



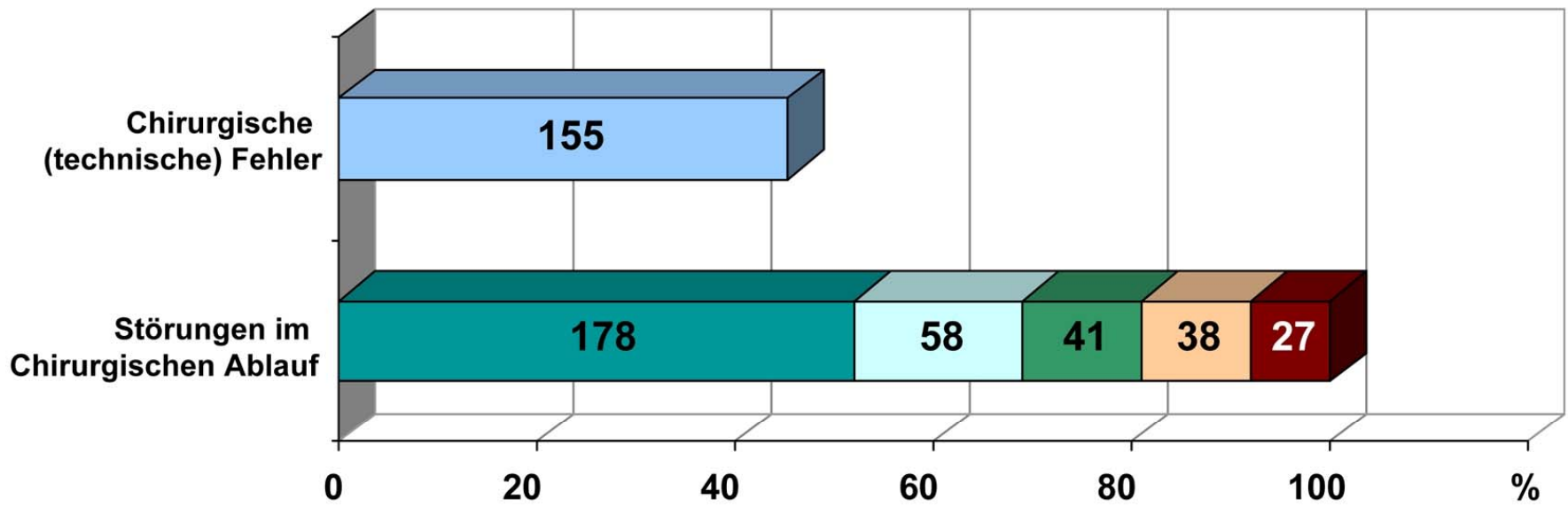
Herz-, Thorax-, Transplantations-  
und Gefäßchirurgie

# *Ein Co-Pilotensystem in der Herzchirurgie der MHH*

Prof. Dr. M. Strüber



MIT SICHERHEIT.



**31 ACVB /**  
**Herzklappenoperationen**

- Störungen in der Zusammenarbeit
- Externe Störungen / Unterbrechungen
- Unterbrechung von Supervision / Training
- Technische Probleme mit dem Equipment
- Unzureichende Hilfsmittel

Modifiziert nach A. W. ElBardissi et al. / Eur J Cardiothor Surg 2008;34:1027-1033



