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# What can an Evidence Base Practice model tell us about Podiatric Biomechanics

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# Aims



- What is Evidence Based Practice?
- Model of Evidence Based Practice
  - Research evidence for Podiatric Biomechanics
  - Clinical state
  - Patient preferences
  - Economic resources
- Conclusions

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# My Evidence



- Qualified in 1995
- Worked as Biomechanics/MSK Podiatrist
- Since 2005 Senior lecturer teaching MSK/Biomechanics

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# My Evidence



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- Undergraduate
- Postgraduate taught Masters
  - Podiatry
  - Theory of Podiatric Surgery
  - Forensic Podiatry
- PhD – How do MSK podiatrists interpret evidence?



# What is Evidence Based Practice?



- Evidence based **medicine** is the conscientious, explicit, and judicious use of **current best evidence** in making decisions about the care of **individual** patients. The practice of evidence based medicine means integrating **individual** clinical expertise with the best available external clinical evidence from **systematic research**. (Sackett et al **1996**)

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# What is Evidence Based Practice?



- Emerged as a concept in the UK in 1990's linked to evidence-based medicine
- Had an impact on policy in health and social care in the UK
- Has been accepted by all health professions including podiatry

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# How to do Evidence Based Practice



- Answering clinical questions
- Finding the evidence
- Critical appraisal this evidence
- Application to individual patients
- Evaluating the impact of care  
(Straus et al 2011)

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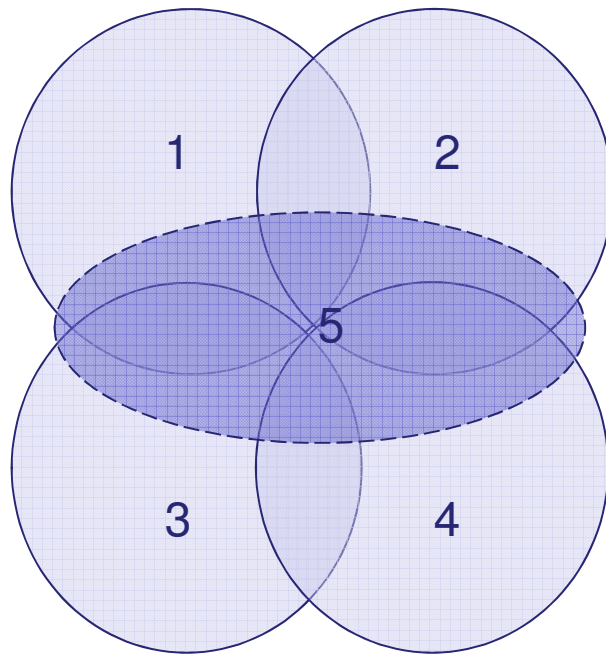
# Evidence Based Practice – Criticisms



- It is a simplistic approach to answer complex problems (Goldenberg 2006)
- It places a high value on certain types of knowledge and that they are more worthy than other kinds of knowledge (Buetow et al 2006).
- It also has lead to a narrowing of the definition of evidence (Haynes et al 2002, Buetow et al 2006).
- It is clinician focused as it prioritises clinical effectiveness and cost effectiveness over patient perceptions (Lambert 2006).



# Model of Evidence Based Practice



- 1 Research evidence
- 2 Clinical state and circumstances
- 3 Patient preferences and actions
- 4 Healthcare Resources
- 5 Clinical Expertise

# Podiatric Biomechanics



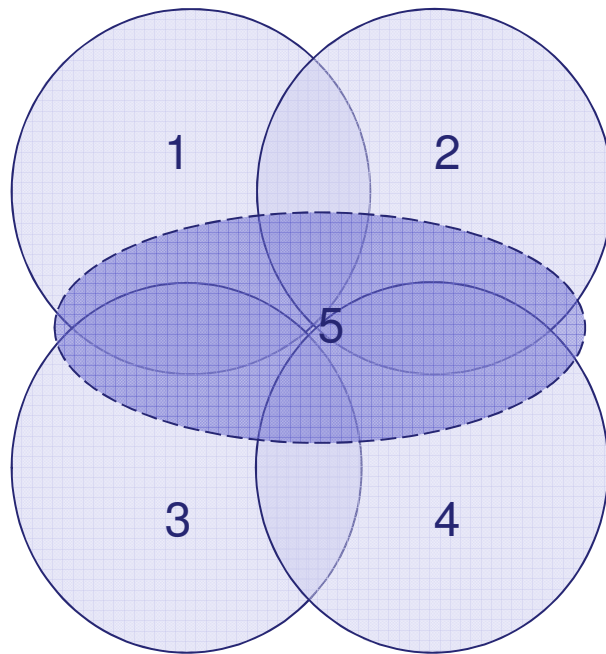
- In the UK there is a constant debate about
  - Competing theories of biomechanics
  - Effective treatments for MSK conditions
  - Choice of orthoses
- Can this model of Evidence based practice help us focus this debate?

