Acute Pain Assessments and Records – A Pilot Study of Digital Transformation

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Guy's and St. Thomas' NHS Foundation Trust

Background

- SNOMED CT (SCT) plays an important role in electronic health records (EHRs).
- The user interfaces within EHRs are not typically developed to enhance the use of SCT and its features, limiting associated benefits in data recording, analytics and interoperability.
- A clinically-friendly interface designed to enhance interactivity with SCT could support a range of improvements across the entire data pipeline (data entry → analytics).
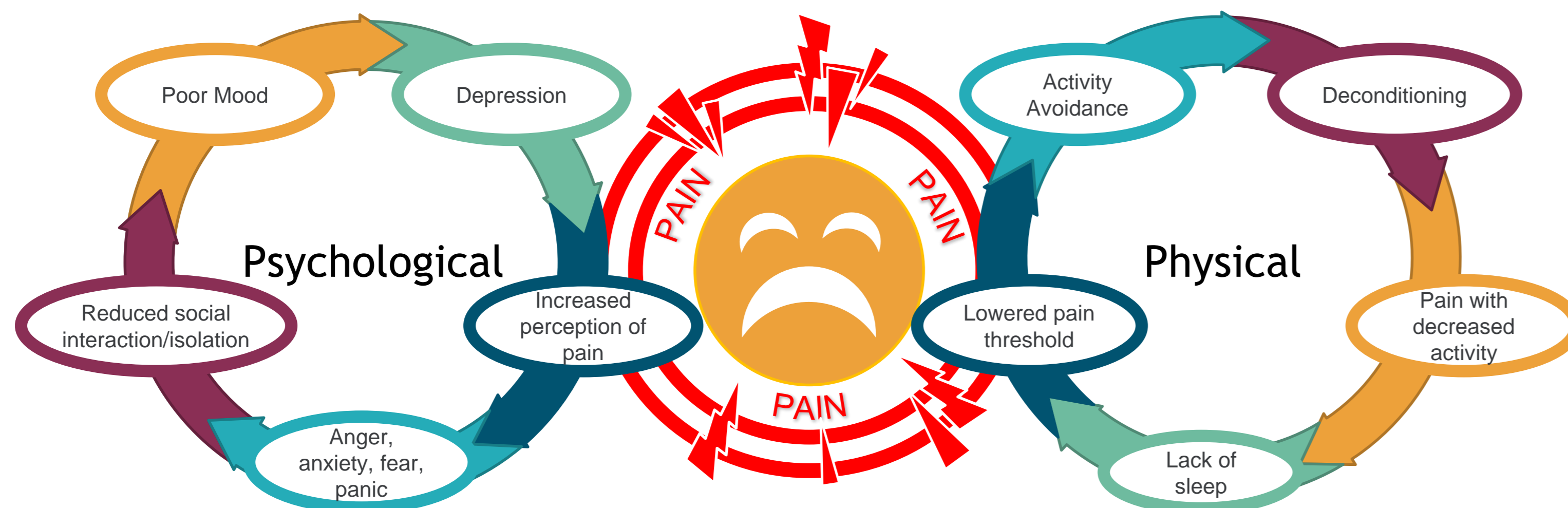
Pain Assessments – a SNOMED CT pilot

- Pain assessments are a critical part of effective and evidence-based care worldwide.
- There is unwanted variation in behaviours of record keeping, impeding timely documentation, reporting capabilities, and analytics.
- As a highly expressive terminology, SCT can be used to record patient events and experiences spanning the entire pain cycle (Figure One).
- Pain assessments are a standard and meaningful nursing interface to assess the impact of collaborative SCT development, integration and use.

Figure One: The Continuous Pain Cycle

Psychological: Poor Mood, Depression, Reduced social interaction/isolation, Anger, anxiety, fear, panic, Increased perception of pain

PAIN

Physical: Activity Avoidance, Deconditioning, Pain with decreased activity, Lack of sleep, Lowered pain threshold

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SNOMED CT and electronic health records have a symbiotic relationship.