Medizinische Hochschule  
Hannover

# HUMAN FACTORS AND CARDIAC SURGERY: A MULTICENTER STUDY

Marc R. de Leval, MD<sup>a</sup>

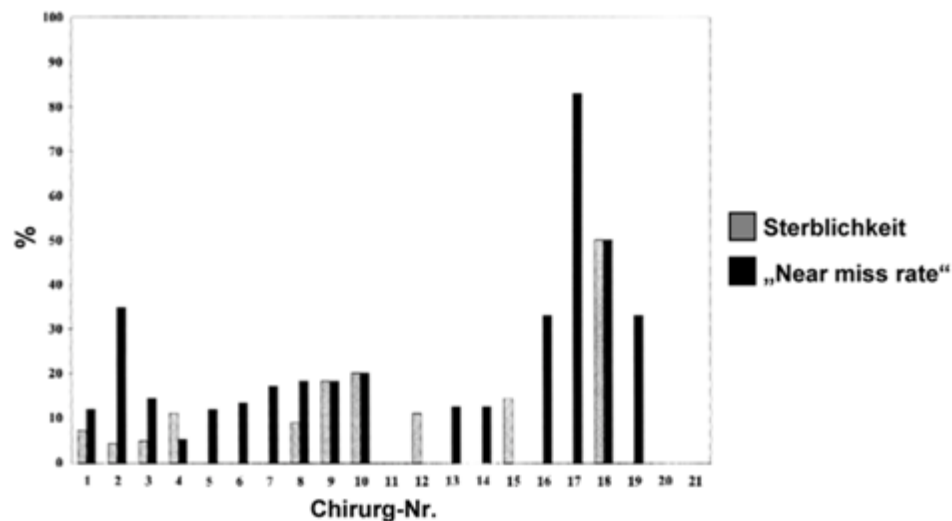
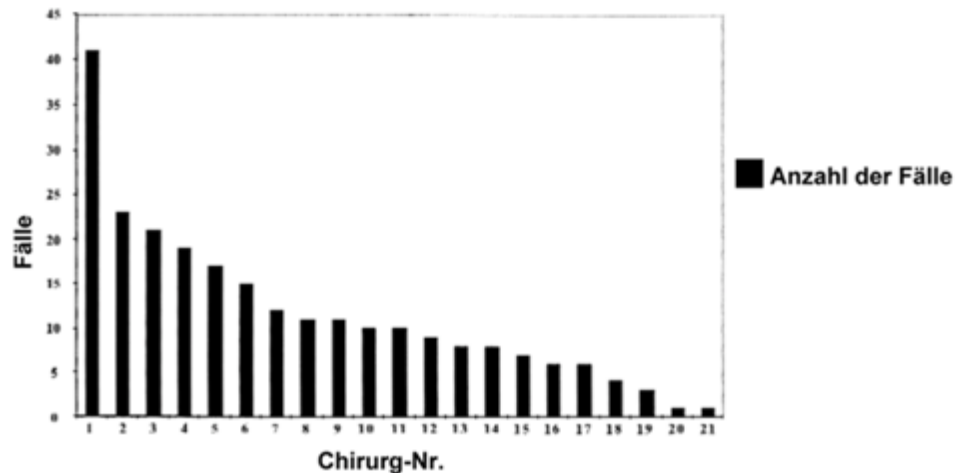
Jane Carthey, PhD<sup>a</sup>

David J. Wright, PhD<sup>b</sup>

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James T. Reason, PhD<sup>c</sup>

All United Kingdom pediatric cardiac centers



J Thorac Cardiovasc Surg 2000;119:661-72

**Table IX.** Major and minor events examined jointly

<i>Type of analysis</i>	<i>Death</i>		<i>Death and/or near miss</i>	
	<i>OR (95% CI)</i>	<i>P value</i>	<i>OR (95% CI)</i>	<i>P value</i>
No. of major events per case +	0.44 (0.12, 1.6)	.21	6.2 (2.0, 19)	.0020
No. of uncompensated major events per case	13 (2.1, 83)	.0060	6.4 (0.99, 41)	.051
No. of minor events per case	1.4 (1.0, 2.0)	.030	1.4 (1.2, 1.8)	.0010

*OR*, Odds ratio; *CI*, confidence intervals.

### Appendix B. The STAR questionnaire

<i>Category of factors</i>	<i>Individual STAR factors</i>
Organizational factors	Personnel availability Equipment availability Bed space in ICU Scheduling of the operation Substitutions of rostered personnel
Situational factors	Free to concentrate/distractions and interruptions Physical conditions in the theater “Atmosphere” in the theater Equipment design or reliability Monitoring of displays or equipment
Team factors	Preoperative team briefings Confidence in other team members Team’s ability to deal with unexpected events Communication between theater teams Harmony/clashes between teams
Personal factors	Mental readiness/preparedness Keeping pace with events Technical performance Sleep/rest Well-being/feeling suboptimal

*ICU*, Intensive care unit.

# Disruptions in surgical flow and their relationship to surgical errors: An exploratory investigation

Douglas A. Wiegmann, PhD,\* Andrew W. ElBardissi, BS,\* Joseph A. Dearani, MD, FACS, Richard C. Daly, MD, FACS, and Thoralf M. Sundt III, MD, FACS, Rochester, Minn

