Prolonged ICU Stay After Cardiac Operations

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Cardiothoracic surgery

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Disclosures: none

Introduction

- Cardiac surgery patients are older, more complex.
- General ICU beds usually cannot backup CVS pts.

CVS ICU beds are occupied by patients for extended lengths of time.

4% of patients utilize 30% of ICU beds

Williams et al

What are the outcomes in such patients?

Introduction

Duration of stay in the ICU is dictated by:

- Co-morbidity
- Intra-operative events
- Post-operative events

Criteria: 2-14 days

Williams
Hassan
Hellgren
Hein
Lagercranz
Gaudino

Bapat
Heimrath
Bashour
Isgro
Ghotkar
Tu
Mazzoni

Objectives

Identify clinical profile of patients requiring prolonged ICU stay after cardiac operations

Determine: predictors for prolonged ICU stay

predictors for operative mortality in patients requiring prolonged stay in ICU

long-term outcome in these patients

Methods

1993-2011

Inclusion:

All patients admitted to ICU following cardiac operation

n=6385

retrospective study:

clinical profile

operative data

post-operative data

Methods

Stratification into 3 groups

	grp1 1-2 d	grp 2 3-14 d	grp 3 >14 d
n=	4631 (73%)	1423 (22%)	**331 (5%)**

****170 patients >30 days****

CVICU is run by CVS personnel

Pre Operative Data

	1-2d	3-14d	>14d
n	4631	1423	331
Male	3394 (73)	888 (62)	180 (54)
Age	62±12	68±11	70±10

p<0.0001

Pre Operative Data

	1-2d	3-14d	>14d
n	4631	1423	331
HTN	2585 (56)	976 (69)	244 (75)
DM	1496 (32)	563 (40)	171 (52)
COPD	326 (7)	155 (11)	50 (15)
RF	289 (6)	275 (19)	99 (30)
PHT	739 (16)	555 (39)	164 (50)
CVA	363 (8)	163 (11)	41 (12)
PVD	554 (12)	197 (14)	54 (16)
A-fib	446 (10)	267 (19)	86 (26)
EuroSCORE	6±7	14±15	22±19

p<0.0001

Pre Operative Data

	1-2d	3-14d	>14d
n	4631	1423	331
NYHA 3-4	1303 (28)	836 (59)	241 (73)
Shock	50 (1)	79 (6)	41 (12)
LV dys	826 (18)	400 (28)	129 (39)
MR 3-4	988 (21)	632 (44)	199 (60)
TI grad	33±14	40±15	45±34

p<0.0001

Operative Data

	1-2d	3-14d	>14d
isolated CAB	3286 (71)	555 (39)	82 (25)
Urgent	1047 (23)	448 (31)	118 (36)
Reoperation	213 (5)	147 (10)	62 (19)
BPT	93±40	123±55	147±62
XCT	61±30	83±38	94±46
BPT-XCT	33±22	41±35	55±45

p<0.0001

Post-operative events

	1-2d	3-14d	>14d
ICU stay	1.3±0.5	5.5±3	38±24
range	1-2	3-14	15-160
median	1	5	31
Prol vent (>24 hr)	40 (1)	499 (35)	242 (73)
Periop MI	59 (1)	51 (4)	18 (5)
Stroke	31 (0.7)	26 (2)	50 (15)
Sepsis	42 (1)	63 (4)	134 (40)
New RF	59 (1)	93 (7)	101 (31)
Low CO	207 (4)	287 (20)	146 (44)
Pacemaker	39 (1)	68 (5)	13 (4)