The greater the integration, the more opportunities for improvement, innovation and interoperability.

SNOMED CT and the EHR

Aims

- Does front-loaded consideration and integration of SCT content and features deliver clinical benefits above and beyond those of late terminology binding?
- Does using SCT in digital pain assessments improve clinical quality, safety and efficiency?
- Does the use of SCT in digital pain assessments reduce unwanted variation in documentation between nurses?
- Does the use of SCT help clinicians to identify, quantify, and act upon critical elements of the pain cycle?

"Nursing assessments are a core component of delivering evidence-based healthcare, improving outcomes and clinical education."

- Katrina Cooney, Chief Nursing Information Officer

Introduction

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Introduction

Methods

Results

Discussion

Collaborative design principles

- Terminology expertise was not used in developing the pre-existing pain assessment, and content was mapped to SCT after production and publication.

Engage with Stakeholders • Determine best clinical practices and recording needs • Align needs with SCT concepts and identify terminology gaps • Build assessment to support optimal usability and maximise use of SCT features • Implement form and monitor performance • Optimise form and begin improvement cycles
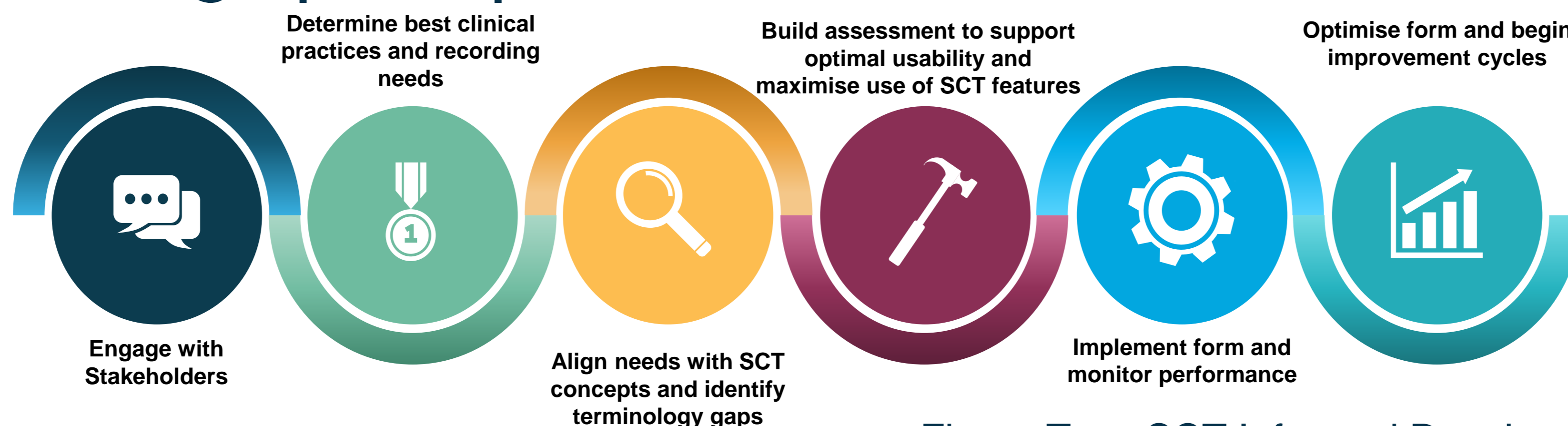
Figure Two: SCT Informed Development

- A team of acute pain nurses and anaesthetists identified 18 pain-related characteristics, events and factors that were clinically relevant and should be recorded as part of best practice in a pain assessment (Table One).
- A digital, SCT-enabled assessment form was then collaboratively developed between the clinical team, terminologists and EHR analysts to support optimal clinical usability and promote SCT's features (See Figure Two).

