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Choosing and Implementing Evidence-based Treatments for Motor Speech Disorders in Children and Adults

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Overview

- What do I mean by evidence based practice?
- Why should you care?
- How do people learn motor skills?
- How to choose motor speech treatments.

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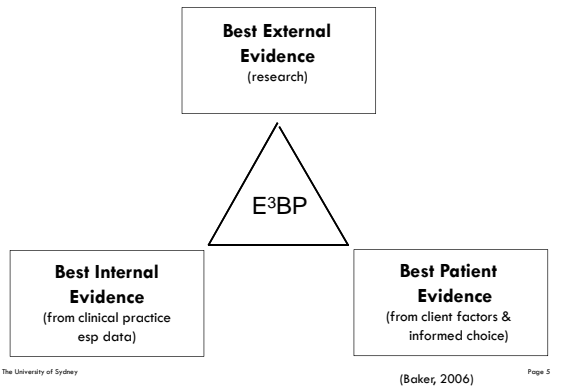
What is E3BP?

“The CONSCIENTIOUS EXPLICIT and JUDICIOUS use of current best evidence in making decisions about the care of individual patients ...[by] integrating INDIVIDUAL CLINICAL EXPERTISE with the BEST AVAILABLE EXTERNAL CLINICAL EVIDENCE from systematic research”
Sackett et al 1996

“the integration of best research evidence with clinical expertise and PATIENT VALUES”
Sackett et al 2001

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What is E3BP?



Some words about bias

- Placebo effects – any treatment would be the same
- Confirmation bias – you see what you want to see
- Bandwagon effect – because everybody else believes it works
- 20:20 hindsight – of course it works, we knew it would
- Status quo bias – “it ain’t broke, don’t fix it”
- Authority bias – someone you respect said so

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Page 6

E3BP: Research Evidence



How to get the evidence when you don't have a trillion pesos

- Email the author directly!
- Research Gate, Academia.edu, Mendeley
- Google scholar
- PubMed Central,

- SpeechBITE.com
- Open access
- Twitter

Which research? Why?

Not all research is equal!

- Meta analysis, Systematic Review, Narrative review
- Large and independently repeated randomised control trials
- Smaller or not yet repeated randomised control trials, other 2+ group studies
- Single case experimental control design studies

That's it!

- Everything else is low or no level

- Case- control studies
- Pre-post or single case studies without control
- Case reports
- Opinion
- Text book
- Websites
- Published programs
- What you learnt in your degree
- What your Clinical Supervisor or Boss says
- **What I say**

How do you know?

- Be sceptical
- Look up the references
- Look for DATA not anecdote or opinion
- Look for Stats
- Use PEDRO-P scale, SCED scale, RoBIN-T scale – (SpeechBITE.com)

Pseudo-science

Be alert to..

- Anecdote
- Expertise
- Testimonial
- If it seems to be too good to be true, it is!
- If it claims to treat everything, it probably doesn't!

And we need to teach our patients to ask for the evidence

- Dr Google is available to everyone
- teaching patients to be critical health information consumers?
 - Authorship – what do the authors gain?
 - Accuracy- research based?
 - Bias/ Objectivity- who benefits from the publication? Do they consider their own bias? Peer review?
 - Authority – how do you know you can trust them?
 - Currency – is it up to date?
 - Are references provided?

Not enough to know the treatment works

You need to know **why** it works
and which are the **active ingredients** and the **optimal dose**

Active ingredients

– Each tablet contains:

- Ferrous sulfate, calcium phosphate, cellulose, croscarmellose sodium, FD&C red #40, hypromellose, magnesium stearate, mineral oil, polyethylene glycol, sodium starch glycolate, stearic acid (veg. grade), talc, and titanium dioxide.

– Which one is the active ingredient?

– Do you need the others?

– How would you know?

Articulation therapy

What are the common ingredients in articulation therapy?

- Modelling
- Feedback
- Drill practice
- Pictures
- Mirror
- Touch
- Gesture
- Homework
- Others???

What are the active ingredients in articulation therapy?

- Modelling
- Feedback
- Drill practice
- Pictures
- Homework
- Mirror
- Touch
- Gesture
- Slowed speed
- Others???

How would you know?

How would you know about the active ingredients?

