Research Methodology and Medical Treatment Guidelines

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- Colorado Division of Workers’ Comp. (Medical Treatment Guidelines)
Presentation Goals

- Why we create the MTGs
- The Colorado DOWC process
- Study quality / confidence based on study type and risk of bias
Why Evidence-Based Medical Treatment Guidelines?
WHY EVIDENCE-BASED MTGs?

Our goal is to make decisions that are most likely to achieve our desired outcomes.
**WHY EVIDENCE-BASED MTGs?**

- Healing ➔ Functional improvement ➔ Return to work
- Safety
- Resources / Cost-effectiveness
WHY EVIDENCE-BASED MTGs?

- Medical Decisions in Workers’ Comp
  - Treatment options
    - When and for whom
    - How much, how long
    - When to try something different
  - Diagnostic approaches
For these types of decisions, **medical research** is a valuable information source.
WHY EVIDENCE-BASED MTGs?

But there’s a lot of research - of varying reliability – how do we navigate that?
WHY EVIDENCE-BASED MTGs?

How do we navigate that?

- It’s often complicated
- Specialized knowledge and experience
- It’s time consuming
OUR AIMS FOR THE MTGs

- Provide best evidence on available medical treatments
- Weigh appropriateness of treatment relative to functional outcomes
- Address emerging treatments and diagnostics
- Create actionable recommendations
Phases of the Colorado DOWC MTG Process
PHASES OF THE MTG PROCESS

- Expert interviews and scoping
- Finding and selecting studies
- Evaluating individual studies
- Combining evidence from multiple studies
- Writing recommendations and guidance
- Task Force process
- Advisory Panel and public input process
PHASES OF THE MTG PROCESS

- Expert interviews and scoping
  - What topics should we review?
    - Specify using PICO questions.
      - Population (including the medical condition)
      - Intervention (the treatment being studied)
      - Comparison (typically a traditional/proven treatment)
      - Outcome (function, pain, adverse events)
      - Timing (how long after treatment)
PHASES OF THE MTG PROCESS

- **Expert interviews and scoping**
  - Occ Med and PM&R Physicians
  - Physical and Occupational Therapists and Physiatrists
  - Psychiatrists and Psychologists
  - Claimant’s and Respondent’s Attorneys
  - Other Medical, Government, and Insurance Professionals
PHASES OF THE MTG PROCESS

- Expert interviews and scoping
- **Finding and selecting studies**
- Evaluating individual studies
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Finding and selecting studies

- Systematic search
  - PubMed and Cochrane Databases
  - Detailed search terms
SEARCH TERMS

PHASES OF THE MTG PROCESS

- Finding and selecting studies
  - Inclusion / exclusion criteria
    - RCT or SR/MA of RCTs
    - Published in a peer-reviewed journal in English
    - Fits our scope (PICOTs)
    - Sufficient size (20 subjects per group)
PHASES OF THE MTG PROCESS

- Expert interviews and scoping
- Finding and selecting studies
- **Evaluating individual studies**
- Combining evidence from multiple studies
- Writing recommendations and guidance
- Task Force process
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PHASES OF THE MTG PROCESS

- Evaluating individual studies
  - Which results are we interested in?
    - Direct comparison of the amount of change
  - How confident are we that those results represent the true effect of the treatment?
    - Risk of bias – many factors can potentially bias the results
      - We currently use Cochrane’s updated risk-of-bias tool (RoB 2)
      - Also called “internal validity”
PHASES OF THE MTG PROCESS

- Expert interviews and scoping
- Finding and selecting studies
- Evaluating individual studies
- **Combining evidence from multiple studies**
- Writing recommendations and guidance
- Task Force process
- Advisory Panel and public input process
Combining evidence from multiple studies

Systematic review – the “qualitative” questions:

Which studies can be combined based on their scope (PICOs)?

For example: Different age ranges; Different methods of delivering the treatment; Different outcome measures

Do the study results agree?

If not, look for explanations of the inconsistency.
Combining evidence from multiple studies

- Meta-analysis – the “quantitative” analysis:
  - Results in a “pooled estimate” of the effect
  - Is there evidence of publication bias (unpublished studies)?
  - Do any low-quality studies bias the pooled estimate?
  - How certain is the pooled estimate (confidence interval)?
PHASES OF THE MTG PROCESS

- Expert interviews and scoping
- Finding and selecting studies
- Evaluating individual studies
- Combining evidence from multiple studies
- **Writing recommendations and guidance**
- **Task Force process**
- Advisory Panel and public input process
PHASES OF THE MTG PROCESS

- Writing recommendations and guidance
- Task Force process
  - Consider multiple factors that go into recommendations:
    - Study results
    - Risks/harms
    - Other factors like availability and cost
    - Expert perspectives
PHASES OF THE MTG PROCESS