Pilot Assessment

- The acute pain nursing team completed pain assessments for adult patients, across a six month period at a tertiary centre. Random samples of these pain assessments were examined and scored using the 18 best practice factors (Table One) at three consecutive stages:

Stage One → **Stage Two** → **Stage Three**

Original Digital Pain Assessment Form (BPA) → SNOMED CT – enabled Pain Assessment Form (NSPA) → Reassessment of Original Digital Pain Assessment Form (RBPA)

- In Stage One a baseline of scores and times was established using the original digital pain assessments. During Stage Two, the original form was discontinued and the SCT-enabled form used and assessed. During Stage Three, the SCT-enabled form was withdrawn and the nurses returned to using the original form, with scores and times again reassessed.

- Throughout each stage, two analysts assessed each form against quality and safety related (Table One: navy and green) pain characteristics and factors. The time taken to extract and interpret the data in the assessments was also analysed.

- Statistically significant changes were assessed using Welch's t-tests and Fisher's exact tests.

Table One: 18 Pain Assessment factors

Factor	Description	Data type	Example Value
Sedation[S,Q]	Assessment of alertness	SNOMED CT	248234008 |Mentally alert (finding)|
Physiological site(s)[S,Q]	Anatomical site(s) of pain	SNOMED CT	771367001 |Amputation stump of left lower limb (body structure)|
Distribution[Q]	Spread of pain over defined area	SNOMED CT	9972008 |Radiating pain (finding)|
Pain at rest[S,Q]	Rest scores	SNOMED CT	40196000 |Mild pain (finding)|
Pain on movement[S,Q]	Movement scores	SNOMED CT	50415004 |Moderate pain (finding)|
Assessment tool[Q]	Assessment type	SNOMED CT	*Known omission - Authoring in progress. Placeholder concepts used.*
Pain descriptor(s)[Q]	Characteristic feature(s) of pain	SNOMED CT	49575005 |Shooting pain (finding)|
Nature[Q]	Acute or chronic	SNOMED CT	274663001 |Acute pain (finding)|
Onset[Q]	Onset of pain	Date	12/13/2022
Periodicity[Q]	Continuous or intermittent	SNOMED CT	314642004 |Intermittent pain (finding)|
Known/Suspected Cause[Q]	Cause of pain	SNOMED CT	107401000119105 |Acute postoperative pain (finding)|
Aggravating factors[Q]	Non-pharmacological factors increasing pain perception	Free text	*Free text*
Alleviating factors[Q]	Non-pharmacological factors decreasing pain perception	Free text	*Free text*
Impact on sleep[Q]	Assessment of sleep impact	SNOMED CT	301345002 |Difficulty sleeping (finding)|
Impact on activities of daily living (ADLs)[Q]	Assessment of activities of daily living	SNOMED CT	284977008 |Difficulty dressing (finding)|
Anxiety[Q]	Assessment of anxiety	SNOMED CT	48694002 |Anxiety (finding)|
Low Mood[Q]	Assessment of mood	SNOMED CT	366979004 |Depressed mood (finding)|
Non-pharmacological intervention(s)[S,Q]	Started/evaluated	SNOMED CT	229559001 |Transcutaneous electrical nerve stimulation (regime/therapy)|

S Factor used for safety scoring
Q Factor used for quality scoring)
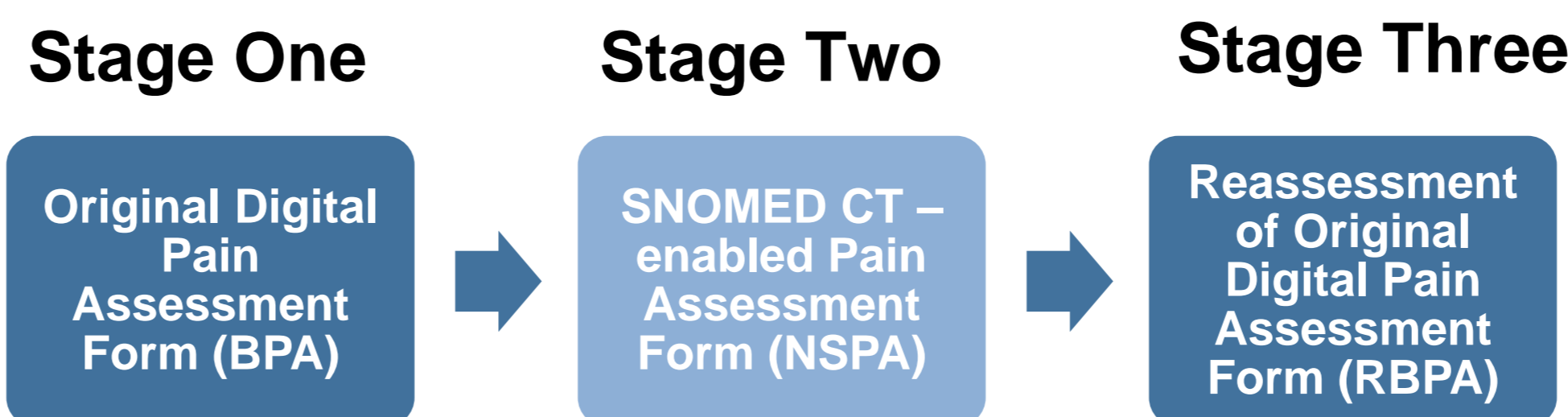*Note: SNOMED CT content was taken from the latest UK release at the time of writing (NHS Digital, 2021).*

