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# Long term follow up after ICU - what can we learn?

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Long term outcome, FFI 2006

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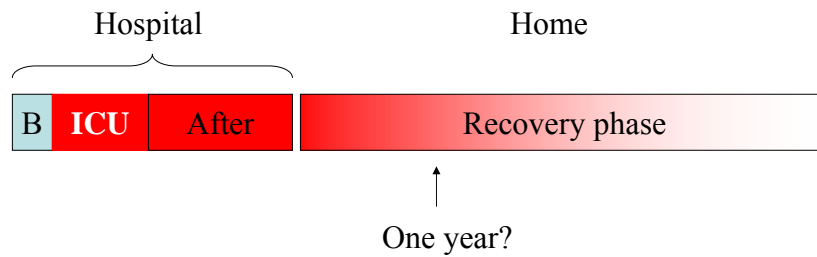
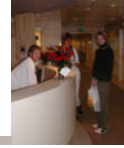
## What is long-term?

- Suggestions
  - 3-6 months
  - 6-12 months
  - More than 12 months
  
  - We do not have a common definition or understanding of the phrase long-term in the post-ICU setting

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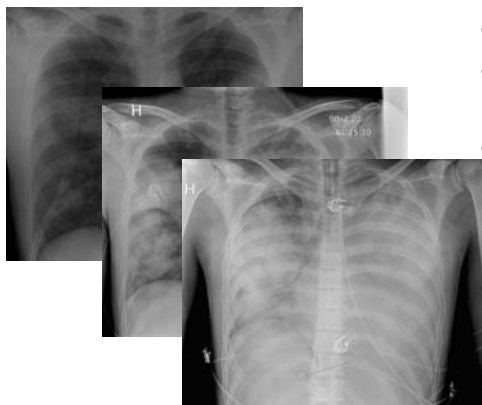
## The continuum of care



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## A short case history

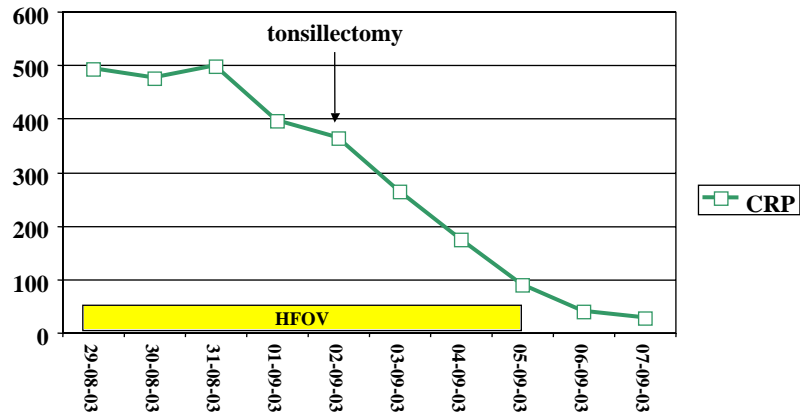


- Male 25 years
- Admitted to the ICU with tonsillitis and pneumonia
- ARDS developed the next two days
  - The worst PaO<sub>2</sub>/FiO<sub>2</sub> ratio was 5,8kPa (44 mmHg)
- in spite of aggressive goal directed antibiotic therapy, only moderate clinical improvement

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# CRP development



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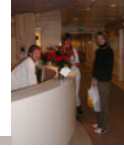
# Tonsillectomy



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## Good by



- 14 days later he is on his way home
  - Drops in to say good-by
- On direct question he
  - only remember the last two days in the ICU (of eight)
  - admit having nightmares
  - comments on his weight-loss which is considerable
  - concerned about the ability to train (athlete)
- So what?
- What can we offer him?

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## Why bother?

