Physiotherapy 40 years ago
to 40 years on

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Presentation

• The last century
• Changes internationally over past 30 years
• Practice today based on scientific evidence
  - The Internationally Physiotherapy Group for CF (IPG/CF)
• Looking into the crystal ball
The last century

• Postural drainage with 30 – 40 degrees head down tilt with percussion and vibrations

• Side effects:
  - head aches
  - sinus pain
  - fractured ribs
  - poor adherence
  - needed a helper
  - discomfort
Introduction of newborn screening 1989 - RCH

- Newborns diagnosed with CF 4-6 weeks
- Immature infants not just little adults
- Lungs and gastric system closely related
- Infants consume liquid feeds
- Spend much time lying down
- Immature gastric system
- Horizontal ribs and inefficient anti-reflux barrier
- Vulnerable
Gastro-oesophageal reflux - GOR
Gastro-oesophageal reflux research in Melbourne: RCH & Alfred Hospital
Standard physiotherapy - SPT
Modified physiotherapy - MPT
Blue bars = without head down tilt
White bars = with head down tilt

Button et al, 2004
Brasfield scores: MPT - SPT

Button et al 2003

p=0.028*
Lung function - SPT versus MPT
5 to 6 years

- FVC $p=0.036^*$
- FEV $p=0.012^*$
- FEF25-75 $p=0.12$

Orenstein D, 2003
Editorial: Ped Pulm
“Heads UP! Clear those airways”

Button et al 2003
24hr pH monitoring in a young adult with CF

PD = postural drainage with 30° head down tilt
GOR during PD: 3 – 18 years

Button et al 1998

Black bars = during postural drainage
White bars = background
PD to PEP in upright sitting in CF  

Button et al 1998

↓ Annual hospital bed days:
- PD year mean 105 days (87-135)
- PEP year: 36 days (9-83)
215 fewer days in PEP year p<0.0005

↓ in symptoms using PEP  p<0.001

↑ FEV\textsubscript{1} & FVC  -  p<0.001  ➔ PEP
Aspiration in an adult
GOR and Yoga

20 minute episode of GOR at end of session

Head down tilted positions → ↑ reflux episodes → inflammation of LOS & oesophagitis → inappropriate relaxations of the LOS → vicious cycle

Vandenplas 1991

Postural drainage may trigger & maintain this vicious cycle
GOR research a “game changer”

• High incidence of GOR across all age groups

• More reflux when in head down positions of at least 30 degrees – standard practice in 1990s

• Do no harm
Change in practice across the lifespan worldwide

• Head down positions no longer used

• Horizontal and upright sitting positions

• Denmark led the change by introducing PEP therapy in upright sitting in 1983

• Europe developed a number of new techniques in the last 3 decades
Modern airway clearance techniques
- individualised

Exercise as ACT
Adjunctive Inhalational therapy

• Pulmozyme - cuts up DNA in sputum

• Hypertonic saline + PEP
The Vest

- US $15,000
- Large & heavy
- ↑ treatment Time
- new research
HFCWO – The Vest

• Canadian study comparing the Vest with PEP
• 12 centres across the lifespan
• More than double the number of acute exacerbations requiring oral, inhaled or IV antibiotics
• Treatment took significantly longer
  - at least 30 minutes twice a day versus
  ~ 15 minutes twice a day
• Expensive, not easily portable
The future

Dry powder medication: quick & easy, portable

• Inhaled Bronchitol
  - rehydrate the mucus layer and allow improved cilial beating to clear secretions

• Inhaled antibiotics
  – Tobi Podhaler & other dry powder antibiotics being developed
  - kill bacteria in the lungs
Exercise the elixir of life

• Large study across all populations

• Increasing benefits of exercise:
  - mental well being
  - diabetes
  - heart disease
  - cancers

• Decrease in the decline of lung function in adults with CF who regard themselves as exercisers
Exercise in CF

• As ACT
• For cardio fitness
• For normal joint and muscle function
• Body image
• Mental well-being

endorphins released with exercise
• Immune system
• Enjoyment & social interaction – normal activity
ACT in babies & children

- Swedish approach
- PEP
- Assisted Autogenic drainage
- Future large international study
ECMO V-v

Tube enters body through vena cava down to heart

Approx cross section of tube

ECMO machine (extracorporeal membrane oxygenation)

Superior vena cava

Right atrium

Inferior vena cava

Source: Glenfield Hospital, Leicester
The future

• Gene therapy will change the landscape for CF
• More normal sputum and muco-ciliary clearance
• Slowing effect on the development of CF lung disease
• Re-think when to start physiotherapy & how much required – choice of techniques
• Musculo-skeletal prevention & treatment
• Artificial method of ventilating the body while waiting for transplant – how effective will the technology become?
The future

- Optimistic
- Many new therapies being developed
- Much choice in physiotherapy
- Time efficient treatments – dry powder drugs
- Individualised
- Physiotherapy fits more easily in daily life
- Daily life much more normal & balanced than 40 years ago
- **Winston Churchill Fellowship: Europe & USA**
  - Physiotherapy & ECMO
  - Management of GOR
Lying on left side stomach forms a bag & protects from GOR compared to lying on right side

Maimonides 12\textsuperscript{th} century:
Start the night on your left side
Finish the night on your right