

## *Case Study*

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# How **BE***works* Helped Reduce Health Practitioner Error *in* Diagnosis

# *The Challenge*

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Our client, a clinical tool developer, was creating an electronic medical record (EMR) integrated tool to assist health practitioners with lower back pain diagnosis.

The client asked BEworks to help optimize the EMR tool in order to improve objective diagnosis, encourage end-to-end tool use and reduce imaging as well as surgical referrals.

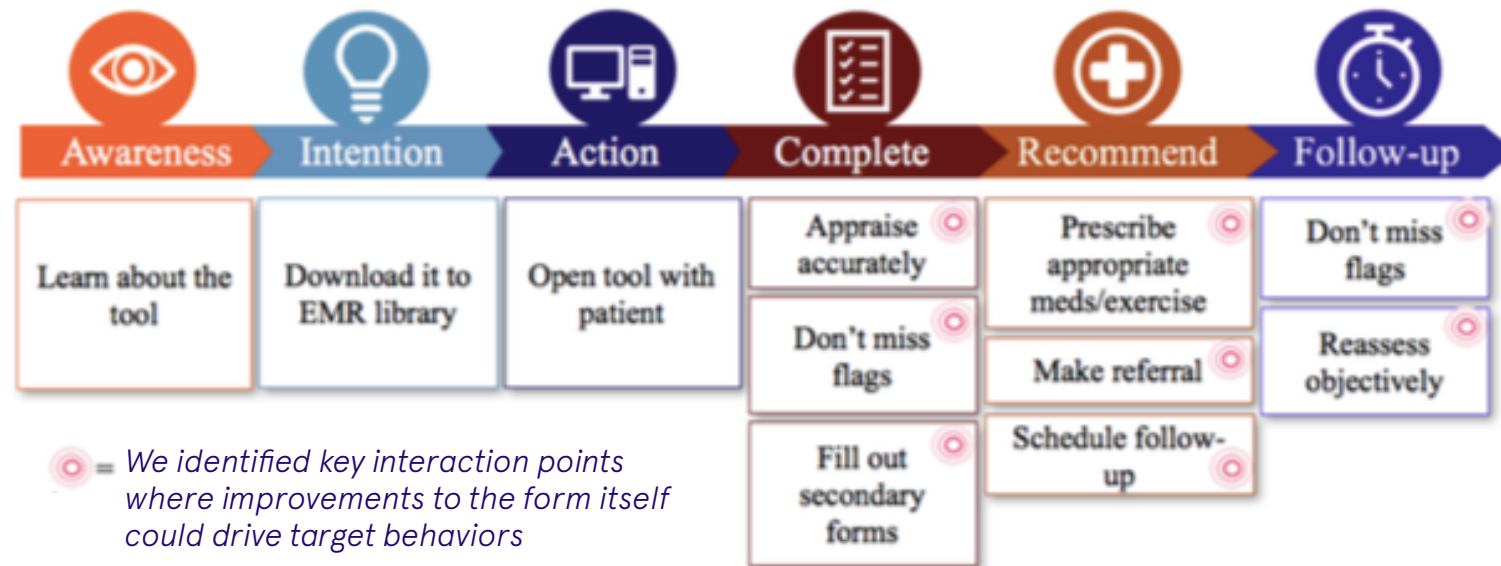
# Step 1: *Discovery*

## *Understanding the health practitioner journey*

We began by conducting stakeholder interviews across the organization to create a health practitioner journey map.