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# Evidence Based Practice – Applied to Podiatric Biomechanics



- 1 Research evidence - **Effectiveness of orthoses**
- 2 Clinical state and circumstances - **Evidence for theories**
- 3 Patient preferences and actions - **Patient satisfaction**
- 4 Healthcare Resources - **Cost effectiveness**
- 5 Clinical Expertise

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Taken from DiCenso, Ciliska & Guyatt 2005

# Podiatric Biomechanics – Research Evidence



Hierarchy of Evidence	
Levels of Evidence	Types of Evidence
1A	Systematic reviews with homogeneity of RCT's
1B	Randomised controlled trials (RCT)
2A	Systematic reviews of cohort studies
2B	Cohort studies or Poor quality RCT's
2C	Outcomes research
3A	Systematic reviews of case-controlled studies
3B	Individual case-controlled study
4	Case study series
5	Expert opinion

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Taken from CEBM 2009



# Research Evidence – Effectiveness of Orthoses



- Systematic Reviews
  - Cochrane review of functional orthoses (Hawke et al 2008) shows orthoses are successful for plantar fasciitis, HAV
  - Cochrane reviews of patellofemoral pain (Hossain et al 2011), prevention of running injuries (Yeung et al 2011) and Morton's neuroma (Thomson et al 2004) orthoses have limited effects on these conditions
  - Should be level 1A evidence but these reviews struggle with a lack of homogeneity in RCT methods so can only be classed 2A



# Research Evidence – Effectiveness of Orthoses



- RCT's for the following conditions have shown that orthoses are a successful treatment
  - Medial OA of the Knee (Kerrigan et al 2002, Rubin & Menz 2005)
  - Posterior tibial tendinitis (Woodburn et al 2002, Kulig et al 2005)
  - Medial tibial stress syndrome (Hume et al 2008)
  - Prevention of stress fractures (Simkin et al 1989, Finestone et al 1999)
- Should be level 1B evidence but due to weak methodology level 2B and 2C
- There is some evidence that orthoses work as a treatment

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# Research Evidence – Effectiveness of Orthoses



- Are RCT's 'gold standard' for the MSK conditions treated with orthoses?
- Recent research suggests that sham orthoses may have similar effects to orthoses (McCormick et al 2013)
- Can we truly control the variables?
  - Patients' age
  - Patients' weight
  - Activity levels
  - Footwear
  - Biomechanical/Gait variations
  - Orthoses variation

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# Clinical State – Evidence for theories



- Which orthoses should we use?
- Evidence for biomechanics theories
- STJN theory
  - Root's theory of foot function is discredited STJN not normal position for function (McPoil & Cornwall 1996, Pierrynowski & Smith 1996)
  - No reliability in measurement (Elveru et al 1988, Smith-Oricchio & Harris 1990, Pierrynowski et al 1996)
  - Foot functions in a different way from Root theory (Nigg et al 1999, Nigg et al 2001, Nestor et al 2001, Mundermann et al 2003)
  - Functional foot orthoses work for some patients (see previous slides)

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# Clinical State – Evidence for theories



- SALRE theory
  - The position of the STJ axis and its rotational equilibrium which are most important
  - Theory based physics principles
  - Supination resistance test – Noakes & Payne (2002) demonstrated reliability of this test
  - Evidence for this theory is largely anecdotal
  - Harradine & Jarrett (2001) used Kirby skive successfully in 10% of their patients
  - No large scale studies

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# Clinical State – Evidence for theories



- Sagittal plane facilitation theory
  - Based on the reverse windlass mechanism (Hicks 1948)
  - This mechanism requires an adequate range of 1<sup>st</sup> MPJ dorsiflexion (Kogler et al 1996).
  - Limited evidence for Dananberg (1993) specific theories
  - 1st ray cut out's shown to reduced pain at 1<sup>st</sup> MTPJ (Harradine & Jarrett 2001, Welsh et al 2010)
- Kinematic/Kinectic theories
  - High gear/low gear propulsion (Bojsen-Møller 1979)
  - shock attenuation (Bobbert et al 1992, Nigg 1999)
  - neuromotor control (Nigg 2001, Nawoczenski & Janisse 2004)
  - MTJ function (Nestor et al 2007)

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# Clinical State – Evidence for theories



- When should we use orthoses?
- There is no clear evidence on the best time to use an orthoses
- Biomechanics theories are unproven or discredited
- Gait is complex, we may never fully understand it
- Studies into theories are always small scale and reliant on complex equipment

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# Patient Preferences – Patient Satisfaction



- Patient satisfaction is good between 65-80% of lower limb conditions improved (James et al 1978, Clement et al 1981, Sperryn & Reston 1983, Moraros & Hodge 1993, Saxena & Haddad 2003, Taunton et al 2003, Walter et al 2004, Hirshmuller et al 2011)
- Need to audit and evaluate our own practice using validated outcome measures
- We need to publicise the results



# Health resources – Cost effectiveness



- This is a difficult category to assess
- Comparable costs to a short course of physiotherapy – 4 sessions = £140.00
- Cheaper than surgery
- More cost effective than accommodative devices (Rome et al 2004)
- Prefabricated orthoses may be as good as custom made orthoses (Landorf et al 2004)

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# Conclusions – What does this mean?



- **Research Evidence**

- Limited evidence that orthoses are effective treatment
- Focus on improving evidence for orthoses as a successful treatment
- Are RCT's the best way to assess orthotic therapy?

- **Clinical State**

- Studies that focus on theories should not be confused with research evidence and may not affect clinical practice
- Focus on finding optimum time and design for orthoses

- **Patient Preferences**

- High patient satisfaction with treatment
- What does this tell us about orthoses?

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# Conclusions – What does this mean?



- **Health Resources**
  - Cost effective treatment
- **Clinical Expertise**
  - How do MSK podiatrists interpret the evidence for their practice?

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# Thank You



- Any Questions?

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