$p<0.0001$

Mortality

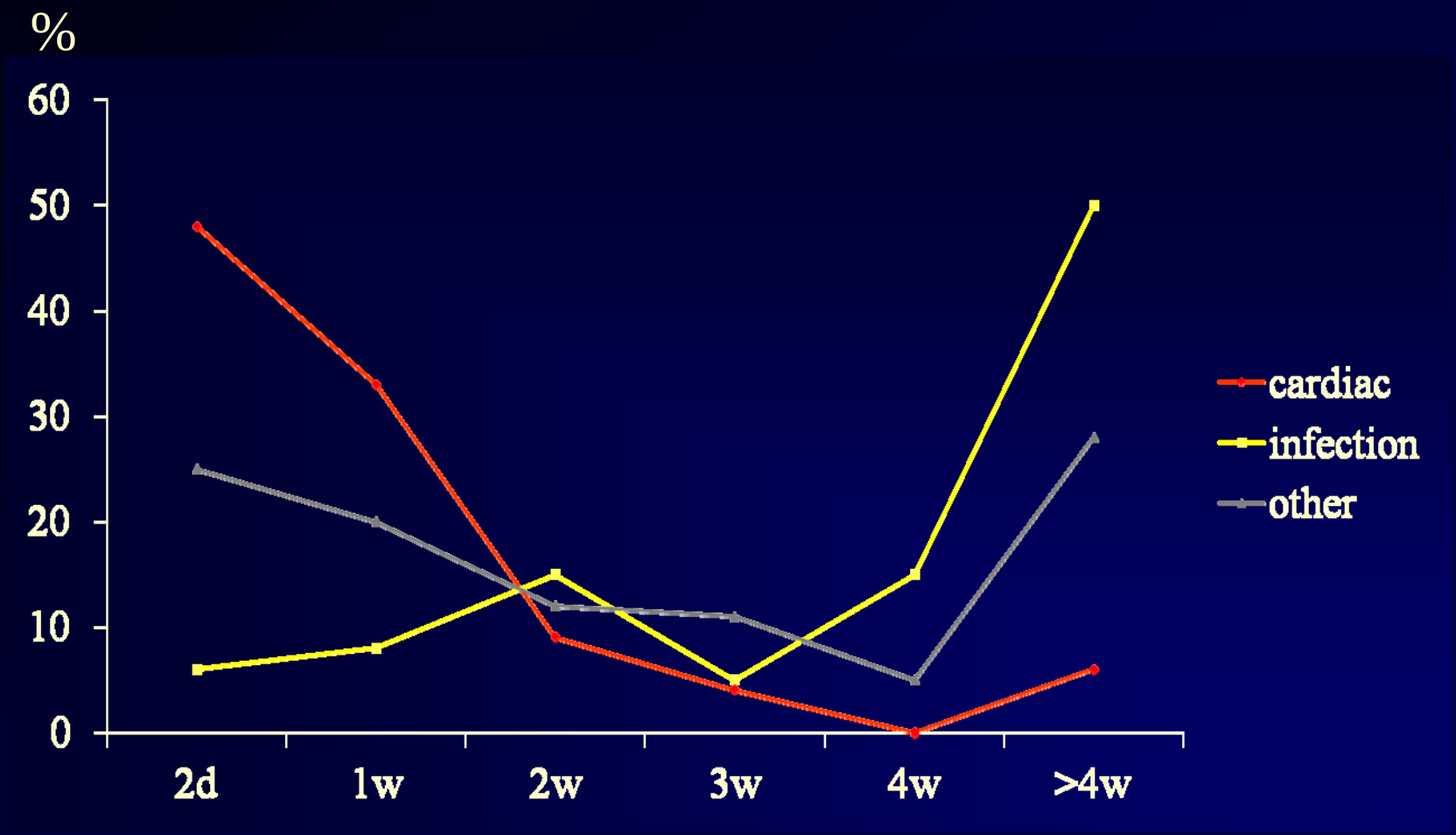
	1-2d	3-14d	>14d
n	92 (2)	109 (8)	131 (40)
cardiac	59 (64)	51 (47)	12 (9)
infection	6 (7)	23 (21)	71 (54)
stroke	9 (10)	8 (7)	18 (14)
other	18 (21)	27 (25)	30 (24)

p<0.0001

p=ns

- cardiac deaths – 90% in short ICU groups
- non-cardiac deaths- 57% in long ICU groups

Operative mortality by cause



Observed *vs* predicted mortality

predicted	observed		
	1-2d	3-14d	>14d
0-10%	1%	6%	31%
11-20%	5%	9%	41%
21-30%	13%	8%	40%
31-40%	16%	10%	32%
>40%	36%	19%	63%