We identified key interaction points where improvements to the tool could drive the following target behaviors:

1. **Objective** Diagnosis
2. **Accurate** Diagnosis
3. **End-to-end** Tool Use
4. **Appropriate** Recommendations
5. **Decrease** in the percentage of patients referred to imaging or surgery



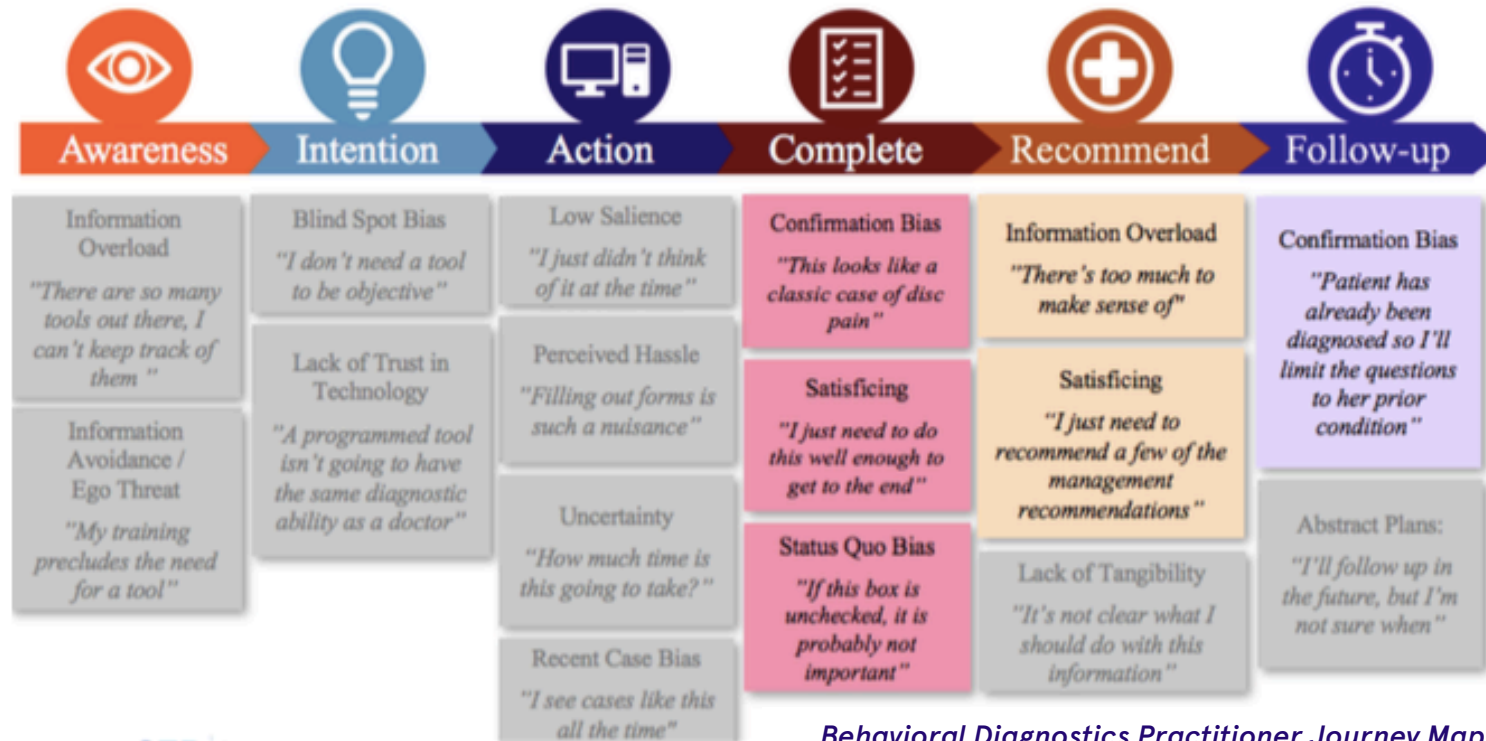
Health Practitioner Journey

# Step 2: Behavioral Diagnostics

## Identifying Behavioral Barriers Across the Practitioner Journey

We conducted a literature review on the behavioral barriers, biases and heuristics that impact medical decision making.

We prioritized four behavioral barriers across the practitioner journey that were the highest in prevalence throughout the tool and would cause the greatest impediment to achieving our client's target outcomes.