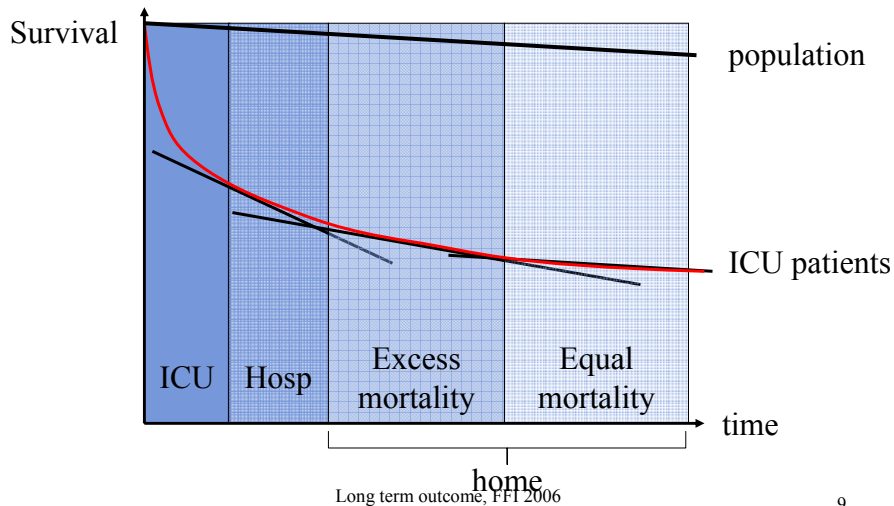


- Post ICU morbidity and mortality is considerable
- A significant part (but not all) have its root in the ICU period
- If we don't care about it, no one else does!
  - With the probable exception of the patient

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## Mortality development post ICU



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## Excess mortality-for how long?

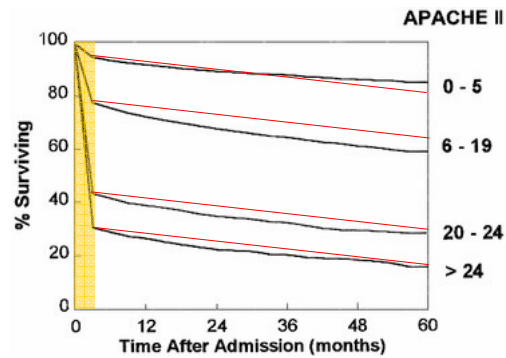


Author	Country	Equal population
Zaren 1989	Sweden	1 year
Ridley 1994	UK	3 years
Niskanen 1996	Finland	2 years
Lam 1999	UK	2 years
Kvåle 2001	Norway	≈ 1,5 years

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## 5 year survival according to APACHE II score

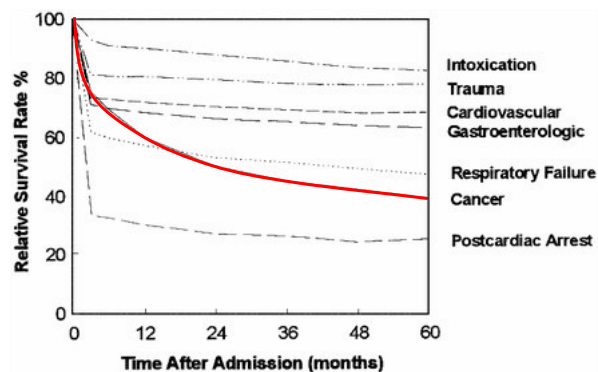


Data from Niskanen et al CCM 1996

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## 5 year survival according to diagnostic groups