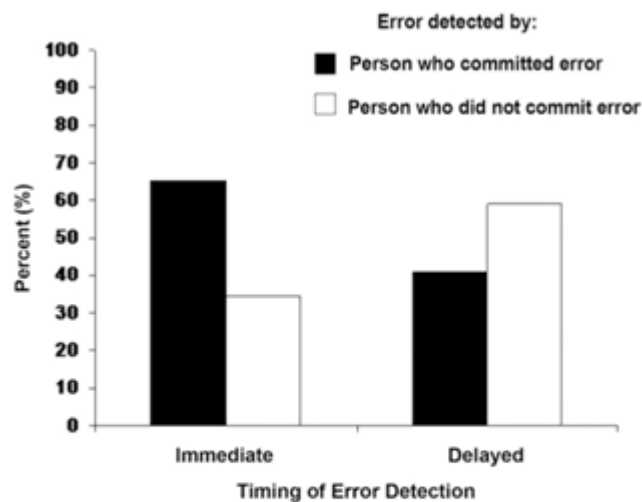
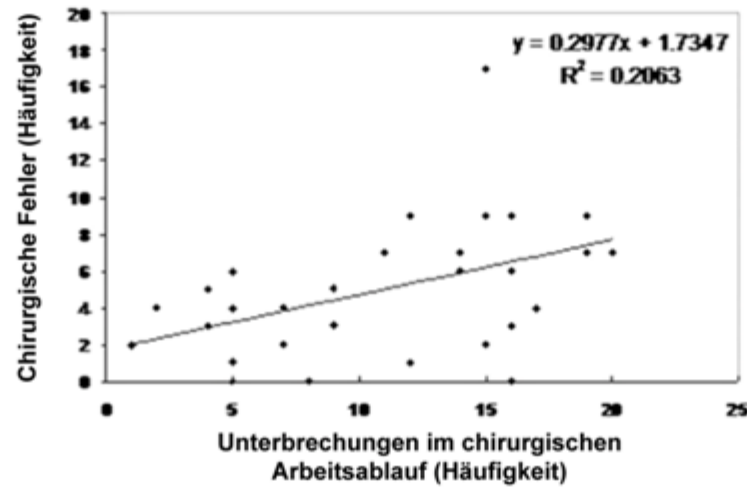


Fig 1. Percent of errors detected either immediately or after a delay. White bars indicate errors detected by the same individual who committed the error. Black bars errors detected by an individual other than the person who committed the error.

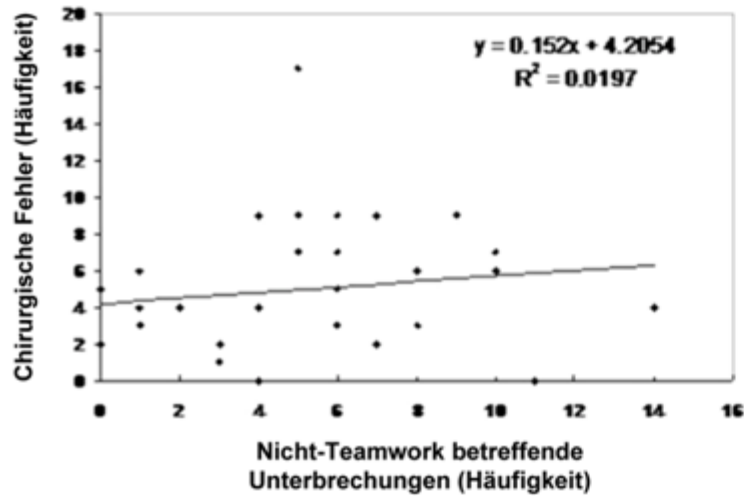
**Table I.** List of flow disruption categories for events that were categorized

<i>Surgical Flow Disruptions Category</i>	<i>Example/Definition</i>
Teamwork	Issues revolving around communication, team coordination, team familiarity, and team monitoring.
Extraneous interruptions	Disruptions occurring during a procedure that did not directly pertain to the treatment of the patient and resulted in disruption of surgical flow.
Equipment and technology	Malfunction of technologic equipment or delays secondary to equipment design or performance resulting in surgical delays.
Resource-based issues	Failure to progress to the next stage of the operation because of a lack of resources available at the operative table.
Supervisory/training-related issues	Failure to progress to the next stage of the operation because of management of personnel, guidance, and training of members of the operating room team.

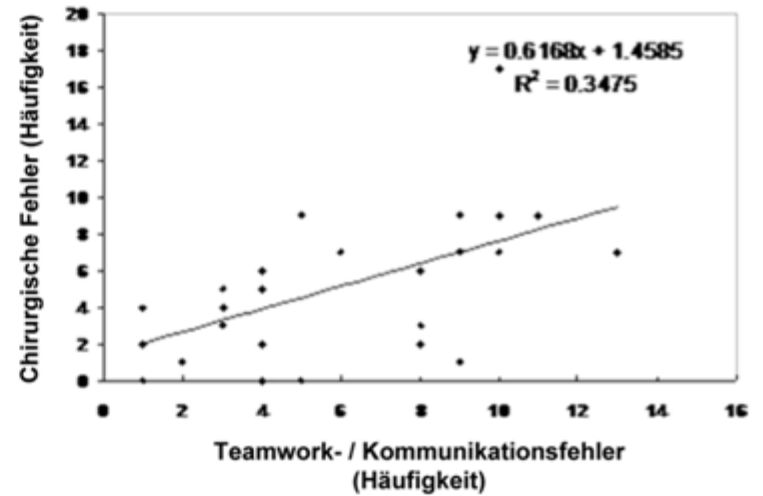
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B.