- Writing recommendations and guidance
- Task Force process
  - Consider details that inform the guidance around recs:
    - Study population and condition – informs the indications
    - Details of the study treatment – informs dose and duration
    - Other factors like co-interventions in the studies
PHASES OF THE MTG PROCESS

- Expert interviews and scoping
- Finding and selecting studies
- Evaluating individual studies
- Combining evidence from multiple studies
- Writing recommendations and guidance
- Task Force process

Advisory Panel and public input process
PHASES OF THE MTG PROCESS

- Advisory Panel and public input process
  - 35 member Advisory panel for the spine guidelines
  - Public comment period of at least 1 month
    - Actively solicit input by emailing all prior stakeholders
Study design
STUDY TYPE

Systematic reviews and meta-analyses of RCTs*
Randomized controlled trials
Cohort studies
Case-control studies
Cross-sectional studies, surveys
Case reports, case studies
One or more people with a particular condition are given a treatment and improve.

Strengths:
- Hypothesis generating about possibly effective treatments
- Provides information about possible dose, duration, etc.
Limitations:

- Only positive results usually get reported
- The authors often have a vested interest in the treatment
- Many factors other than the treatment could be the reason for improvement
- No control comparison
CROSS-SECTIONAL STUDIES

- All information is gathered at one point in time
- Surveys are typical, though some include other data collection
- Used more to investigate risk factors than treatments
- Diagnostic studies are similar:
  - Results of the diagnostic tool being studied are compared with results of a gold-standard diagnosis
CASE-CONTROL STUDIES

- Used most often to look for links between risk factors and diseases
- Cases are individuals who developed the disease
- Controls are selected from a similar population, often matched for key demographics
- The history of possible risk factors are compared
- Not relevant for evaluating treatments
COHORT STUDIES

- Two groups with a key difference at the starting point are followed over time to detect possible outcomes.
  - For example: people who got a certain treatment vs. others who didn’t get that treatment are followed for improvement.
  - More commonly used to link risk factors and disease.
COHORT STUDIES

Strengths:
- Less expensive and less red tape than a trial
- Can be used when randomization isn’t feasible

Limitations:
- Much greater risk of bias, especially related to the selection of who is in each group
COMPARATIVE TRIAL (INCLUDING RCTs)

- Divide patients with a condition into two groups: treatment A vs treatment B
- Randomized – each individual has an equal chance of being in each group. This eliminates possible selection bias.
- Controlled – treatment B is a “control.” Thus, if group A improves more than group B, it’s reasonable to conclude it’s from treatment A.
Strengths of RCTs:

- If well designed and executed, eliminates many possible sources of bias.
- Is therefore the strongest study type to demonstrate causation.
COMPARATIVE TRIALS (INCLUDING RCTs)

Limitations of RCTs:

- Expensive.
- Recruitment can be difficult.
  - Can be “underpowered” due to small numbers.
- Many requirements to ensure ethical study practices.
- Must balance getting similar groups with representing the general population.
Systematic review
- Formal, rigorous methods to identify all relevant research (such as our MTG process)

Non-systematic review examples
- The latest studies receiving press coverage
- A selection of research provided by a drug representative or device manufacturer
Meta-analysis

- Statistical combination of study results to generate a “pooled” estimate of effect

Our confidence in the findings of systematic reviews and meta-analyses depend on the quality of the included studies
(Minimizing) Risk of Bias
Determines a random order for assigning people into the intervention and control groups

Occurs at the start of the trial before allocation

Helps to eliminate confounders

- Confounder = a difference in some characteristic between the groups that affects outcomes

Avoids selection bias
When a person is recruited to the study, no one can predict which group they will be allocated to.

Ensures the strict implementation of the random sequence:
- Prevents changing the order.
- Prevents selecting who to recruit based on knowledge of which group they would be in.

Avoids selection bias.
Patients don’t know which group they are in for the duration of the study – and neither do their providers.

Ensures there are not differences in additional treatments or patient behaviors resulting from knowledge of group assignment.

Avoids performance bias.

In some cases, blinding might not be possible.
BLINDING OF OUTCOME ASSESSMENT

- Individuals measuring the outcomes don’t know which group each patient is in.
- Prevents psychological biasing of outcome measurement, especially any that are subjective.
- The patient may also be an outcome assessor.
- Avoids **detection bias**.
There isn’t a firm rule, but 95% is generally good.

Can be hard to control lost patients & data
- Patient withdrawal or loss to follow up
- Missing data, such as incomplete assessments

Could “missingness” be related to outcomes for those patients?

Avoids attrition bias
FULL REPORTING AND APPROPRIATE ANALYSIS

- Outcome measures are appropriate
- All outcome measures are reported
  - No selective reporting
- Analysis should be based on group assignment (intention-to-treat)
  - If multiple analyses were done, all are reported
- Avoids reporting bias
This is becoming standard practice

A protocol should be registered prior to enrollment

There should be no major changes in study design from the early protocol to the final study report

Provides assurance against multiple types of potential bias
Any questions?
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