- Systematic research manipulation of treatment to insert and remove components

Lidcombe program – multiple, repeated independent randomised control trials

i.e. very good research evidence

But what are the ingredients?

Active ingredients of Lidcombe program

As originally designed

- Weekly 60min face to face session with clinician
- Parent home therapy
- Praise for smooth speech
- Correction of "bumpies"
- Structured and unstructured speech tasks
- %SS & severity ratings at home & in the clinic
- Home recordings

As tested?

- Weekly with clinician
- Group & Telehealth = 1:1
- Parent home therapy
- Praise for smooth speech
OR
- Correction of "bumpies"
- severity ratings at home & in the clinic

Optimal dose

- How much treatment?
 - Intensity within the session
 - Frequency of sessions
 - Duration of sessions
- Who should provide the treatment & how?
 - Clinician, therapy aide or carer/parent?
 - Home program? Homework?
 - Location of sessions
 - Telehealth, computer program

Baker, 2012; Yoder, Fey & Warren 2012

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Page 20

What do we know about motor speech dosage?

- More is better but there's potentially an upper limit
 - CAS – most effective treatments 3-5 days per week, 100+ trials per session (Murray et al 2014)
 - AOS – average 3 days per week for at least 7 weeks (Ballard et al 2015)
 - Articulation – no clear evidence
 - Dysarthria – no clear recent evidence except LSVT (4 days per week x 4 weeks)

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Page 21

E3BP: Clinical Evidence



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But I've always done it this way, even though there's no evidence

- **Reflect** on where and how you learnt your clinical practice.
- Compare your practice to the research evidence
 - Are you up-to-date?
 - Do you know the literature?
 - If you are not doing the best treatment, why not?
- **Whatever you are doing, you need to measure your efficacy**

What evidence do you have for your own efficacy?

- **Objective evidence**
 - Treatment data
 - Generalisation data (should change but not directly treated)
 - Stimulus generalisation (people, places and things)
 - Response generalisation (something linguistic or motoric)
 - Control data (something you don't expect to change)
- **Subjective evidence**
 - Patient report
 - Comments from others
- **How to control for bias?**

What evidence do you have for the efficacy of your service?

- Benchmarking against other similar services
- Benchmarking against published standards
- Quality improvement projects
- Clinical pathways (eg Stroke)

E3BP: Informed Patient Choice



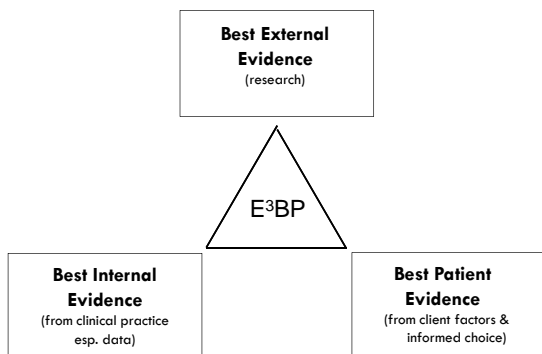
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Page 28

E3BP



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(Baker, 2009)

Page 29

Why should you care about E3BP?

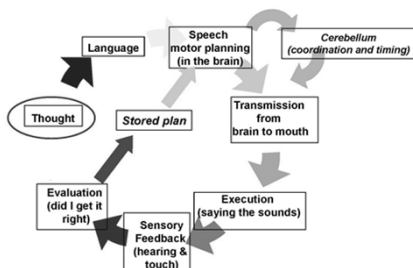
- Profession needs you to care
- Legal and ethic ramifications
 - Wasting time
 - Wasting money

Motor Learning



How do you learn a new motor skill?

Motor sensory circuits



Duffy (2005) pp 35, 57-64.
Bohland, Bullock & Guenther (2009) Neural Representations and Mechanisms for the Performance of Simple Speech Sequences. *Journal of Cognitive Neuroscience*
doi:10.1162/jocn.2009.21306

How do you learn a new motor skill?

General motor plan (GMP)

vs.