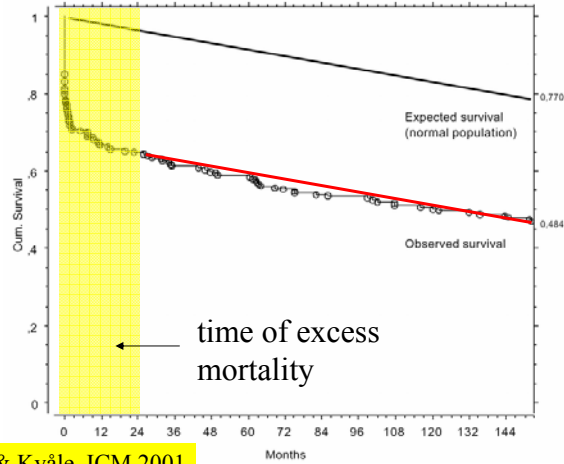


Data from Niskanen et al CCM 1996

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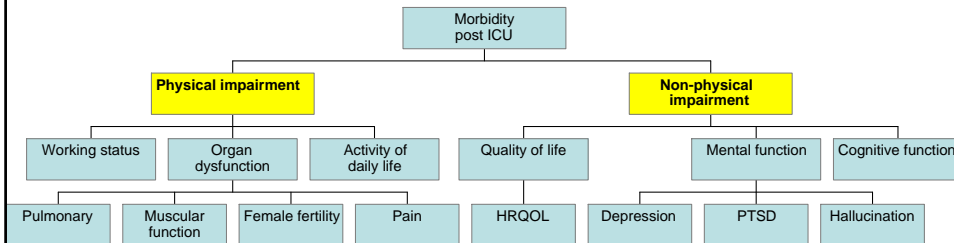
# 12-year survival-Haukeland



Data from Flaatten & Kvåle, ICM 2001

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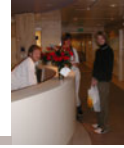
# Outcome - more than survival!



HRQOL = health related quality of life  
PTSD = post traumatic stress disorders

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## How to explore morbidity



- In the individual patient
- An ordinary consultation will give patients and physician the possibility to reveal the most significant problems
- In a group of patients
- In addition use a validated method to explore morbidity
  - *Hayes JA et al: Outcome measures for adult critical care: a systematic review. Health Technol Assess 2000; 4: 1-111*

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## How to organise a follow-up

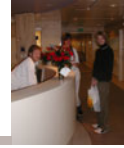


- Direct patient contact
  - At the hospital
    - In the ICU
    - At the Out-patient clinic
  - At home
    - Infrequently used
- Indirect patients contact
  - Telephone interview
  - Letter with questionnaires
- Combination
  - Indirect follow-up as a screening, before direct contact

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## When to perform a follow-up?

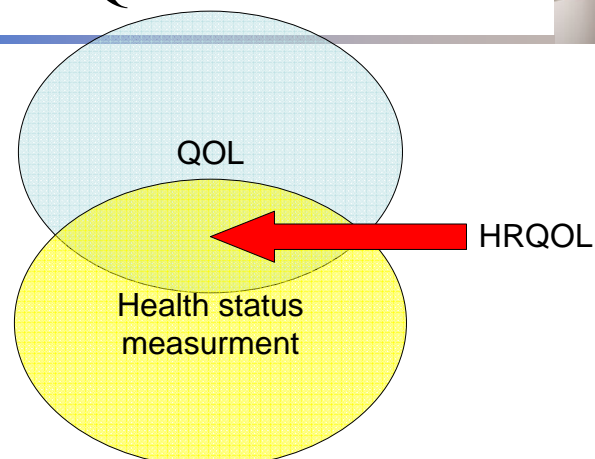


- Morbidity is a changing phenomenon
- Time is important
- The more time passed since ICU stay, the more morbidity is influenced by confounding factors
  - Mainly chronic illness
- Seen from the patient perspective an early contact (3 to 6 months) is probably best
  - Memory (if any) from the ICU stay is still “fresh”
  - Individual problems can be dealt with early and hopefully corrected or improved

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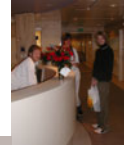
## QOL vs HRQOL



\*After Heyland et al 1998

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## Health related quality of life



