A Quality initiative: Hand calculations to clinical 'app'- SCIMA

Transforming nurses preparation of subcutaneous infusions

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Context:

- Subcutaneous (SC) infusions deliver multiple medications continuously, usually at the patients end of life; in the hospital, hospice or community.
- Although seen as a core nursing competence, performing the medication volume calculations manually at times can be a daunting task
- Often there exists poor confidence completing the calculations and making decisions about the appropriate syringe volume, diluent and correctly identifying medication compatibility issues.

Problem:

- Anecdotally, high numbers of errors or 'near misses' occur in the preparation process,often in patients with limited physical and emotional reserve to cope with errors.
- This is exacerbated by increasing clinical ward pressures, and increasingly complex medication combinations.
- No DHB policy mandating the recording of hand calculations, making retrospective adverse event reviews difficult.

Intervention:

- Adopting a 'Smart system' approach, a web based application was develop called SCIMA (Subcutaneous Infusion Medication Application), which automates the calculations/ decisions involved in the preparation process.
- Developed by the Capital and Coast DHB (CCDHB) IT department through partnership with the Palliative care Directorate and Pharmacy.

SCIMA's primary objective is:

1. Mitigating patient harm events/reduce medication errors through the automation of the preparation process.
2. Supporting nursing staff and enhance confidence during the SC infusion preparation process.

LINKED - with the patients NHI

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ENTER - required medications and dosage

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CALCULATES - the medication volume required, diluent volume/type, syringe size

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HIGHLIGHTS - possible medication incompatibilities

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CREATES - a printable and recallable 'Preparation Order' - essentially a 'How to prepare guide'

Pilot

- A real world single ward pilot was run over 4 weeks.

Primary outcome

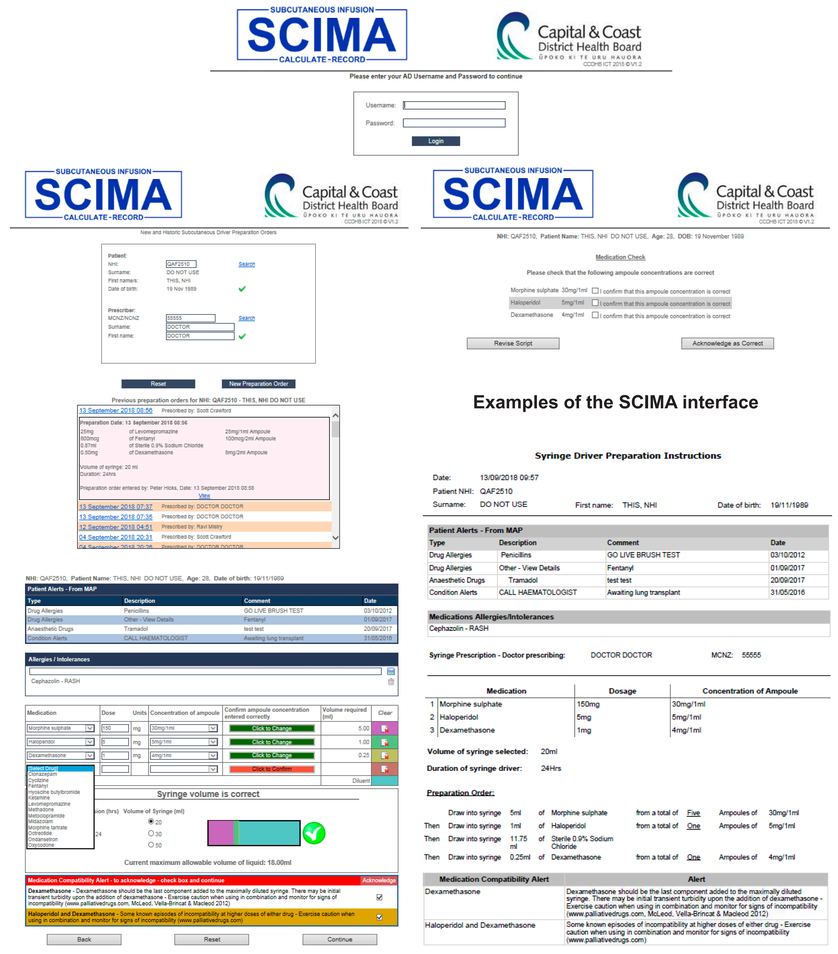
- To assess the practical feasibility, clinical safety and impact on nursing confidence of using SCIMA

Secondary outcomes

- Collate feedback to inform future versions of SCIMA.
- Establishing a data set of all SC infusions prepared for future analysis.

