Fast-Track Concept: Leipzig Heart Center

TITLE

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ERAS CARDIAC PERIOPERATIVE COMPONENTS

1 PREOPERATIVE COMPONENTS

1. Preop Education
2. Prehabilitation
3. Smoking and Alcohol Cessation
4. Nutrition Optimization

DAY OF SURGERY

5. NPO After Midnight
6. Carbohydrate Clear Drink 2-4 Hours Preop
7. Multimodal Analgesia Initiation

2 INTRAOPERATIVE COMPONENTS

8. Short-acting Anesthetics
9. Continue Multimodal Analgesia
10. Minimize Crystalloid
11. **NO BUGS** Normothermia (T>36°C) • Oxygenation (FiO_2>0.8) • anti-Biotic drug/dose(s)/timing Underventilation ($ETCO_2$>38) • Glycemic control (Glc<180mg/dL) • Skin prep (CHG)/no Shaving
12. PONV Prophylaxis Initiated
13. Postop Sedation Started

3 POSTOPERATIVE COMPONENTS

14. Continue Multimodal Analgesia
15. Early Extubation
16. Continue PONV Prophylaxis
17. Diet/Bowel Regimen
18. Early Ambulation
19. Line/Drain Removal
20. Priority Discharge

Heart Care Plus+

A WAKEMED + DUKE HEALTH COLLABORATION

WakeMed | Duke Health

ATCSA2023
Ho Chi Minh city, Vietnam

Goals of Fast-Track

- Early tracheal extubation (6 h)
- Maintaining patient’s safety
- Decrease the psychologic trauma
- Avoiding admission or reducing LOS in the ICU
- Reduction of hospitalization costs

Anesthesiology 2008; 109:61–6

Cardiac Surgery Fast-track Treatment in a Postanesthetic Care Unit

Six-month Results of the Leipzig Fast-track Concept

Joerg Ender, M.D., Michael Andrew Borger, M.D., Ph.D.,† Markus Scholz, Ph.D.,‡ Anne-Kathrin Funkat, Ph.D.,§ Nadeem Anwar, M.D.,‖ Marcus Sommer, M.B.A.,# Friedrich Wilhelm Mohr, M.D., Ph.D.,** Jens Fassl, M.D.‖*

Conclusions

A fast-track protocol with direct admission to an anesthesia-managed PACU can be applied to a wide variety of cardiac surgery patients with very good results. The Leipzig fast-track protocol is a safe and effective method to manage cardiac surgery patients.

Probst *et al. Critical Care* 2014, **18**:468
http://ccforum.com/content/18/4/468

CRITICAL CARE

RESEARCH Open Access

A specialized post-anaesthetic care unit improves fast-track management in cardiac surgery: a prospective randomized trial

Stefan Probst[1*†], Christof Cech[1,2†], Dirk Haentschel[3], Markus Scholz[4] and Joerg Ender[1]

Key messages

- ET for cardiac surgery patients in a fast-track protocol is significantly shorter in a dedicated PACU than in ICU
- PACU-LOS is significantly shorter than ICU-LOS

Fast-Track Criteria

- Elective cardiac surgery
- Stable haemodynamic condition without or with minimal inotropic support at the end of the operation
- Core temperature of > 36°C
- Not bleeding
- **Clinical judgement and communication between anaesthesiologist and surgeon**

Anaesthesia

Anaesthesia 2019, 74, 602–608 doi:10.1111/anae.1457

Original Article

A comparison of sufentanil vs. remifentanil in fast-track cardiac surgery patients*

W. Z. A. Zakhary,[1] E. W. Turton,[1] A. Flo Forner,[1] K. von Aspern,[2] M. A. Borger[3] and J. K. Ender[4]

1 Senior Consultant, 4 Head, Department of Anaesthesiology and Intensive Care Medicine, 2 Senior Registrar, 3 Head, University Department for Cardiac Surgery, Heart Center Leipzig, Leipzig, Germany

Opioid: - Induction 0,2mg Fentanyl

- In OR Sufentanil infusion:
  - 0,5-1,0 µg/kg/h until CPB HLM or 10 min after sternotomy in Off-Pump procedures
  - 0,25 -0,5 µg/kg/h during CPB
  - Stop after pericardium closure

Hypnotics: Propofol:
- 1-2 mg/kg bolus for induction
- 0.8 MAC Sevoflurane until end of surgery then propofol infusion 1-2mg/kg/h for transport until chest X Ray

Muscle Relaxans: Atracurium 0,5-0,6mg/kg single bolus

Postanaesthetic Care Unit (PACU)

Weaning criteria:

- Train-of-four (TOF) ratio > 0.9
- Pressure support ventilation; PS 10–12 cmH_2O, PEEP 0–5 cmH_2O, $F_IO_2 \leq 40\%$
- Arterial blood gases; $PaO_2 \geq 13.3$ kPa, $PaCO_2 \leq 5.8$ kPa
- $SvO_2 \geq 70\%$, serum lactate < 4 $mmol.l^{-1}$, no acidosis
- Chest drainage ≤ 200 ml in 1st h, ≤ 100 ml in 2nd h then ≤ 50 $ml.h^{-1}$

Intubation is as skill, *Extubation* is an art…

Criteria for tracheal extubation:

- Full consciousness, no neurological deficit
- Haemodynamically stable
- Core temperature ≥ 36 °C
- Arterial blood gases; $PaO_2 \geq 13.3$ kPa, $PaCO_2 \leq 5.8$ kPa with F_iO_2 0.4
- Normal SvO_2
- Acceptable tidal volumes with pressure support of 8 cmH_2O and PEEP of 5 cmH_2O
- Blood loss < 100 $ml.h^{-1}$
- Normal serum lactate
- No new ECG or CXR changes

Transfer to the Intermediate Care IMC

Criteria for transfer of patients from recovery area to IMC:

- Fully awake and alert with no neurological deficit
- Haemodynamic stability
- None, or minimal, inotropic support
- Arterial blood gases; PaO_2 > 12 kPa, $PaCO_2$ < 6.1 kPa, S_pO_2 > 96% breathing 2–6 $l.min^{-1}$ oxygen
- Urine output > 0.5 $ml.kg^{-1}.h^{-2}$
- Blood loss < 50 $ml.h^{-1}$
- Normal serum lactate
- Normal SvO_2
- Cardiac enzymes and CXR warranting no further intervention
- Visual analogue pain score < 4

Fast-Track Concept Evaluation

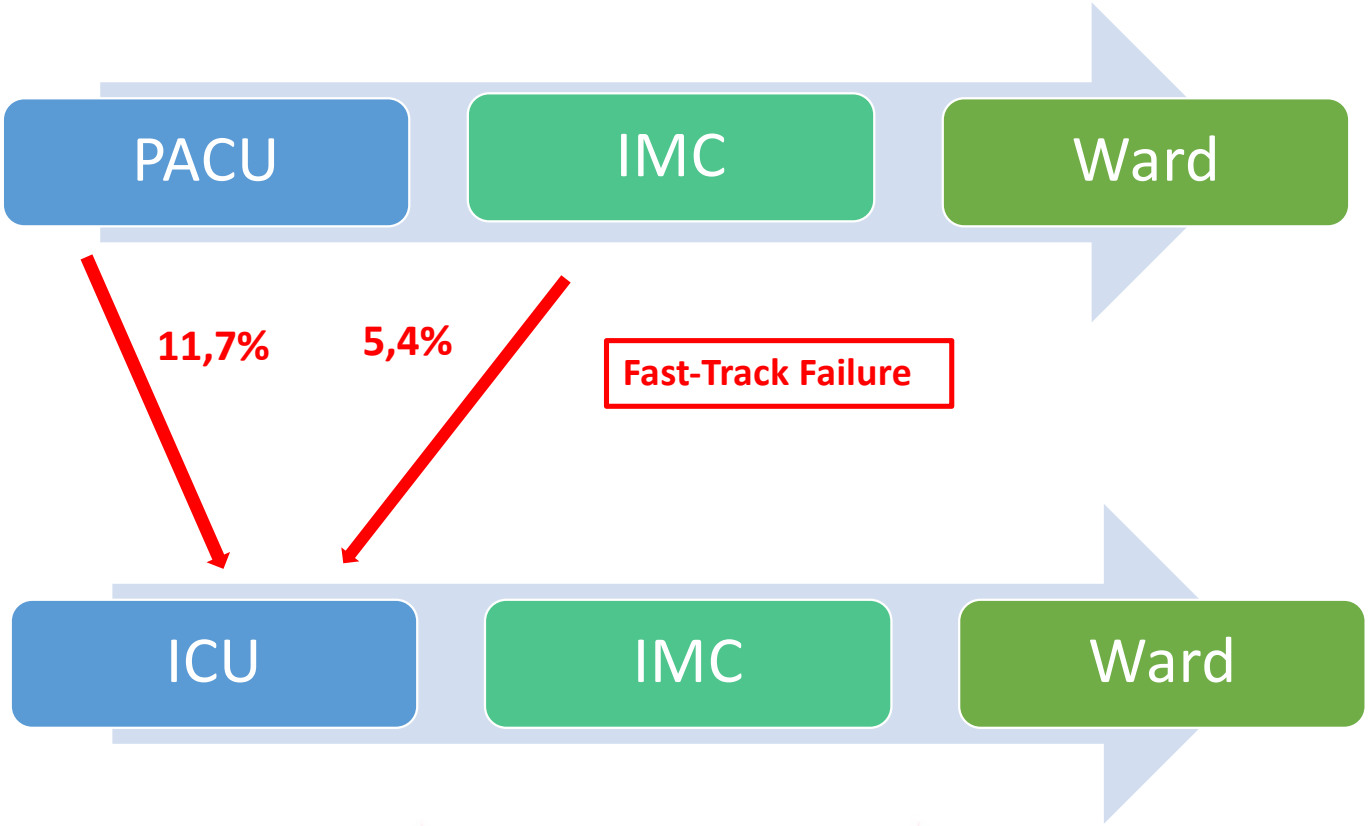
	Fast Track	*Control*	
Number	360	360	p value
Extubation time [Min]	75 [40; 105]	840 [600; 1140]	< 0.01
PACU / ICU [h]	4 [3; 5]	20 [16; 24]	< 0.01
Intermediate care [h]	21 [17; 38]	26 [18;49]	< 0.01
Total LOS hospital (days)	10 [8;12]	11 [9;13]	< 0.01
Intermediate care readmission	35 (9.7%)	36 (10.0%)	1
LOS for intermediate care readmission [h]	17 [7; 26]	13 [4.8; 22]	0.26
ICU readmission	17 (4.7%)	26 (7.2%)	0.21
LOS for ICU readmission [h]	22 [9; 37]	18 [10; 128]	0.87
Myocardial infarction	1 (0.3%)	3 (0.8%)	0.62
Low Cardiac Output	0	9 (2.5%)	< 0.01
Renal insufficiency	3 (0.8%)	8 (2.2%)	0.22
Stroke	3 (0.8%)	8 (2.2%)	0.22
Mediastinitis	1 (0.3%)	2 (0.6%)	0.90
Mortality	1 (0.3%)	11 (3.1%)	< 0.01