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Methods

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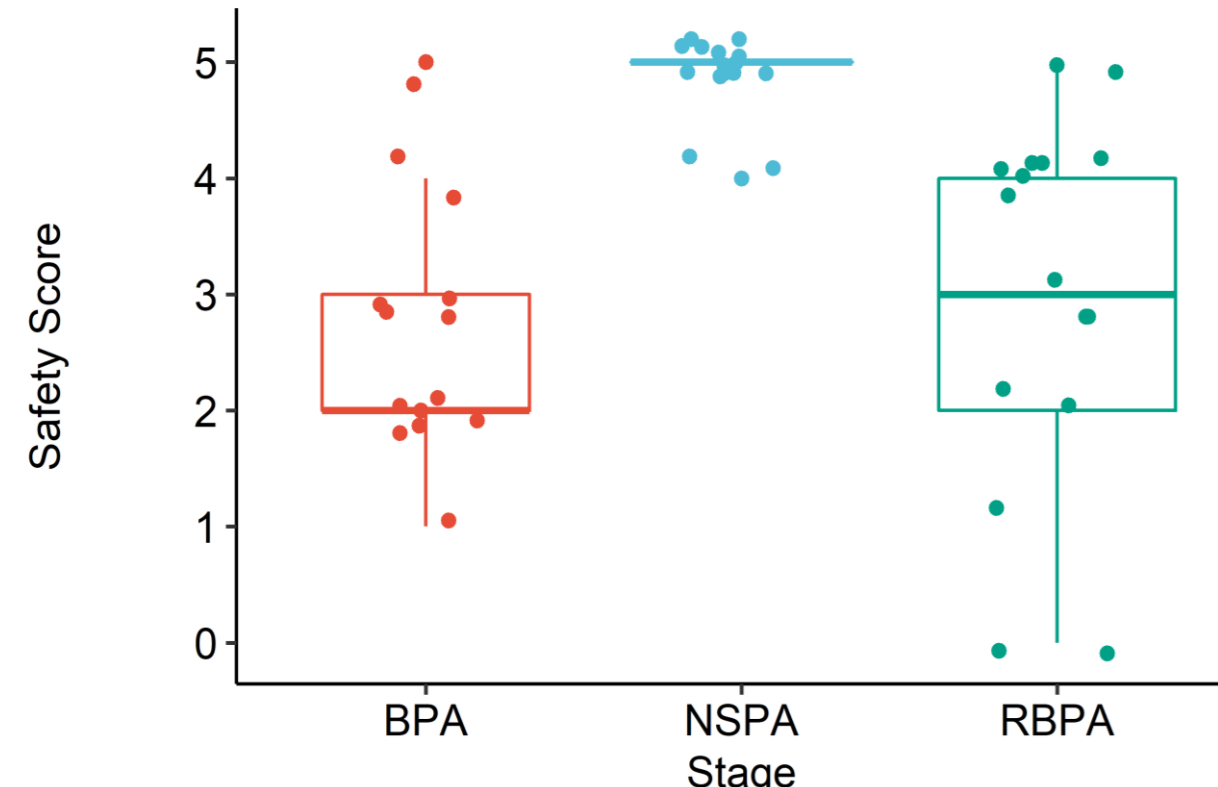**Joanne Grady** *Clinical Nurse Specialist*