- One of the most frequently used assessments in patients and individuals
  - Chronic illness
  - Acute illness
  - After intensive care
  - In normal population
- Many methods
  - **Short-Form 36 (SF-36)**
    - Probably the most frequently used method
  - Perceived quality of life scale
  - Nottingham Health Profile
  - Sickness Impact Profile
  - **EuroQol 5-D**
    - The most simple method
    - Only five questions and a VAS scale

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## How to assess HRQOL

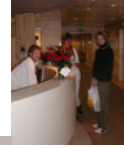


- HRQOL instruments specifically designed for adult ICU patients
  - Perceived QOL
    - Patrick 1988
  - QOL (Italian)
    - Capuzzo 1996
  - QOL (Spanish)\*
    - Rivera Fernandez 1991
- Generic (not disease specific) HRQOL instruments used in adult ICU patients
  - EQ-5D
    - Brooks 1996
  - Sickness Impact Profile
  - Short Form 36 (SF-36)
  - Nottingham Health Profile
  - Spitzer's QOL index

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## SF-36



- 36 questions
- 8 domains
  - Physical functioning (PF)
  - Role-physical (RP)
  - Bodily pain (BP)
  - General health (GH)
  - Vitality (VI)
  - Social functioning (SF)
  - Role-emotional (RE)
  - Mental health (MH)
- The eight domains further aggregated into
- Physical health
  - PF, RP, BP and GH
- Mental health
  - VI, SF, RE, MH

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## EQ-5D

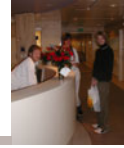


- A more simple questionnaire
  - 1 part: Descriptive, five areas
    - Mobility
    - Personal care
    - Usual activities
    - Pain/discomfort
    - Anxiety/depression
  - 2 part: VAS scale (general health state)

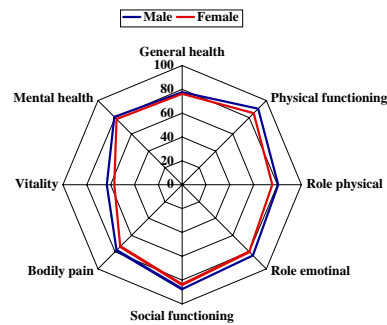
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## Short Form 36



- Non disease specific questionnaire about the quality of life from the health perspective
  - Ware 1993
- Have their own home-page: [www.sf-36.org](http://www.sf-36.org)
- Eight dimensions (or domains) are evaluated with 36 questions and several alternative answers
  - Rated from 0 - 100



SF-36 scores in the average Norwegian Population 1996 (Loge % Kaasa 1998)

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## Outcome after intensive care



- Results from a systematic review in 1998
  - Heyland D et al 1998
- 1073 published papers relevant to the practice of intensive care was investigated
  - Only 1,7% included QOL measures
  - Of the few including QOL after intensive care, comparison between studies were limited because of the wide variety of instruments used

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## Results from a recent systematic review



- 8894 potentially relevant citations identified
  - 352 reports reviewed for evaluation of abstracts
    - 111 reports reviewed for evaluation of full text
      - 85 excluded
        - » 47 QOL not measured or
        - » Did not use SF-36, SIP, NHP pr EQ-5D
        - » 26 Excluded more then 50% of ICU patients
        - » 4 Not original results,
        - » 4 lack of flollow-up > 30 days
        - » 4 No population of adult ICU survivors
      - 26 reports of 21 unique patients cohorts

Dowdy DW et al: QOL in adult survivors of critical illness: a systematic review of the litteratur e. ICM 2005; 31: 611-20

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## Characteristics of studies