Leipzig Fast-Track since November 2005

N = 22368	Mean	Std Dev	Upper quart	Median	Lower quart	Interquart Range
Extubation time/min	105,4	77,4	135	90	55	80
LOS PACU/min	259,9	114,5	310	255	195	115
Primary FT Failure	11.7%					
Secondary FT Failure	5.4%					
Mortality	1%					

Unpublished data

Clinical Path



Fast-Track Failure

Independent Risk Factors for Fast-Track Failure Using a Predefined Fast-Track Protocol in Preselected Cardiac Surgery Patients

Waseem Zakhary, MD,* Jacob Lindner, MD,† Sophia Sgouropoulou, MD,* Sarah Eibel, MD,* Stefan Probst, MD,* Markus Scholz, PhD,‡ and Joerg Ender, MD*

Journal of Cardiothoracic and Vascular Anesthesia, Vol 29, No 6 (December), 2015: pp 1461–1465

N = 1704 Pts

Primary FTF 11,6%

Secondary FTF 5,6%

Table 6. Independent Risk Factors After Multivariate Analysis for Primary FTF Patients

Parameters	p Value	OR
Age >70 y	<0.01*	2.2
Surgery duration	<0.01*	1.4/h >3 h
Cross-clamp time	<0.01*	1.5/h >65 min
Female sex	<0.01*	1.5

Cochrane Library

Cochrane Database of Systematic Reviews

Fast-track cardiac care for adult cardiac surgical patients (Review)

Wong WT, Lai VKW, Chee YE, Lee A

„ The results of fast- track treatment provided in a postanesthetic care unit („Leipzig fast-track concept“) instead of admission to an ICU, are encouraging.

The need for accurate fast-track failure risk prediction models in cardiac surgery appears to be substantial.

If a threshold probability of fast-track failure of between 5% and 20% is used to determine who should be admitted to the ICU or to the fast-track recovery unit, we would expect an increase in ICU bed utilization from 23% to 67%, even after adjustments for the negative consequences of unplanned ICU admissions.“

Wong Cochrane Library 2016

Evolving Fast-Track

2005-2010

2005- First PACU pts

3 beds

2008- First publication

2010- **8 beds**

2010-2020

PONV protocol

POCUS TTE protocol

POCUS LUS protocol

Delirium Score

NO Benzodiazepines

2020-2023

Thoracic blocks:

ESP-Block

SAP-Block

PIRS-Block

GDFT

Fourteen from the 21 elements of perioperative ERACS bundles, guidelines by Engelman et al. were already applied in our protocol

Journal of *Clinical Medicine*

MDPI

Article

A Comparison of Patients Undergoing On- vs. Off-Pump Coronary Artery Bypass Surgery Managed with a Fast-Track Protocol †

Henrike Grützner [1,‡], Anna Flo Forner [2,‡], Massimiliano Meineri [2], Aniruddha Janai [2], Jörg Ender [2] and Waseem Zakaria Aziz Zakhary [2,*]

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† Presented in part at the European Association of Cardiothoracic Anesthesiology (EACTA) 2020, Grenoble, France (online congress).
‡ H.G. and A.F.F. contributed equally to this work.