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Methods

Results

Discussion

Benefits

Key: BPA baseline digital pain assessments; NSPA New SNOMED CT-enabled pain assessments; RBPA Re-assessment of baseline pre-existing assessments
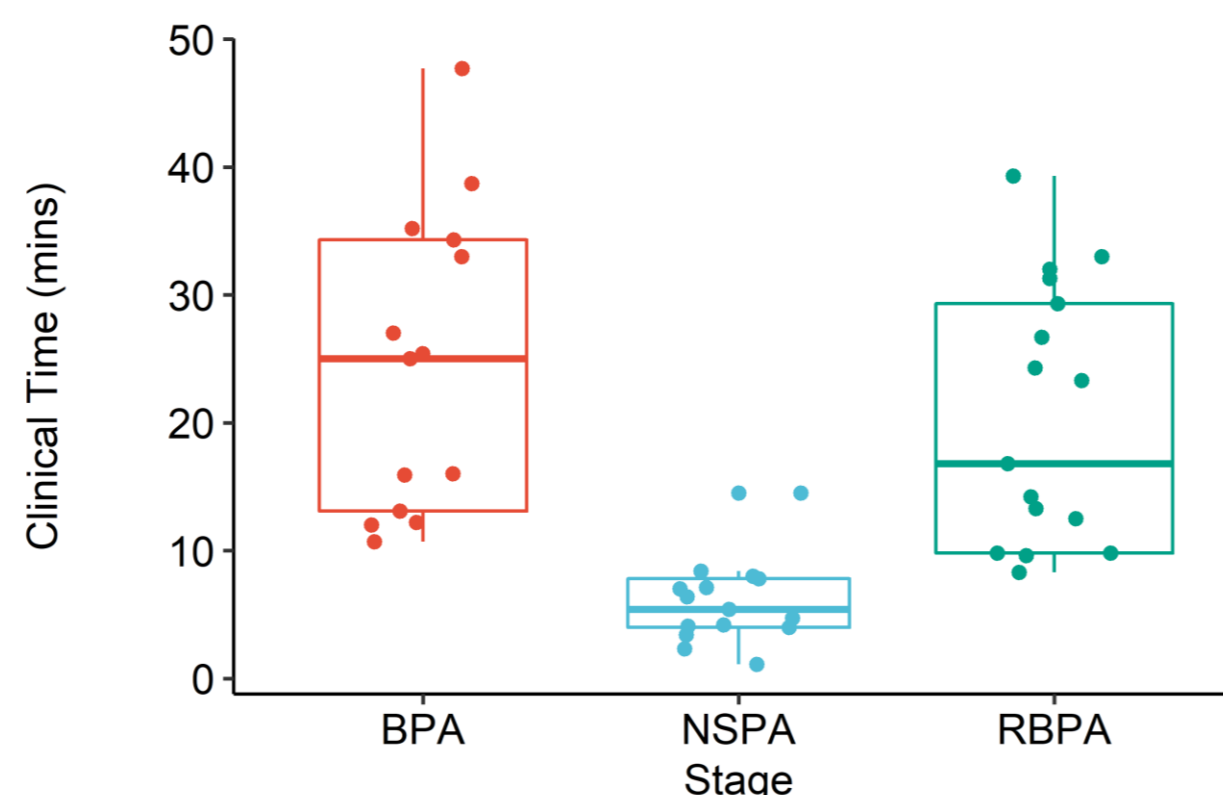
Safety

The SCT-enabled form **reduced unwanted variation** between assessments resulting in **significantly superior** recording of safety related factors.