Specific motor plan (SMP)

General motor plan is the idea of how to do something

Specific motor plan is the actual instructions for doing it THIS time

A single GMP can be used in many situations

e.g. tennis swing can be hard or soft (but not used for squash)

e.g. /k/ "kiss" & "sick"

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Motor plans are specific

Tennis

- Large ball and racquet head
- Stiffish wrist
- Slow movement
- Uses force for speed
- Ball moves in 135° arc

Squash

- Small ball & racquet head
- Flicky wrist, elbow & shoulder
- Faster movement
- Uses joint, ballistic motion for speed
- Ball from any direction, to any direction

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Page 34

Motor plans are specific, therefore:

- Treat the behaviour you want to change
 - i.e. Don't treat related behaviours e.g. oral motor
- Treat the whole behaviour
 - i.e. Change the whole gesture
- Practice ≠ Performance
 - Just as in sport, you need match practice
- Vary the parameters

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Page 35

Motor plans are specific

Parameterisation

In speech

- (1) Faster, slower, louder, softer, more emphasis, i.e. emotional & situational variation
- (2) Between these phonemes, word position etc i.e. Linguistic variation

Changing the parameters doesn't change the GMP, it makes an SMP for now.

The SMP may or may not be stored.

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Motor learning

"the process of acquiring the capability for producing skilled actions"

Schmidt 1988

Acquisition = only in the session

Learning = transfer, generalisation, retention

Pre-practice aims for acquisition

Practice aims for retention and generalisation

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Principles of motor learning

Pre-practice

- Massed (blocked) practice
- Low rate of practice
- Feedback on technique
- Feedback 100%
- Low target complexity
- Until the patient demonstrates acquisition

Practice

- Distributed practice
- High rate of practice
- Feedback on outcome
- Feedback - timing, random, not 100%
- Target complexity ↑

Maas et al, 2008; Mclwaine, Madill & McCabe, 2010

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Page 38

Internal reference of correctness



How do you use the diagonal bar?



Pre-practice = acquisition

AIM: Develop an internal reference of correctness (know what is required)

COMPONENTS:

1. Verbal Information

a. Instructions

How to do the task – eg placement of articulators

b. Explanations

Information to help client understand more about the target movement.

c. Perceptual training

Raising client awareness of sensation. e.g. "how did that feel?"

Contrasts old pattern with new pattern, "which way was easier?"

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Page 40

Pre-practice

2. Modelling: Clinician provides a demonstration of the target behaviour

3. Motivation: Clinician increases client motivation to do the therapy task

4. Feedback

a. Type – focus on what the patient did

Knowledge of Performance (KP)/(KP + KR)

b. Frequency

High expected

c. Timing

Immediate expected

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Page 41

Pre-practice

5. May include bio-feedback and training of the patient on judging correct/incorrect (self-evaluation)
6. Massed practice
7. Simple targets
8. As little therapy as required to develop internal reference of correctness.
9. STOP when the patient can get a few productions correct in a row and CHANGE to practice.
10. Alternate between pre-practice and practice till patient can judge own productions correctly (i.e. can practice independently).

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Page 42

Practice = learning

AIM: be able to independently use the skill

- High number of attempts
- Daily or more frequent sessions
- Distributed practice (across the day)
- Varied practice (lots of different targets)
- Random order of practice
- Complex targets
- Knowledge of results (KR) feedback
- Feedback – infrequent and random or summary
- Delayed feedback (3-5 sec)

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Page 43

Important Expectation!

Use of these principles in therapy may result in slower acquisition, but long-term gains (learning) will be substantial.

When do you use the PML?

In any disorder with a motor component – both adults and children

- Articulation
- Apraxia
- Accent
- Dysarthria
- Stuttering
- Voice
- Swallowing

Bringing it all together



E3BP and the principles of motor learning

- Look for the research evidence
- Consider it without bias
- Evaluate it for research rigour
- Include your patient in the decision making, including information about the limits of our knowledge
- Collect data on how the therapy is going
- When there is little evidence, **use PML to guide your decision making.**

Non speech oral tasks

No evidence in paediatric or adult literature that training non-speech oral tasks will improve speech (except in flaccid dysarthria?)

To improve speech – work on speech

So what does a good motor speech session look like?

- Two phases – prepractice and practice
- Focus changes between phases when
 - Internal reference of correctness established
 - Client can practice safely without you
- Low dose of prepractice
- High dose of practice – days pw, trials per day
- Presentation of stimuli varies with phase

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