ACTIVITY RESTRICTION (AR) IN PREGNANCY - prevention of preterm birth

Bed rest
Immobilisation
Rest
Bed confinement

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What is known about strict AR in pregnancy?

• Inconclusive evidence - treatment efficiency unknown
• Many demonstrated adverse side effects
• Costly both in individual terms and on a broader societal level
## Standard definition of Activity Restriction

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<td>Two hours or less continuous rest, in bed or in the sitting position during waking hours, and no lifting of &gt; 10lb.</td>
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<td><strong>Moderate</strong></td>
<td>&gt; 2 hours but &lt; 8 hours continuous rest during waking hours with no household chores and no lifting. Health-related visits are allowed.</td>
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<td><strong>Strict</strong></td>
<td>Confinement to their dwelling except for health-related visits. Rest in the sitting or supine position the entire day. No household chores and no lifting.</td>
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Hippocrates

5th century B.C.
Hippocratic Corpus
Observational and anatomical studies

- Rest as soon as there is pain
- Too much rest is deteriorating physical strength
- Any change much in excess of the moderate, is harmful

John Hilton
Anatomist and Surgeon
1805-1878

- Professor of Anatomy and Surgeon
- Charter Fellow of The Royal College of Surgeons College,
- Surgeon-Extraordinary to Queen Victoria (appointed in 1871)

- 1860-62 series of lectures on Rest and Pain
- The basis for his classic: "On Rest and Pain"¹ published in 1863

Observation: immobilization heals broken bones and big wounds

Hypothesis: immobilization as therapeutic treatment will presumably heal other systems in the body.

• The context of the recommendation of rest was misunderstood
• The bed was raised to the pinnacle of medical therapeutic aid at that time

Browse NL. The Physiology and Pathology of Bed Rest. CC Thomas Books. 1965.
AR as treatment for any illness
Pioneer research on AR 1855-1929

- Beigel 1855, Johansson, 1898
  - Day and night temp. curves, excretion of urine, carbon dioxide and nitrogen in respectively 1 and 4 healthy males, after a short period of rest

- Campell and Webster, 1921
  - Day and night urine with cycles of nitrogen excretion in a 28-year-old male having been activity restricted for 5 days

- Cuthbertson, 1929
  - Metabolic effects of immobilization
  - 5 males, aged 19 to 40 years, and 2 females, aged 19 to 37 years

Is prolonged sAR beneficial?

- Clinical observations during World War II of immediate ambulation after injury
- Bone fracture treated with sAR
  - obs. ↑ excretion of calcium and nitrogen
  - same obs. in healthy men on sAR

Sprague AE. The evolution of bed rest as clinical intervention. JOGNN. 2004;33:542-549.
Entry into space age
Research on sAR

- Physiological changes expected in space with removal of gravity
- Bed rest and immobilization best method to simulate weightlessness on earth

NASA research

Adverse effects of sAR

- Cardiovascular and pulmonary systems
- Musculoskeletal
- Hematologic and Metabolic
- Gastrointestinal tract and renal functions
- Endocrine and immune systems
- Psychological functions

Physiology of strict bed rest

- <24 hours sAR: shift in distribution of the total blood volume ➔ ↑diuresis to reduce the increased blood volume in the thorax, neck and head
- ↑ excretion of sodium, chloride, potassium
- ↓ stroke volume and cardiac output,
- ↑ blood pressure at brachial artery

NASA teaches Obstetrics

• Serious complications from antenatal sAR:

  Deep Vein Thrombosis\textsuperscript{1}
  – prevalence DVT 15.6/1000
  – Control group: 0.8/1000
  – Very significant difference (p<0.0015)

Bone Demineralization\textsuperscript{2}
  – OR 6.5  95% CI 2.2-18.9, very significant risk (p>0.001)

Side effects of sAR in pregnancy

- Physical deconditioning, muscle ache and weakness, headache, shortness of breath, indigestion, obstipation, weight loss
- Dizziness, loss of appetite, fatigue, difficulty concentrating, sleep changes
- Increased stress, depression, anxiety, worries, boredom, loneliness, feelings of loss

RCT Reviews of treatment effect of AR

• Insufficient evidence to draw a conclusion on the recommendation of sAR
  - preventing miscarriage (2 trials / n=84)¹
  - singleton pregnancies* (1 trial/ n=422)²
  - multiple pregnancies* (7 trials / n=713) ³

*for preventing preterm birth

Recommendations for sAR

- Mail-based survey, 2007
  - 814 US obstetricians of 1812 active members of Society for Maternal-Fetal Medicine
  - 71% would recommend sAR for threatening preterm birth (GA26)
  - 87% would recommend sAR for PPROM (GA26) even though the majority associated sAR with minimal / no benefit
  - 18% pregnant women are recommended sAR ≥1 week each year

The Danish AR Study

• The extend and significance of inpatient activity restriction in pregnant women being hospitalized in Denmark with threatening preterm birth.

• Four substudies all with the aim of describing the extend and significance of antenatal activity restriction
The Danish AR Study

- Descriptive population register based study
- Data provided from the National Board of Health
- Occurrence, variations and indications
- Admissions in Denmark > 3 days before birth during pregnancy from 15th gestational week
Admissions of pregnant women being hospitalized due to an obstetric issue in Denmark
Mean admission days

![Graph showing mean admission days from 2001 to 2010. The graph indicates a trend of decreasing mean admission days over time.](image)
Mean admission days divided by pregnancy length
Admissions by diagnosis groups

- Pre-eclampsia + hypertension DO139, DO140, DO141, DO142, DO150
- Threatening preterm birth DO472
- Cervical incompetence DO343A, DO348G
- False labour before 37 completed weeks of gestation DO470
- PPROM DO422
- Antepartum haemorrhage/placenta praevia DO208, DO468A, DO449
- Infections of bladder in pregnancy DO231
- DVT DO223
- SGA DO365
- Subluxation of symphysis pubis DO267
- Exhaustion and fatigue DO268B
- Observation during pregnancy DO639
- Delivery DO80-84
- Diabetes in pregnancy DO240A, DO241A, DO244D, DO244E
- Other maternal medical diseases DO99
- Other maternal non-medical diseases
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Table 3. Description of birth outcomes after pregnancies with hospitalizations ≥ 3 days prior to labor due to an obstetric issue in Denmark

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Proposal for extending
The AR study to a European Context

Occurrence, variations and indications of admissions > 3 days before birth in the European countries in pregnancy from 15 gestational week

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jaben@noh.regionh.dk
Thank you for your attention!