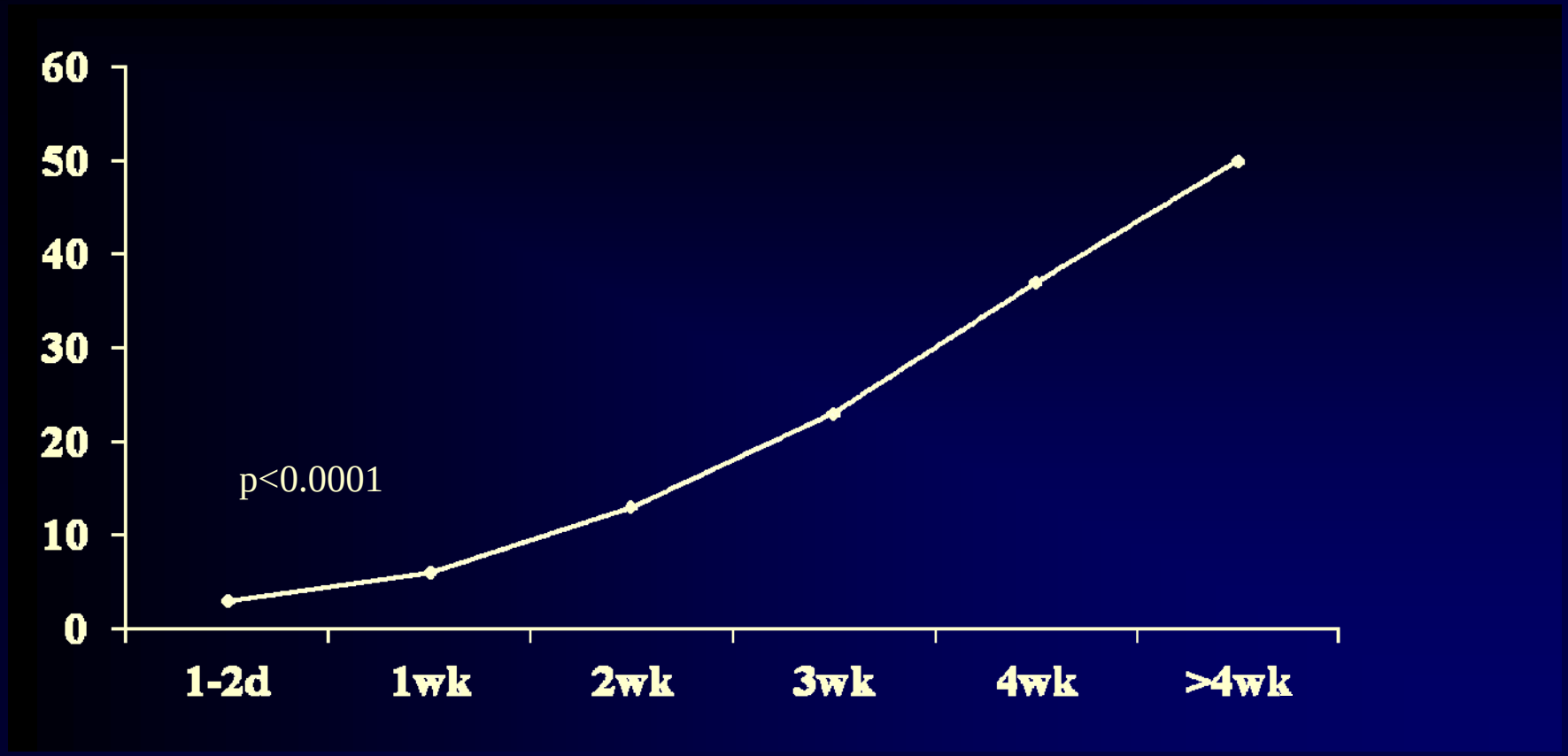
Prolonged ICU- predictors

		OR (95% CI)	
Baseline parameters	age	1.04 (1.02-1.06)	<0.0001
	female	1.36 (1.17-1.62)	0.04
	diabetes	1.54 (1.15-2.08)	0.004
	COPD	2.17 (1.46-3.24)	<0.0001
	MR	1.48 (1.05-2.08)	0.03
	shock	2.27 (1.28-4.03)	0.005
	Euroscore	1.01 (1.00-1.02)	0.01
Operative	non-pure CABG	2.31 (1.57-3.38)	<0.0001
	BPT-XCT	1.008 (1.004-1.012)	<0.0001
Post-operative	Low CO	3.00 (2.18-4.13)	<0.0001
	Sepsis	13.29 (9.21-19.7)	<0.0001
	Stroke	9.13 (5.14-16.23)	<0.0001
	new RF	6.24 (4.23-9.21)	<0.0001

