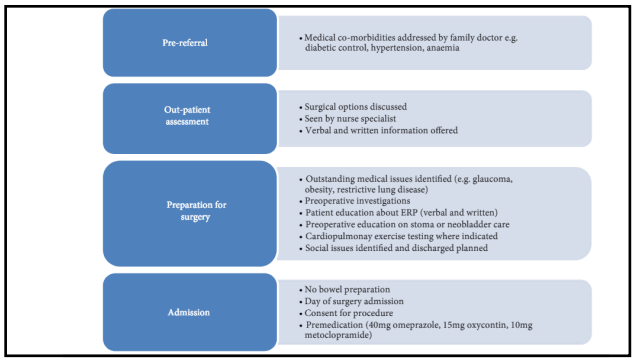


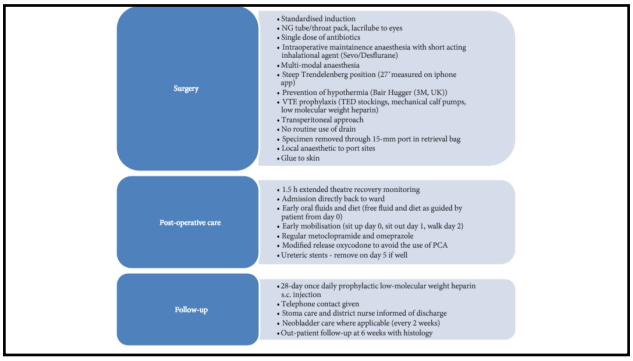


Conclusions

- ERAS is safe and it promotes standardised care
- Potential differences in ERAS in robotic surgery include:
  - Analgesia
  - Fluid replacement
  - Transfusion rates
  - Ability to mobilise earlier
- ERPs have cost implications: reduce LOS without negatively impacting complication rates or readmission rates
- ERAS supports changing patient demographics
- **The surgeon has a key role in educating the patient about ERAS protocols**
- **ERAS protocols could be improved with home monitoring technologies**






Surgery
• Standardised induction
• NG tube/throat pack, lacrilube to eyes
• Single dose of antibiotics
• Intraoperative maintainence anaesthesia with short acting inhalational agent (Servo/Desflurane)
• Multi-modal anaesthesia
• Steep Trendelenberg position (27° measured on iphone app)
• Prevention of hypothermia (Bair Hugger (3M, UK))
• VTE prophylaxis (TED stockings, mechanical calf pumps, low molecular weight heparin)
• Transperitoneal approach
• No routine use of drain
• Specimen removed through 15-mm port in retrieval bag
• Local anaesthetic to port sites
• Glue to skin
Post-operative care
• 1.5 h extended theatre recovery monitoring
• Admission directly back to ward
• Early oral fluids and diet (free fluid and diet as guided by patient from day 0)
• Early mobilisation (sit up day 0, sit out day 1, walk day 2)
• Regular metoclopramide and omeprazole
• Modified release oxycodone to avoid the use of PCA
• Ureteric stents - remove on day 5 if well
Follow-up
• 28-day once daily prophylactic low-molecular weight heparin s.c. injection
• Telephone contact given
• Stoma care and district nurse informed of discharge
• Neobladder care where applicable (every 2 weeks)
• Out-patient follow-up at 6 weeks with histology