# Step 3: Behavioral Diagnostics

## Conducting a Behavioral Audit of the EMR Diagnostics Tool

After identifying behavioural barriers across the health practitioner journey, we conducted an audit of the EMR tool. Using the practitioner journey as a reference, we identified four key barriers within the tool:

- Confirmation Bias
- Satisficing
- Status Quo Bias
- Information Overload

Section 4: Initial Management

	Pattern 1	Pattern 2	Pattern 3	Pattern 4	Non-Mechanical Pain
Commonly Called <sup>1</sup>	Disc Pain	Facet Joint Pain	Compressed Nerve Pain	Symptomatic Spinal Stenosis (Neurogenic Claudication)	Non-spine related pain
Medications <sup>1,2</sup>	<input type="checkbox"/> Acetaminophen <input type="checkbox"/> NSAID	<input type="checkbox"/> Acetaminophen <input type="checkbox"/> NSAID	<input type="checkbox"/> May require opioids if 1st line pain meds not sufficient	<input type="checkbox"/> Acetaminophen <input type="checkbox"/> NSAID	Consider other etiologies prior to pain medications
Recovery Positions <sup>3</sup>					Consider internal organ pain referral such as kidney, uterus, bowel, ovaries
Starter Exercises <sup>4</sup>	Repeated prone lying passive extensions (i.e. hips on ground, arms straight), 10 reps, 3 x/day	Sitting in a chair, bend forward and stretch in flexion. Use hands on knees to push trunk upright. Small frequent repetitions through the day	"Z" lie (see image above) <b>Caution:</b> exercise will aggravate the pain so start with pain reducing positions	Rest in a seated or other flexed position to relieve the leg pain	Spine pain does not fit mechanical pattern
Exercises	ISAEC, HealthLink BC, SASK Pattern 1	ISAEC, HealthLink BC, SASK Pattern 2	ISAEC, HealthLink BC, SASK Pattern 3	ISAEC, HealthLink BC, SASK Pattern 4	Consider centralized pain medications (i.e. anti-depressants, anti-seizure, opioids)
Functional Activities <sup>5</sup>	<input type="checkbox"/> Encourage short frequent walking <input type="checkbox"/> Reduce sitting activities <input type="checkbox"/> Use extension roll for short duration sitting	<input type="checkbox"/> Encourage sitting or standing with foot stool <input type="checkbox"/> Reduce back extension and overhead reach	<input type="checkbox"/> Change positions frequently from sit to stand to lie to walk	<input type="checkbox"/> Use support with walking or standing. Use frequent sitting breaks	Consider pain disorder
Follow-up	<input type="checkbox"/> 2-4 weeks if referred to therapy, or prescribed medication <input type="checkbox"/> PRN if given home program and relief noted in office visit	<input type="checkbox"/> 2-4 weeks if referred to therapy, or prescribed medication <input type="checkbox"/> PRN if given home program and relief noted in office visit	<input type="checkbox"/> 2 weeks for pain management and neurological review	<input type="checkbox"/> 4-12 weeks for symptom management and determination of functional impact	
Self Management <sup>6,7</sup>	Once pain is reduced, engage patient for self management goals	Self management can be initiated in 1st or 2nd session with most patients	Patient is not usually suitable for self management due to high pain levels and possible surgical intervention	Self management can be initiated in 1st or 2nd session with most patients	

ISAEC = Inter-professional Spine Assessment and Education Clinics; SASK = Saskatchewan Spine Pathway Group Healthy Back Exercise

Behavioral Diagnostics Audit : Satisficing Example

**Relational processing/anchoring:**  
Side-by-side comparison of pain patterns increases likelihood that users will jump to biased conclusions about management, based on perceived severity (1-4) rather than reported symptoms

**Abstractness:**  
Recommendations that lack concreteness – such as how often is considered “frequent” – are less likely to be understood and remembered

# Step 4: Ideation Designing Nudges

We redesigned the EMR tool by embedding behavioral tactics (nudges) to overcome the identified barriers throughout the tool.