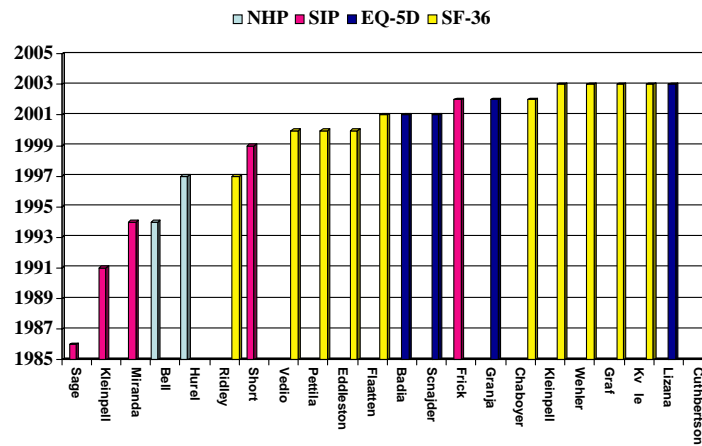


- |                                 |        |                   |         |
|---------------------------------|--------|-------------------|---------|
| • SF-36 (11)                    | n=1544 | • EQ-5D (4)       | n=769   |
| – Pettila (2000)                | 298    | – Badia (2001)    | 334     |
| – Kleinpell (2003)              | 199    | – Granja (2002)   | 275     |
| – <i>Cuthbertson (2005) 173</i> |        | – Lizana (2003)   | 96      |
| – Wehler (2003)                 | 171    | – Sznajder (2001) | 64      |
| – Graf (2003)                   | 164    | • SIP (4)         | n= 4733 |
| – Eddleston (2000) 136          |        | – Miranda (1994)  | 3655    |
| – Kvåle (2003)                  | 126    | – Short (1999)    | 853     |
| – Vedio (2000)                  | 115    | – Sage (1986) 140 |         |
| – Ridley (1997)                 | 95     | – Frick (2002)    | 85      |
| – Flaatten (2001)               | 51     | • NHP (2)         | n=283   |
| – Chaboyer (2002) 16            |        | – Hurel (1997)    | 223     |
|                                 |        | – Bell (1994) 60  |         |

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## When published



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## Other results



- Measuring pre-ICU values
  - Five studies
    - Retrospectively by patients or proxy
- Comparison to age and sex matched population
  - Seven studies
    - All using SF-36
- Population comparison
  - Pre ICU (n=3)
    - Reduced values in all domains (physical and mental)
  - Post ICU (n=7)
    - 6 months to 13 years
    - All studies shows reduced values in both physical and mental domains)

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# Changes in SF-36 from pre-ICU level



	Follow-up time									
	1 m		3 m	6 m				9 m	12 m	
	Kleinpel	Graf	Cuthb.	Kleinpell	Wehler	Ridley	Cuthb.	Graf	Kleinpel	Cuthb.
PF	↑	↑	-	↑	-	-	-	↑	↑	-
RP	↓	↓	↓	↑	↑	-	-	↑	↑	-
BP	-	↑	↑	↑	-	↑	↑	↑	↑	↑
GH	-	-	-	-	-	-	-	-	-	-
VIT	-	-	-	↑	-	↑	↑	↑	↑	↑
SF	-	↓	-	↑	↑	↑	↑	-	↑	↑
RE	-	↓	↑	↑	↑	-	↑	-	↑	↑
MH	-	↑	↑	-	-	-	↑	↑	-	↑

↑ Or ↓ = clinically meaningful (> 5 points) improvement/decline in QOL  
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# Predictors of QOL



- Age
  - A majority of studies found significantly lower physical functioning, usual activities and physical or total QOL in older vs younger survivors
  - No study found significant association between various measures of mental health and age
- Severity of illness
  - 67% of studies found significant association between SOI and lower physical functioning or general health
- Medical vs surgical
  - Only one study found significant differences in more than one domain
- Trauma
  - 3 studies (using EQ-5D) found significant differences in pain/discomfort

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# Conclusions from the review

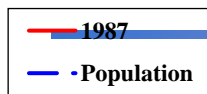


- ICU survivors
  - Reports a lower QOL at baseline
  - QOL improves over time in most domains
  - Remains lower than the average population
  - Physical functioning shows rapid improvements and is associated with age and severity of illness