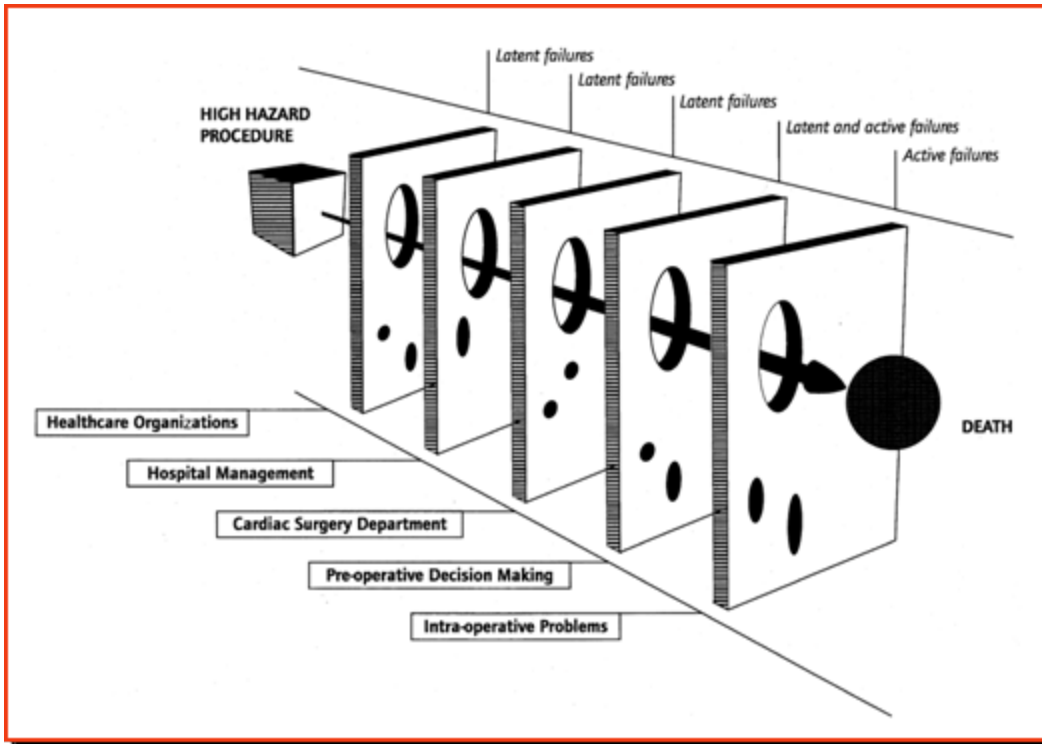
C.



# The Human Factor in Cardiac Surgery: Errors and Near Misses in a High Technology Medical Domain

Jane Carthey, PhD, Marc R. de Leval, MD, and James T. Reason, PhD

Cardiothoracic Unit, Great Ormond Street Hospital For Children NHS Trust, London, England



Ann Thorac Surg 2001;72:300-5

Table 1. Examples of Latent and Active Failures in Health Care

Level	Examples of Latent and Active Failures
Health care organizations	Lack of investment in health care at government and state levels Poor working conditions for nursing staff No continuity in health care management initiatives
Hospital management	Nursing shortages lead to overreliance on agency nurses Lack of investment in high technology equipment Poor organizational communication networks
Cardiac surgery department	Poor organization of staff roles and responsibilities Failure to invest in staff training Absence of, or inadequate, policies and protocols for treatment Poor intradepartmental communication
Preoperative decision making	Incorrect diagnosis of the patient's condition Communication failures between teams Conflicts between clinical, research, and management goals
Intraoperative problems	Poor scheduling of cases Major errors: accidental injury of a coronary artery, pincushioning during catheter insertion leading to a serious cardiac event Minor errors: tension and positioning errors by surgical assistants, instrument handing errors by the scrub nurse, communication failures between the operating room team

# Communication failures in the operating room: an observational classification of recurrent types and effects

L Lingard, S Espin, S Whyte, G Regehr, G R Baker, R Reznick, J Bohnen, B Orser, D Doran, E Grober

**Table 1** Summary of communication events recorded and classification of communication failures

Communication events recorded (n)	421
Communication events classified as communication failures (% of total events)	129 (30.6)
Communication failures by type (% of total of communication failures)*	
Occasion	59 (45.7)
Content	46 (35.7)
Purpose	31 (24.0)
Audience	27 (20.9)

\*Because a single communication event could be classified within more than one category of rhetorical failure, numbers add up to more than 100%.