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Journal of *Cardiovascular Development and Disease*

MDPI

Article

Postoperative Weight Gain within Enhanced Recovery after Cardiac Surgery

Alexandra Krüger [1,†], Anna Flo Forner [2,†], Jörg Ender [2], Aniruddha Janai [2], Youssef Roufail [3], Wolfgang Otto [4], Massimiliano Meineri [2,‡] and Waseem Z. A. Zakhary [2,*,‡]

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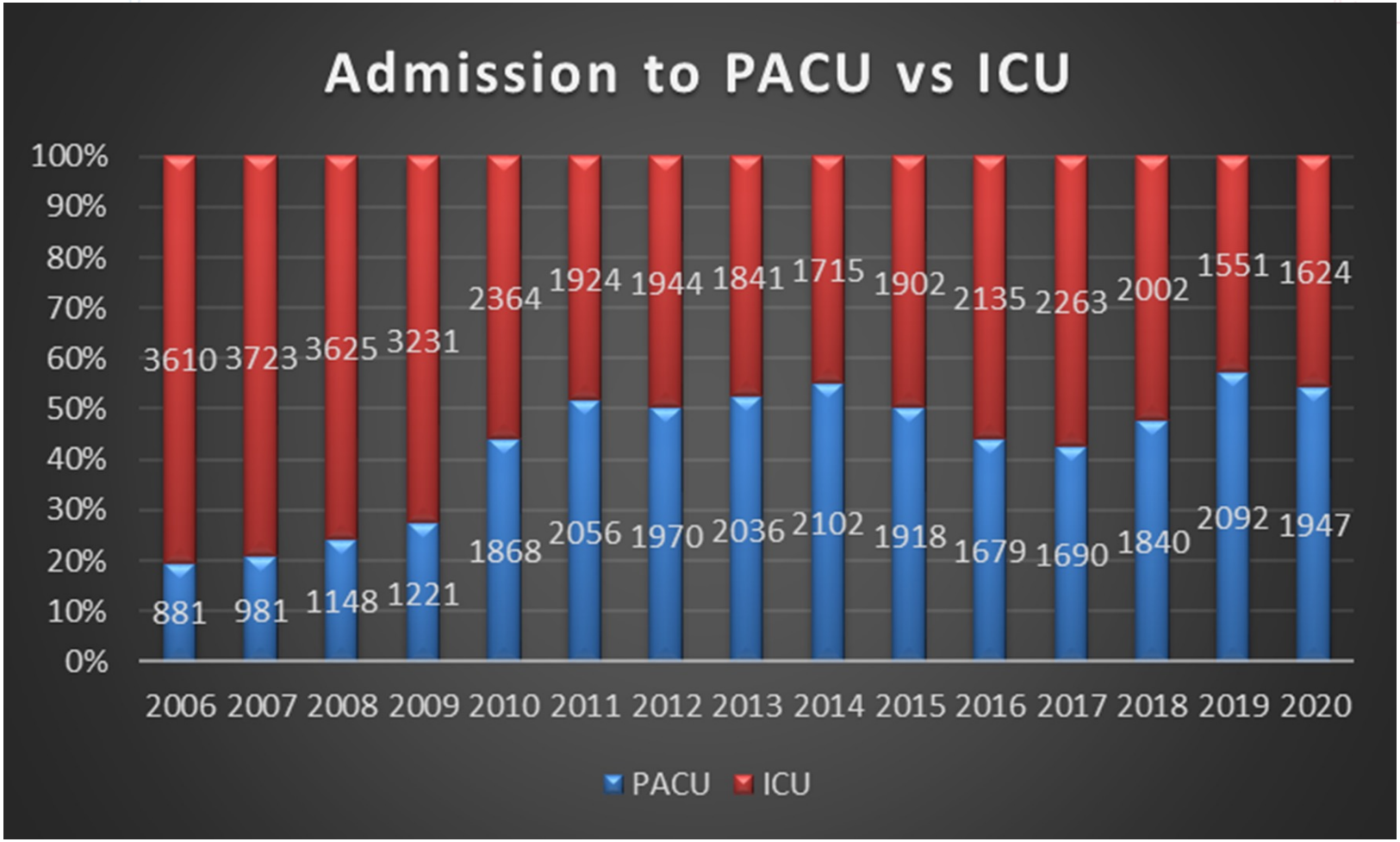

Unpublished data

Prof. Ender, Dr. Zakhary

Our mission at PACU:

Fast extubated, bypassing ICU, pain free patients!

Our motto at PACU:

“Wherever the art of medicine is loved, there is also a love of humanity”

— Hippocrates

Thank you