Methodology

- A mixed semi-quantitative/qualitative assessment method.
- Combining Linkert scale questionnaires to assess nursing confidence pre/post pilot
- Free text response to document experiences/effect on practice
- Review of each clinic 'use' to ensure clinical accuracy/safety.



Examples of the SCIMA interface

Results

Application 'Uses'

- **87 Valid uses** for **21 patients.**
- Potential events - **123 events** with 36 missed events (**70.8% uptake rate**)
  - Allowance for feeling uncertain or uncomfortable using an unfamiliar tool.
- Most cited reason for not using SCIMA
  - Clinical ward was too busy
  - Relative simplicity (i.e. 1 drug, no compatibility errors)

Clinical safety

- **No reportable events**
- **All relevant calculated data was correct** based on the information entered. (medication/syringe volumes, number of ampoules required, diluent volume/type,errors)
- All compatibility errors (4) between medications were correctly identified.

' I have had two patients on dexamethasone in there (sic) SCP drivers - when first drawing this up I did not use SCIMA, I did not realise that I had to put the dex (sic) in last. The solution went cloudy and I realised that something was not quite right'.
'I then put the medications and dosages into SCIMA which told me that the dex (sic) needed to go in last, this helped greatly'.
This was a great tool to work out SCP medications and alerts without looking it up on separate systems - it makes in easier being all there on one tool.'

- One transcription error occurred
  Data entered was incorrect - 15mg of Haloperidol instead of 1.5mg
  However no clinical harm resulted and it was rectified quickly.

Confidence

- Generally high levels of confidence throughout (see Table 1.)
  Overall average confidence increased across all aspects.
  - Notable increases in confidence
    'finding additional resources I may need' (3.79 ⟶ 4.40 out of 5)
  - Relative lower levels of confidence
    '… finding additional resources I may need to successfully prepare a SC infusion', (3.79 out of 5)
    '… identifying medication compatibility issues which may exist' (average 4.05 out of 5)
  - Confidence with opiates vs Benzo's
    'I am confident about preparing a SC infusion which contains …
    … a benzodiazepine medication' (3.74 out of 5) vs … a opiate medication'
    (4.32 out of 5).

- Overall satisfaction increased
  Current process ⟶ Using SCIMA
  (4.11 out of 5) (4.40 out of 5).

- Majority of respondents felt that SCIMA **'increased their confidence'** (11 of 15 respondents)

- Majority would be **'very likely' to recommend SCIMA** to their colleagues (10 of 15 respondents) – average 4.67 out of 5.

Table 1 : Pre-/post pilot average responses

I am confident about ……	Average of responses Pre pilot (n=19)	Post pilot (n = 15)
1. ….. preparing a Subcutaneous (SC) Infusion	4.58	4.73
2. ……calculating the medication volume for each component of a SC infusion	4.58	4.80
3. …… finding additional resources I may need to successfully prepare a SC infusion	3.79	4.40
4. …… preparing a SC infusion with 3 or more medications	4.37	4.73
5. …… selecting the appropriate diluent to complete the syringe	4.26	4.60
6. …… calculating the required appropriate diluent volume	4.05	4.60
7. …… selecting the appropriate syringe size	4.26	4.87
8. …… identifying medication compatibility issues which may exist	4.05	4.40
9. …… preparing a SC infusion which contains an **opiate** medication	4.32	4.73
10. …… preparing a SC infusion which contains a **benzodiazepine** medication	3.74	4.07
11. …… preparing a SC infusion when there is more than one ampoule size available	4.11	4.60

Free text Feedback

- What would you change about the current process?
  "More accessible information about incompatibilities as we used to have a specific SC incompatibility chart which is no longer easily visible"
  "Availability of drug compatibility information"
  "Clearer/more easily accessible reference of drug compatibility and diluent compatibility data"
- What worked well?
  'Very easy to use….. Easy to enter information … gave me all the information I needed'
  ' I like it. All the information I need in preparing the meds is there'
  ' Gives us the idea right away if drugs are incompatible and what syringe size to use'
  'Step by step process of adding multiple drugs and how much diluent to use'

Conclusion

- Overall successful implementation of SCIMA
- Primary objective achieved (increase nursing confidence, clinical safety)
- Uptake of the clinical tool was relatively high
- Further work/analysis needs to be undertaken to identify barriers to increasing uptake.
- Large volume of feedback to IT to improve user experience –Version 2
- Large data set of all SC infusion used - prescribing trends can be easily analysed.
- New practical learning points - in-cooperated into future education programs.

The Future

- Development of an online teaching module to 'teach SCIMA' - Connect Me
- Roll out to other wards with in the DHB
- Roll out to District nurses and Community hospice
- Explore integration into commercial electronic prescribing systems