**Table 3** Observed effects of communication failure

Effect of communication failure by type	No (%)*
No visible immediate effect	82 (63.6)
Inefficiency	23 (17.8)
Team tension	16 (12.3)
Delay	10 (7.7)
Workaround	3 (2.3)
Resource waste	2 (1.6)
Patient inconvenience	2 (1.6)
Procedural error	1 (0.8)

\*Percentage of total communication failures.

# Patterns of Communication Breakdowns Resulting in Injury to Surgical Patients

Caprice C Greenberg, MD, MPH, Scott E Regenbogen, MD, David M Studdert, LLB, SCD, MPH, Stuart R Lipsitz, SCD, Selwyn O Rogers, MD, MPH, FACS, Michael J Zinner, MD, FACS, Atul A Gawande, MD, MPH, FACS

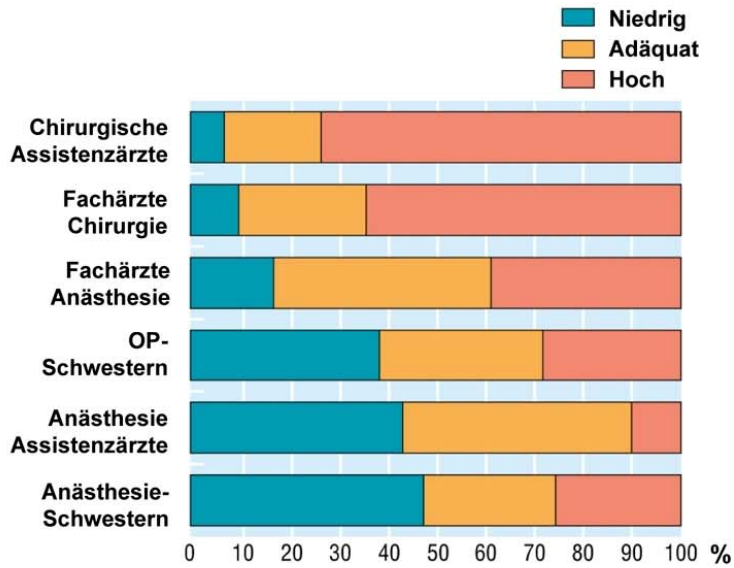
**Table 3.** Most Common Transmitter and Receiver Agents Overall

	Transmitter* (n = 83)		Receiver* (n = 98)	
	n	%	n	%
Surgery attending	24	29	55	56
Surgery resident	14	17	12	12
Anesthesia attending	3	4	7	7
Anesthesia resident	2	2	1	1.0
OR nursing	16	19	12	12
Perioperative nursing	3	4	0	0
Patient or family	6	7	5	5
Other attending	8	10	3	3
Other resident	2	2	3	3
Other staff	5	6	0	0

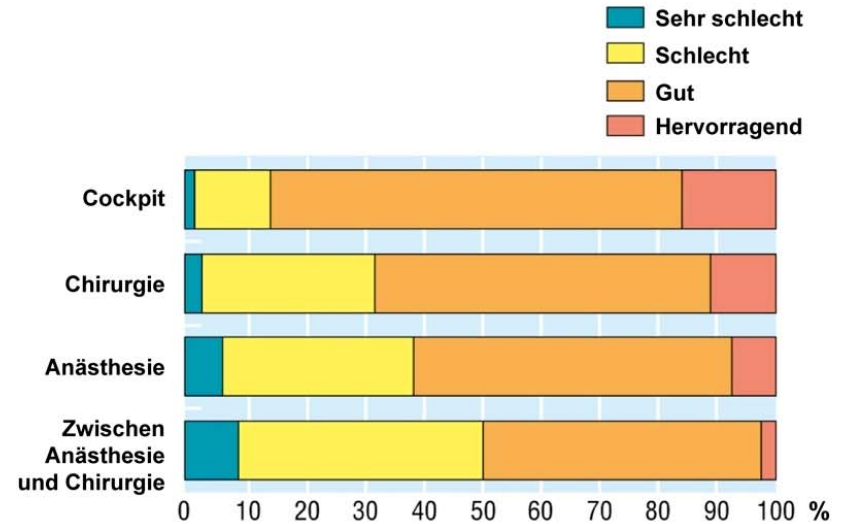
\*Number of transmitters and receivers listed reflects the fact that there can be more than one transmitter and receiver for each communication breakdown. Each agent was treated independently for this analysis.  
OR, operating room.