Documentation Efficiency

Clinical documentation in the SCT-enabled form was significantly faster than current practice **(Time savings: mean: 16.7mins, median: 18.4mins).**

Quality

Quality scores tripled compared with current practice.

Analytics Efficiency

Data extraction and interpretation **was over 2.5x quicker per assessment** with the SCT-enabled form.

Main Findings

Development and use of the SCT-enabled pain assessment form resulted in:
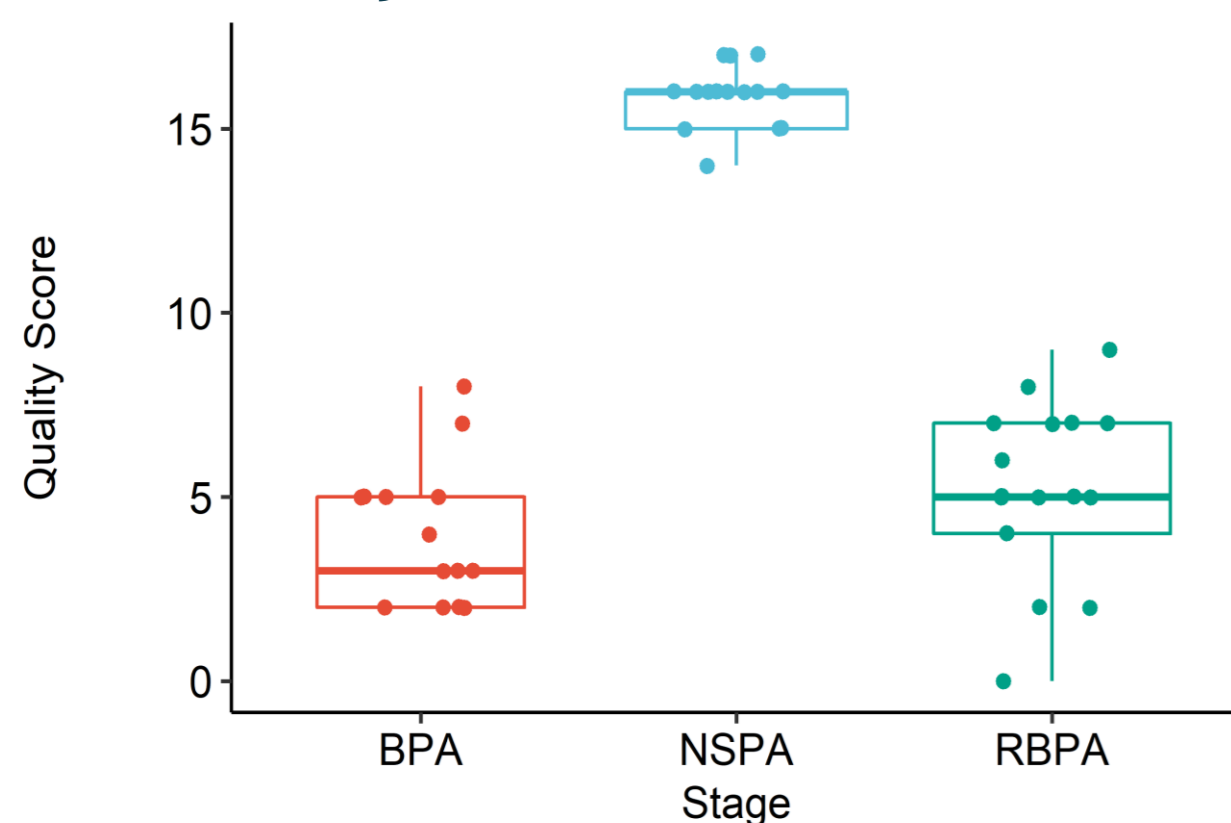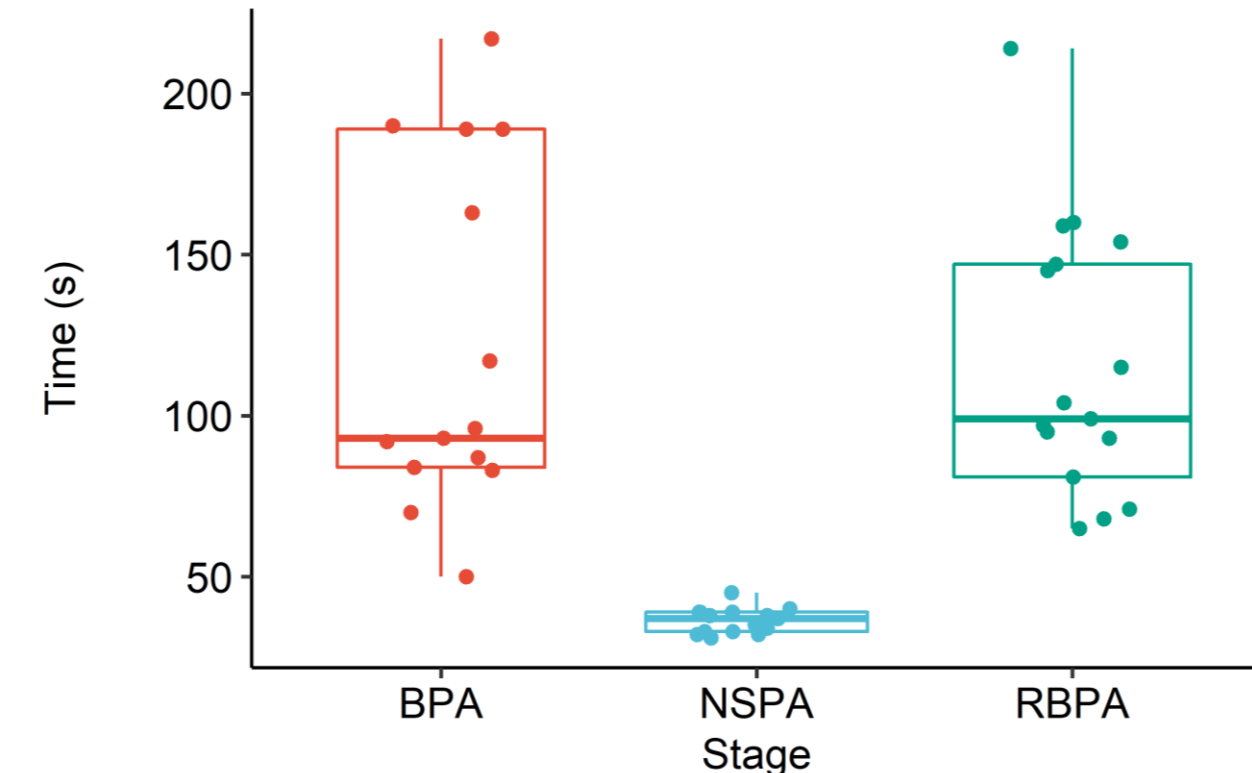
- **Significantly higher quality and safety scores.**
- **A reduction in unwanted variation between assessments, across all 18 metrics.**
- **Identification and quantification of unknown sleep and psychological problems, a central component in effectively disrupting the pain cycle (Figure One).**