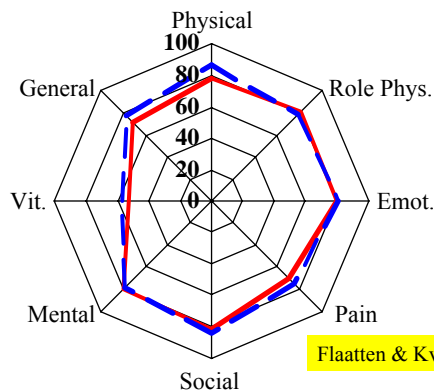
Long term outcome, FFI 2006

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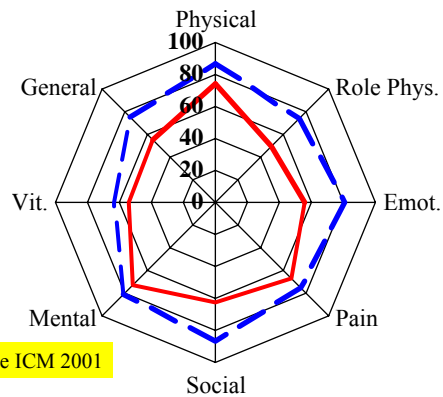
# HRQOL 12 years after ICU



## Females



## Males

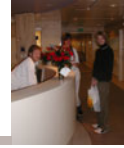


Flaatten & Kvåle ICM 2001

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## Follow up after ARDS



- ARDS patients is one of the most studied ICU-subgroup regarding long term follow up
- This group provides us with important and useful knowlegde applicable to other ICU patients as well

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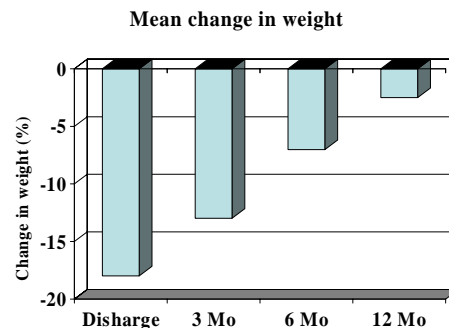
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## One year outcomes in ARDS survivors \*



- 109 ARDS survivors followed at 3, 6 and 12 months after discharge
- At each visit
  - physical examination
  - pulmonary function tests
  - six-minute walk test
  - QOL evaluation
    - SF-36 questionnaire

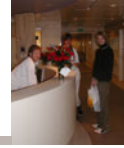
\* Herridge M et al: NEJM 2003; 348; 683-93



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## Six-minute walk test



- The distance the patient was able to walk in six minutes.
- Hypoxia recorded with pulse oximetry
- Significant predictors for better six-minute walk test
  - (univariate analysis)

	3 Mo	6 Mo	12 Mo
No corticosteroid	<0.001	0.006	0.06
Slope of LIS	0.004	<0.001	0.06
Age	0.04	0.24	0.98
Slope of MODS	0.005	0.001	0.1
APACHE II score	0.03	0.13	0.56

LIS = lung injury score  
MODS = multiple organ dysfunction score

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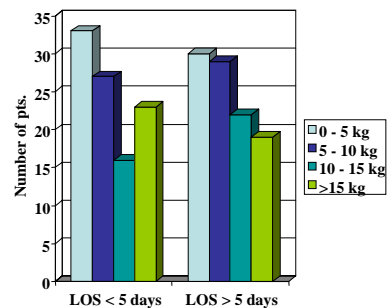
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## Other outcomes



- Glasgow outcome score
  - Good 43%
  - Moderate disability 43%
  - Severe disability 14%
- Karnofsky index
  - 75% > 70 (that is able to look after self)