Operative mortality- predictors

		OR (95% CI)	
Baseline parameters	age	1.03 (1.01-1.05)	<0.0001
	female	2.82 (2.73-2.95)	<0.0001
	renal failure	1.58 (1.08-2.30)	0.02
	urgency	1.78 (1.28-2.47)	0.001
	shock	2.30 (1.32-4.01)	0.003
	Euroscore	1.02 (1.01-1.03)	0.001
Operative	BPT-XCT	1.015 (1.011-1.018)	<0.0001
Post-operative	periop MI	3.73 (2.03-6.83)	<0.0001
	Low CO	2.57 (1.85-3.55)	<0.0001
	Sepsis	8.59 (5.68-12.98)	<0.0001
	Stroke	9.89 (5.60-17.45)	<0.0001
	new RF	4.18 (2.77-6.32)	<0.0001
	ICU stay	1.015 (1.006-1.023)	0.001

Operative mortality by LOS

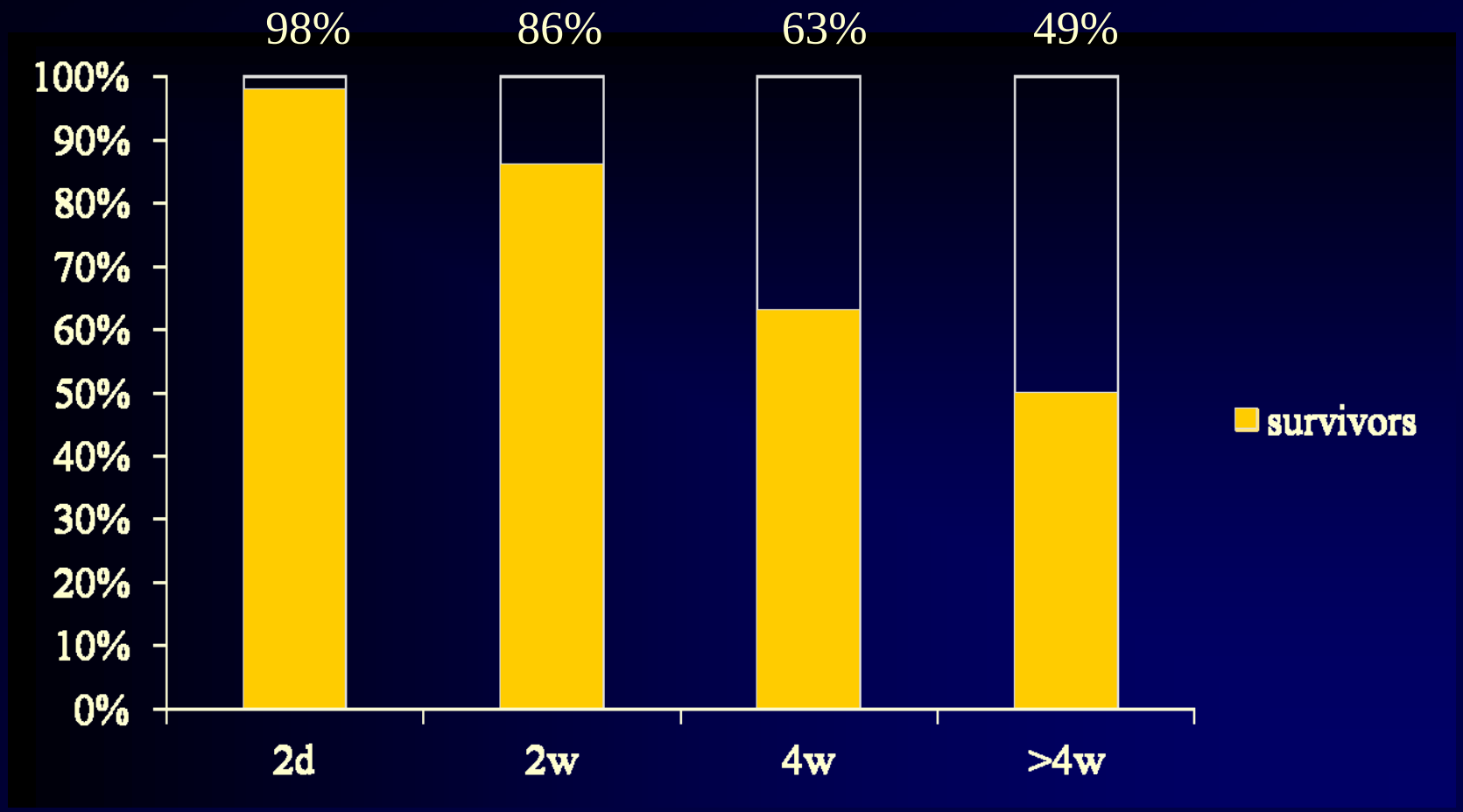


ICU stay is an independent predictor for operative mortality p=0.001

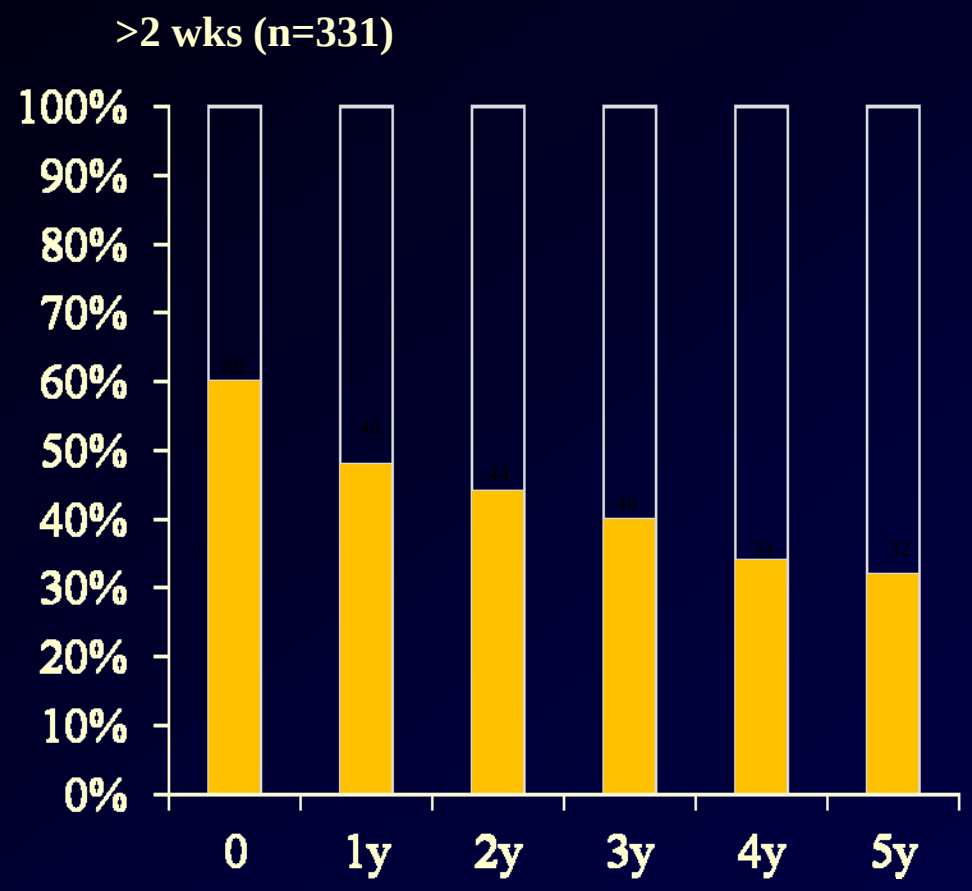
Late survival- predictors

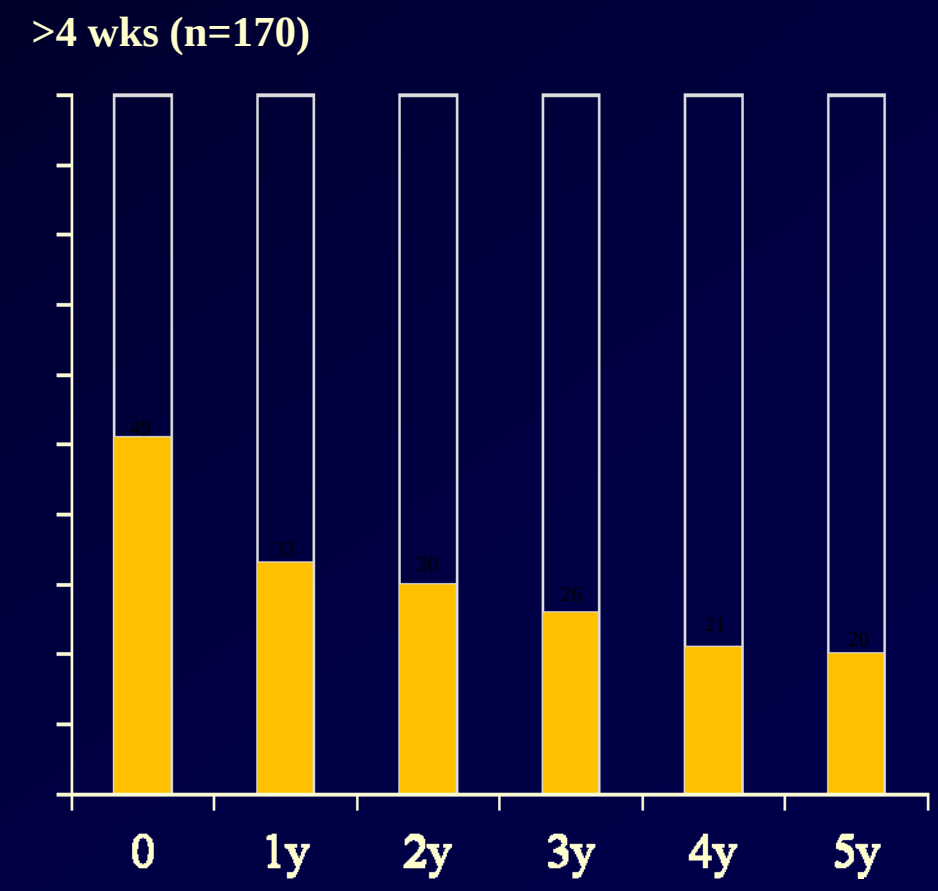
		HR (95% CI)	
Baseline parameters	age	1.06 (1.05-1.06)	<0.0001
	female	1.07 (1.01-1.12)	0.01
	diabetes	1.31 (1.25-1.37)	<0.0001
	COPD	1.30 (1.21-1.40)	<0.0001
	renal failure	1.34 (1.26-1.44)	<0.0001
	CHF	1.20 (1.13-1.27)	<0.0001
	MR	1.08 (1.02-1.15)	0.007
Operative	non-pure CABG	1.06 (1.0-1.1)	0.05
	BPT-XCT	1.004 (1.002-1.006)	<0.0001
Post-operative	periop MI	1.37 (1.20-1.57)	<0.0001
	Sepsis	1.77 (1.04-1.34)	0.02
	Stroke	1.31 (1.10-1.53)	<0.0001
	new RF	1.2 (1.08-1.34)	<0.0001
	ICU stay	**1.25 (1.12-1.39)**	**0.0002**