# Error, stress, and teamwork in medicine and aviation: cross sectional surveys

J Bryan Sexton, Eric J Thomas, Robert L Helmreich



Teamwork-Beurteilung mit chirurgischem Facharzt



Teamwork-Beurteilung durch Beobachter

BMJ 2000;320:745-9

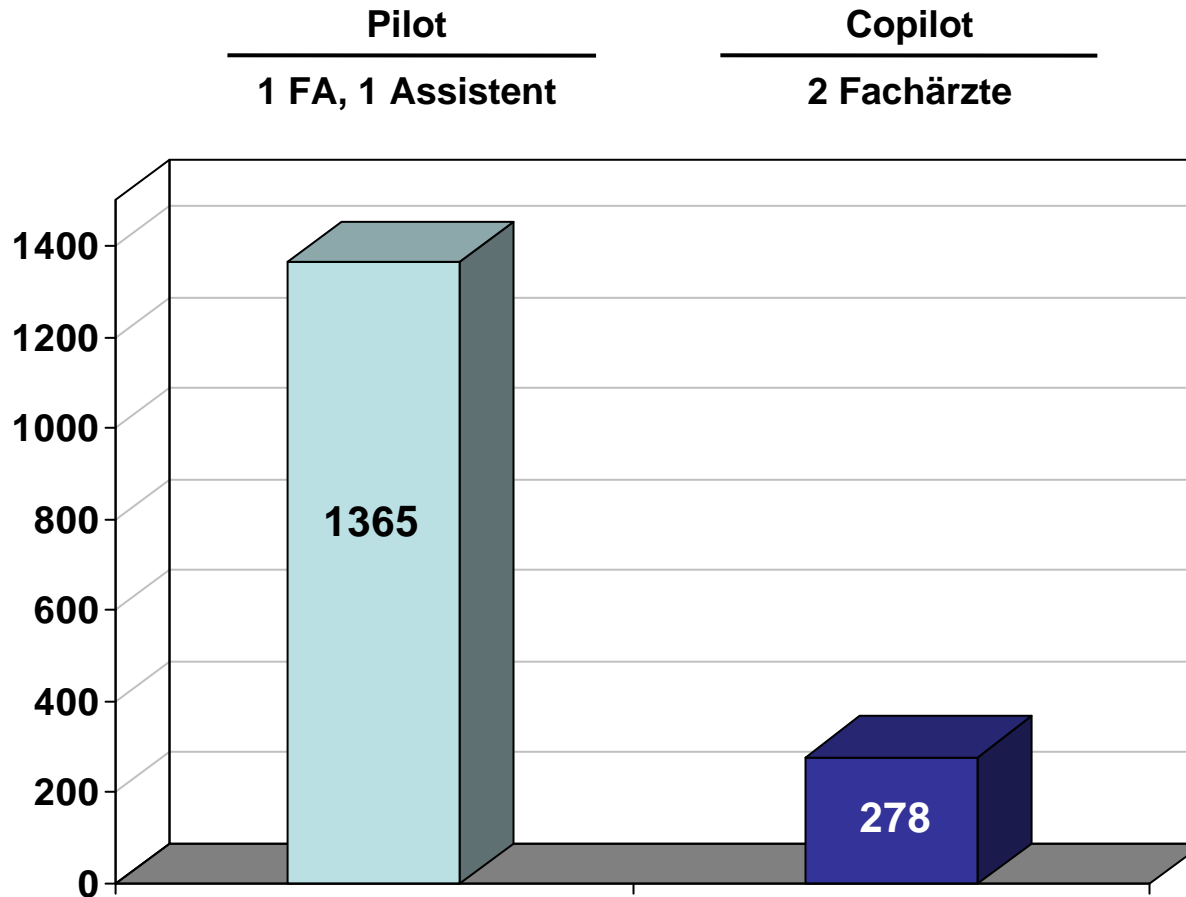


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There is a relationship between perceptions of teamwork and status in the team. Surgeons are most supportive of steep hierarchies in which junior staff do not question senior staff. Surgeons also perceive teamwork and communication in the team to be of a higher quality than the rest of the team. Similarly, in intensive care, doctors rated teamwork with nurses higher than did nurses with doctors. However, future research should not focus exclusively on consultants.