Hidden Health Issues

- The SCT-enabled form showed that pain-related sleep difficulties were **5x** times higher than was currently known and reported.
- Incidence of low mood and anxiety was also higher than was currently reported.

"The SNOMED CT-enabled form has made it easier to record and monitor key elements of care. For the first time ever, we have been able to reliably profile a patient's experiences and treatments, and can quantify psychological and sleep difficulties."

- Joanne Grady, Clinical Nurse Specialist

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Results

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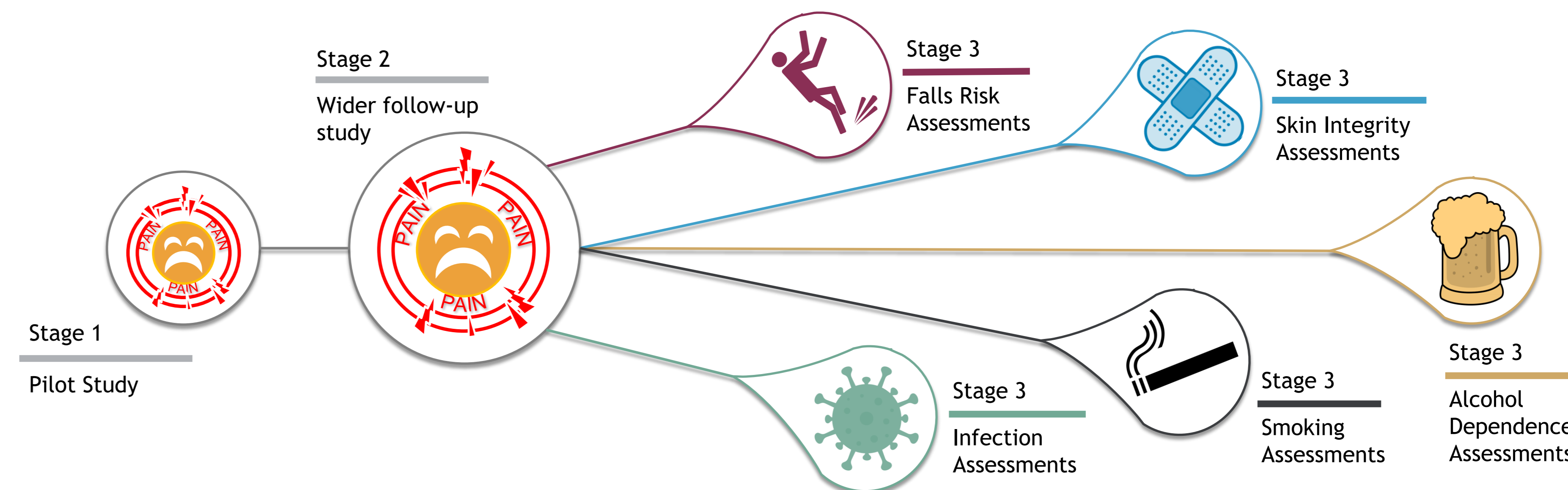
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Results

Discussion

Conclusions

- The design principles used in creating a SCT-enabled pain assessment delivered additional benefits over current interface design and development methods, including late terminology binding.
- The SCT-enabled form resulted in improved documentation of quality and safety-related pain characteristics and factors.
- The SCT-enabled form resulted in significantly more efficient clinical documentation and analytics.
- The form allowed for accurate and consistent recording of key factors involved in the pain cycle, highlighting underreported psychological and sleep difficulties.
- Training and awareness of key pain characteristics alone did not support improvements across all evaluated metrics.

"This study has transformed the way we think about, record and use our data. By using SNOMED CT, and involving terminologists in interface development, we are able to work more safely and quickly, with time saved reinvested back into our patients and staff."

- Suneil Ramessur – Consultant Anaesthetist, Theatres

Future Directions

Figure Three: Nursing Assessment Transformation Pathway

Stage 1 — Pilot Study
Stage 2 — Wider follow-up study
Stage 3 — Falls Risk Assessments
Stage 3 — Skin Integrity Assessments
Stage 3 — Alcohol Dependence Assessments
Stage 3 — Smoking Assessments
Stage 3 — Infection Assessments

- The SCT-enabled form is being integrated as part of a new electronic health record at the study site.
- To further consolidate and validate the results from this pilot, a larger follow up study is due for completion in late 2023.
- The design and development principles used within this study can be extended to other nursing domains. The study site intends to replicate this process for other nursing assessments including: falls risk, infection, alcohol dependence, smoking and skin integrity.
- As SCT content covers the entire clinical domain, there are numerous clinical areas where SCT-enabled interfaces may be beneficial. Future areas for development include physiotherapy, dietetics and speech therapy.

References

1. Roberts L, Lanes S, Kyte J, Grady J, Holdship J, Carey C, Cooney K, Ramessur S. Acute pain assessments and records: a pilot study of digital transformation. Br J Nurs. 2022 May 26;31(10):541-548. doi: 10.12968/bjon.2022.31.10.541. PMID: 35648661.

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Discussion

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