The mock-ups we provided to the client considered the constraints of the EMR to ensure our redesigned tool would be feasible to implement,

**Section 1: Initial Management**

**Section 2: Physical Examination**

Action	Description	Frequency	Priority	Status
Walk	Walk walking (0-10)	○ ●	○	
Standing	Stand walking (0-10)	○ ○		
	Stand walking to bathroom	○ ○		
	Transfer walking (0-10)	○ ○		
	Stand walking to toilet (0-10)	○ ○		
Sitting	Plantar reflex (0-10)	○ ○		
	Great toe extension power (0-5)	○ ○		
	Plantar response, upper extremities (0-10)	○ ○		
	Ankle dorsiflexion power (0-10)	○ ○		
Standing	Active reflex (0-10)	○ ○		
	Plantar reflex (0-10)	○ ○		
Lying	Plantar reflex (0-10)	○ ○		
	Plantar reflex (0-10)	○ ○		
	Plantar reflex (0-10)	○ ○		
	Plantar reflex (0-10)	○ ○		

**Section 3: Radiology of Hip**

- Medical history
- Medical history to determine hip involvement
- Medical history to determine hip involvement
- Medical history to determine hip involvement

**Section 4: Radiology of Hip**

- Physical therapy
- Physical therapy
- Physical therapy
- Physical therapy

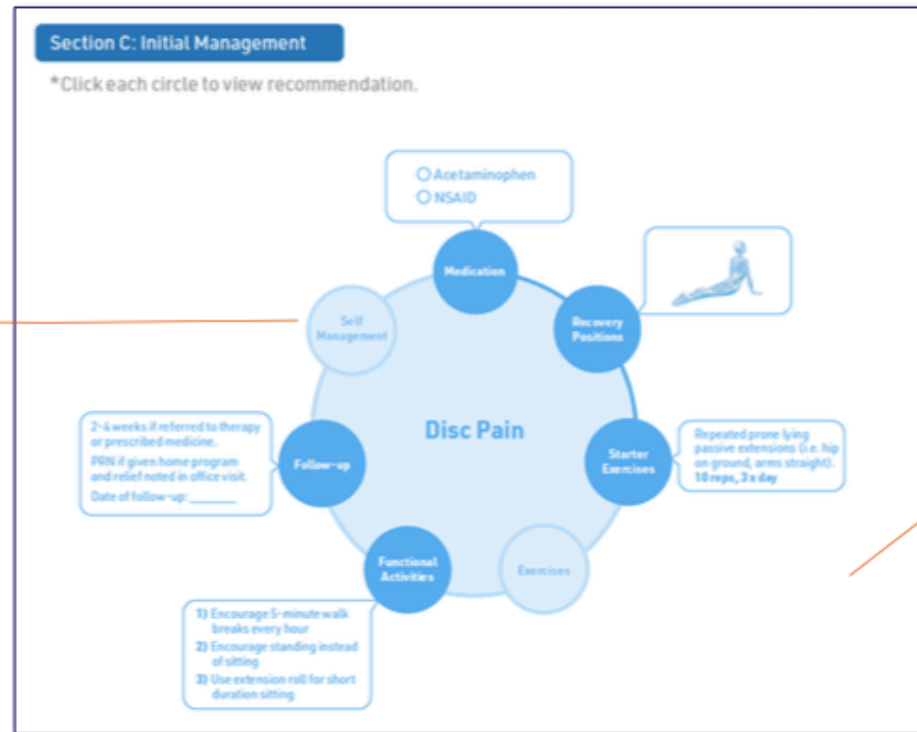
*Ideation: EMR Mockups*

# Step 4:

## *Ideation*

### *Designing Interventions*

Below is one section of the EMR tool we designed to overcome the barriers of information overload and satisficing



**Guided attention:** Clicking on one recommendation at a time increases the amount of attention paid to each one

**Whole Unit Framing:** Increase likelihood that users give all recommendations by forming them into a single image, which people are motivated to keep in tact

## Step 5: *Experimentation*

### *Pilot Testing the Tool*

We provided our client with an experiment design to test the efficacy of the updated tool.

Through this design the client would be able to:

- Generalize learnings to optimize future tool development by testing hypotheses and systematically analyzing results
- Examine the causal effect of the tool on practitioner and patient behavior instead of relying on subjective reports of preference or intuition about what will work