# Retrospektive Analyse von 1643 ACB

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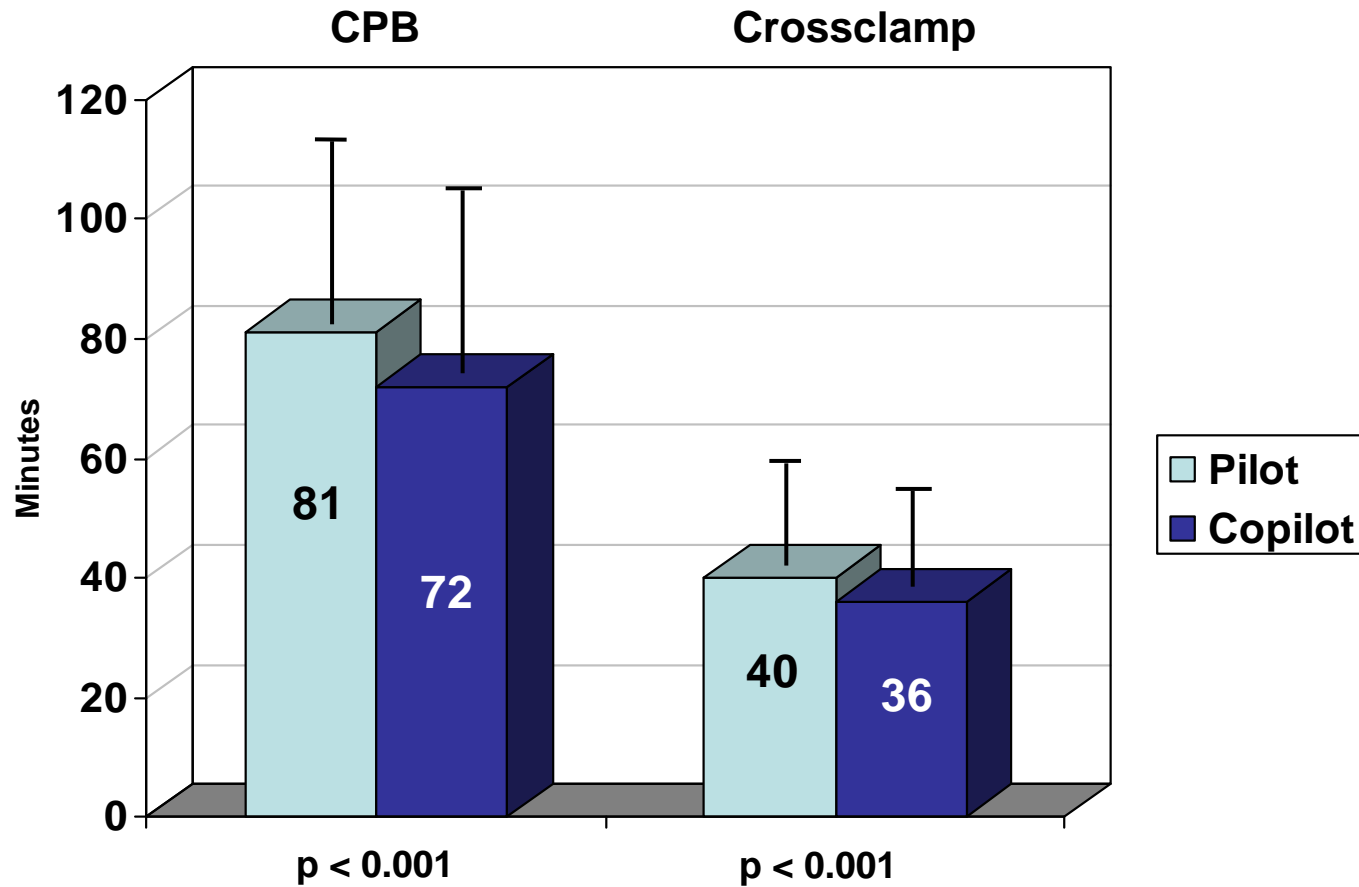
**Distale Anastomosen**

<b>Pilot</b>	<b>3.1 ± 0.9</b>	<b><i>p = 0.15</i></b>
<b>Copilot</b>	<b>3.2 ± 0.8</b>	