Discharge by LOS

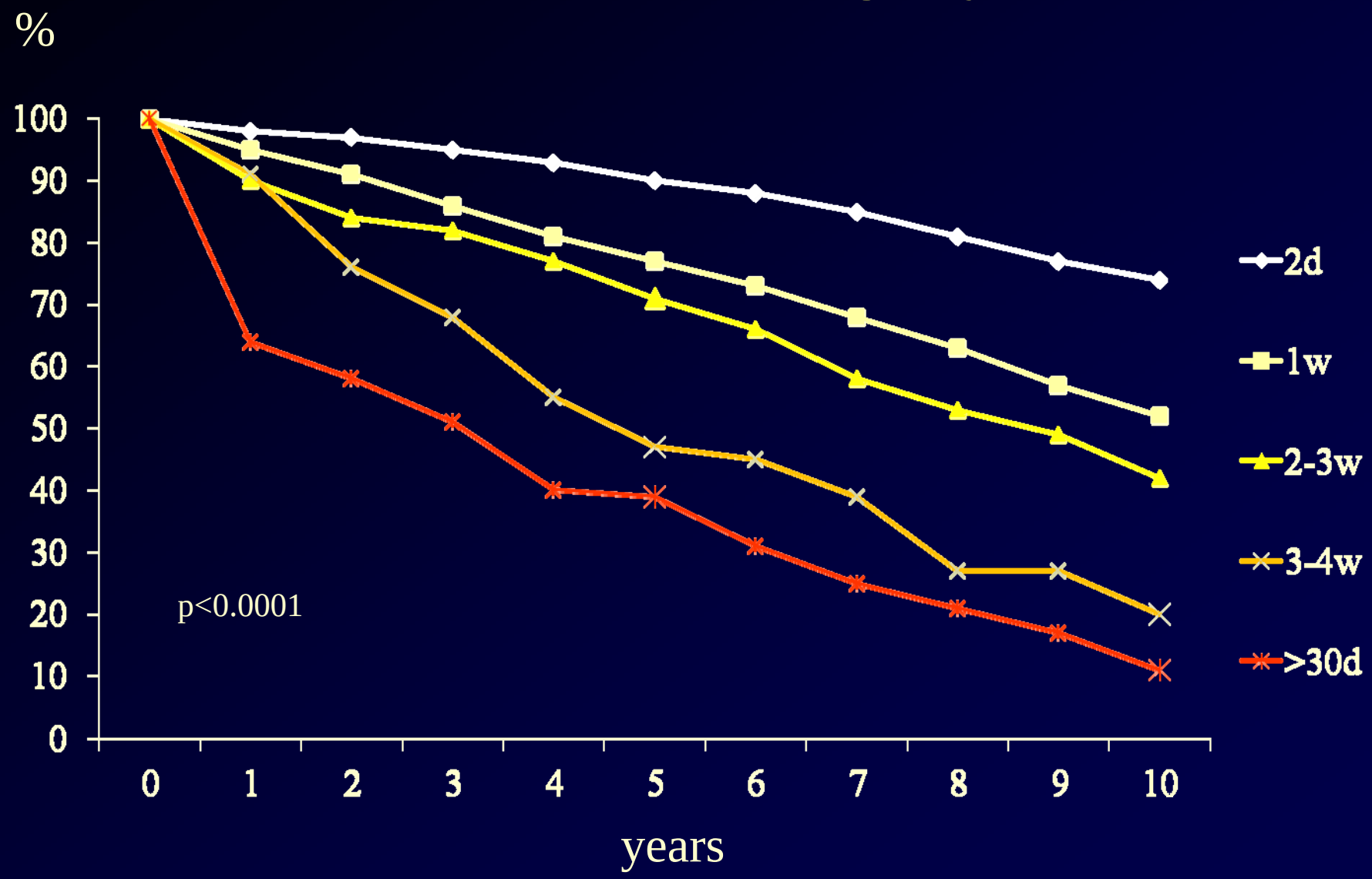


Survival in prolonged groups

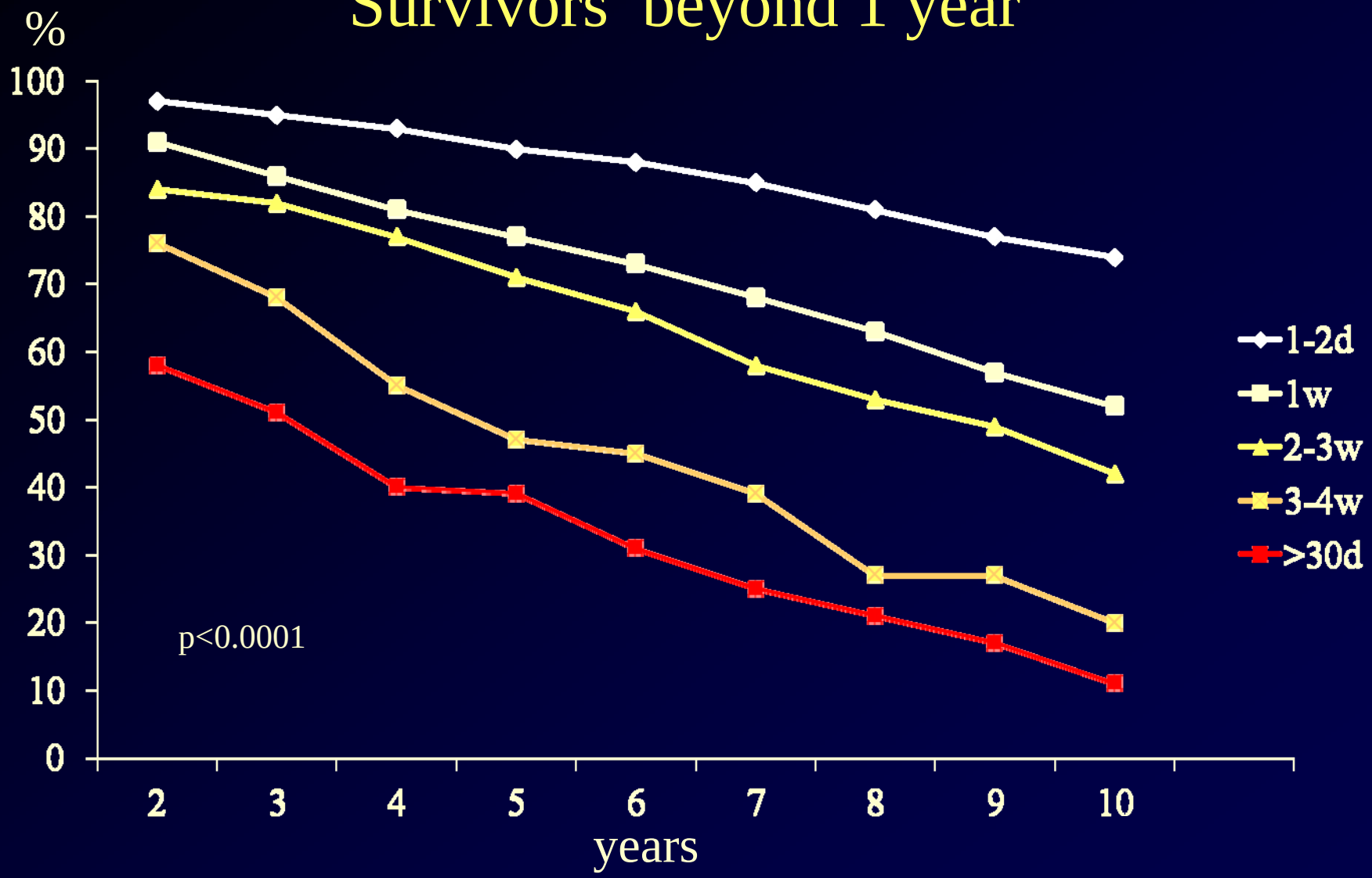




Survival after discharge by LOS



Survivors beyond 1 year



ie long ICU remains a marker for poor survival even beyond 1 year

Summary

Patients requiring prolonged ICU stay:

- more severe cardiac & non-cardiac morbidity
- more complex surgery
- more post-operative events

Summary

Patients requiring prolonged ICU stay:

- mortality is high (higher than predicted)
- modes of death are different compared to controls

Summary

Patients requiring long ICU stay (>14 days):

discharge	60%

survival 1 year	78%
survival 5 years	52%

Conclusions

50% of patients do survive

Prediction is difficult

Risk assessment is a “moving target”

↓

“evolving” score ??

↓

More accurate prediction

Establish expectations

Ethical Dilemmas

ICU stay and cost is increasing

Limited resources

vs

Long term survival

Quality of life (?)

↓

????

Thank you