### Maximum weight loss



Kvåle & Flaatten 2003

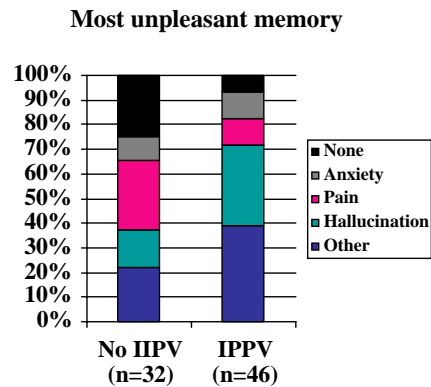
Long term outcome, FFI 2006

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## Various problems



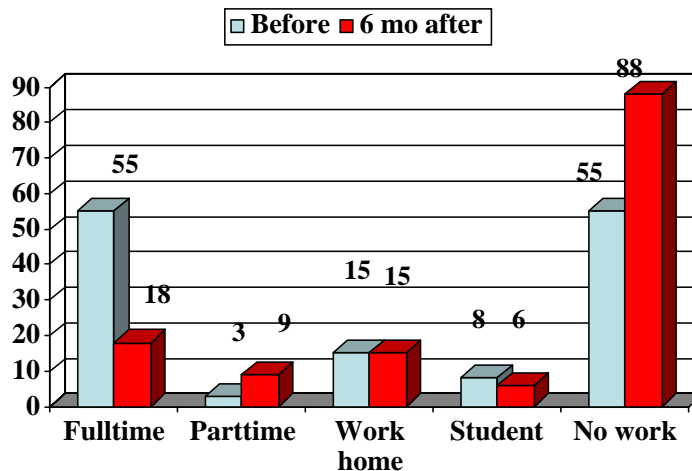
- Subjective breathing capacity reduced in 33%
- Sleeping disturbances: 20%
- Mobility problems: 15%
- 43% had no memory of their ICU stay
  - Only 16% could remember information about their ICU stay and problems
- Pain
  - Most unpleasant memory in patients not on IPPV (28%)
  - A smaller problems in ventilated patients (10%)



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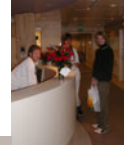
## Work status before and 6 months after ICU (n=136)



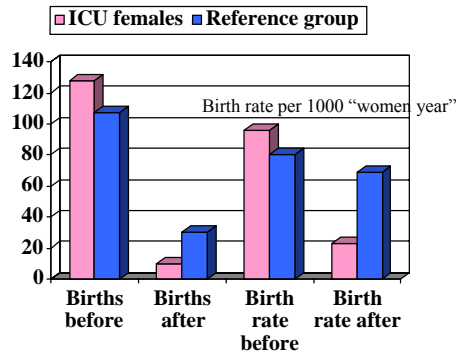
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## Reduced fertility after ICU



- A “reproductive” study regarding fertile females admitted to the ICU 1994-1999
- The number of child-births before and after ICU was recorded and compared with normal birth in a reference female population



Flaatten K, ICM 2002 (abstract)

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## Why do follow up?

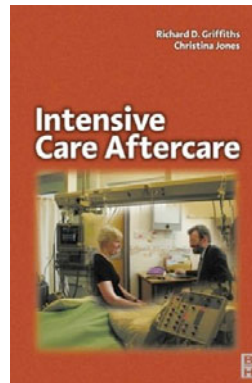
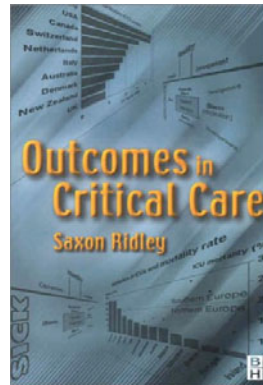


- To identify patients with significant problems related to intensive care, and provide them with help and advice
- To increase knowledge in general regarding post-ICU morbidity
- To provide hypothesis for further studies:
  - The impact of different sedation regimes on mental health post-ICU
  - Long term effects of different form for ventilation in ALI and ARDS
  - Determinants for neuro-muscular function post ICU
  - The effect of nutritional advice post-ICU

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# How to learn more?



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