**KH Mortalität**

<b>Pilot</b>	<b>2.8</b>	<b><i>p = 0.2</i></b>
<b>Copilot</b>	<b>2.1</b>	

# ACVB Procedures

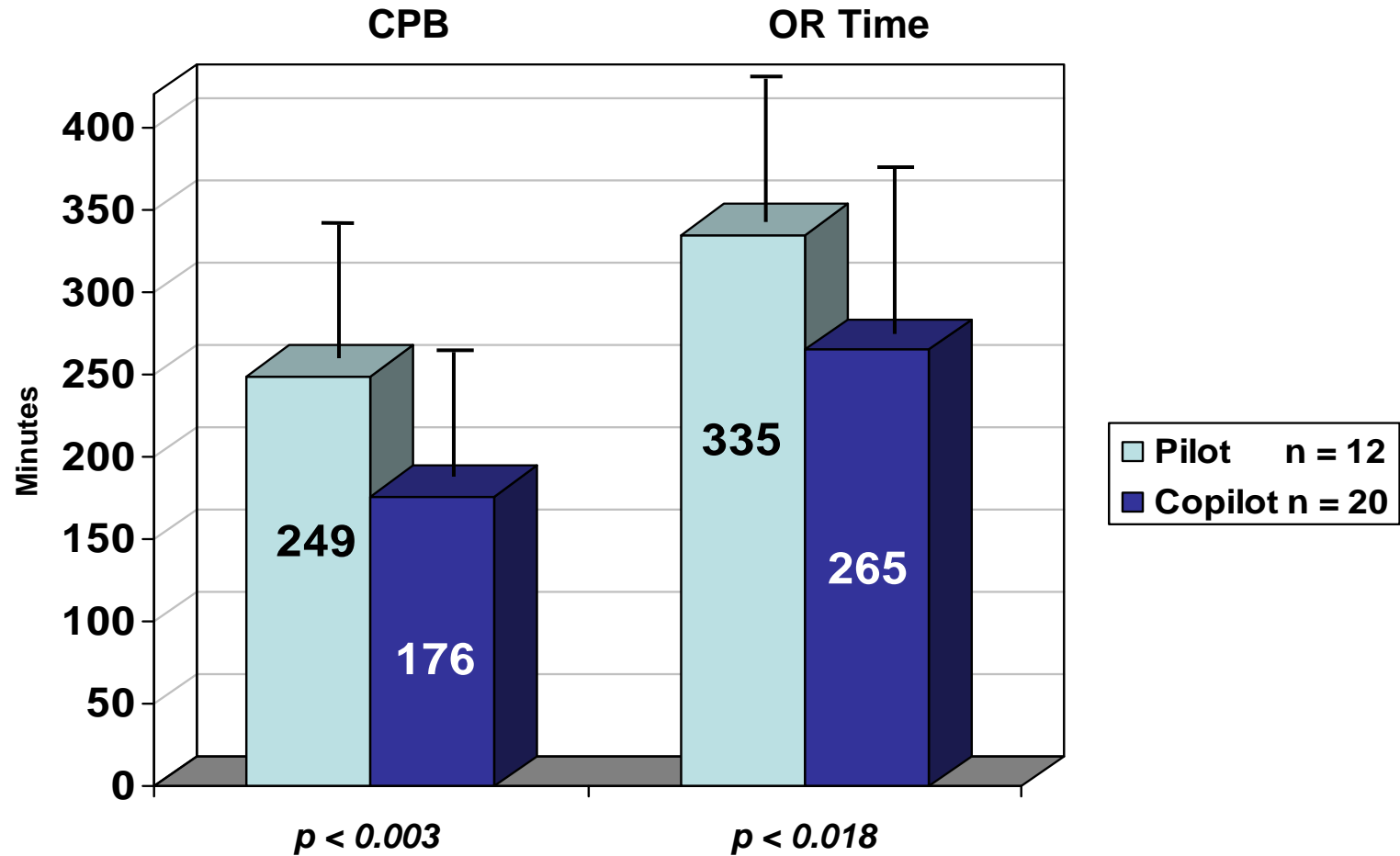


# Myokardinfarkt

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<b>Pilot</b>	<b>n = 23</b>	<b>→</b>	<b>2.5 %</b>	<b><i>p = 0.02</i></b>
<b>Copilot</b>	<b>n = 1</b>	<b>→</b>	<b>0.4 %</b>	

# AADA Procedures



# ICU Time

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**Pilot**                      **5.0 ± 1.0 days**

*p = 0.047*

**Copilot**                      **3.5 ± 1.5 days**

# On error management: lessons from aviation

Robert L Helmreich

## Behaviours that increase risk to patients in operating theatres

### Communication:

- Failure to inform team of patient's problem—for example, surgeon fails to inform anaesthetist of use of drug before blood pressure is seriously affected
- Failure to discuss alternative procedures

### Leadership:

- Failure to establish leadership for operating room team

### Interpersonal relations, conflict:

- Overt hostility and frustration—for example, patient deteriorates while surgeon and anaesthetist are in conflict over whether to terminate surgery after pneumothorax

### Preparation, planning, vigilance:

- Failure to plan for contingencies in treatment plan
- Failure to monitor situation and other team's activities—for example, distracted anaesthetist fails to note drop in blood pressure after monitor's power fails

BMJ 2000;320:781-5