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Elements of CPOE Style: A Guide to Formatting Text for Clinician Users

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Abstract

We present our methodology for formatting the text of medical information to clinicians in the context of computerized physician/provider order entry (CPOE). Well-formatted text improves usability, and ease of use is not just a nicety: systems that are easy to use will be adopted more readily and, more importantly, will be used more accurately and thus more safely. In our experience of CPOE implementation, text formatting can be most helpful for two key goals: helping the user find the desired information, and adding meaning beyond the literal words. Specific principles are presented here verbally, and visual examples of better and worse text formatting are shown on the poster.

Keywords:

Medical Order Entry Systems, CPOE, Usability

Introduction

Computerized Physician/Provider Order Entry (CPOE) systems have the audacious job of presenting vast amounts of material to clinicians, most of whom experience the volatile combination of being both very busy and under high pressure to perform well and almost all of whom express a desire for more simplicity (e.g. fewer clicks, fewer words). In our experience of CPOE implementation, we have encountered both a general under-appreciation of the importance of carefully crafting the on-screen text encountered by clinician users and a demand for an easy-to-follow style guide for clinical content creation. Here we lay out several design principles which have evolved and proven helpful throughout our CPOE implementation – in all levels of content, from individual orderable items to ordersets to complicated pop-up advisors – and on the poster we display several examples of formatting, both better and worse.

Principles of text formatting in CPOE

Help users find their target

Focus on keyword(s) – Starting each item's name with the key concept maximizes visibility for the scanning user and gives similar items parallel structure.

- BEFORE

  VENTILATOR
  8. pc/ps mechanical ventilation
  + emergency (fio2 100%) backup mechanical ventilation
  9. qam compliance study by rt

  AFTER

  VENTILATOR
  8. mechanical ventilation: pc/ps mode
  + mechanical ventilation: emergency (fio2 100%) backup
  9. compliance study by rt qam

- BEFORE

  Complicated Urinary Tract Infection (Peds)

  AFTER

  Urinary Tract Infection: Complicated (Peds)

- Use standard English conventions and familiar (or at least logical) abbreviations – The need to convey the most meaning in the most concise fashion developed in the paper-based world, but it is arguably even *more* important in the digital one. Ideally, present an abbreviated version to the prescriber (input) but a more explicit version for the nurse (output).

- BEFORE

  6. nurse: complete diabetic flowsheet with each glucose measurement
  + nurse: teach patient and family to check blood sugars, draw insulin, and give insulin
  + teach family signs & symptoms of hypoglycemia, and treatment of hypoglycemia
  + nurse: teach family how to administer intramuscular injection (glucagon prn)

  AFTER

  6. record each glucose measurement on diabetic flowsheet
  + teach checking glucose & giving subq insulin
  + teach s/sx & tx of hypoglycemia & giving im glucagon

- BEFORE

  17. nursing: collect aliquot (10-20 ml) of each void and label with time. if frank hematuria is present, notify h.o.

  AFTER

  17. collect & label aliquot each void; notify if hematuria

- Organize text with concise headers and assure the visual alignment reflects logical hierarchy – Subdivide long lists into logical groups so users can go straight for what they want and be less intimidated along the way. Do not let line-wrapping interfere. Concise use of ALL CAPS helps draw the eyes to important categories.

- BEFORE

Nitrates
17. nitroglycerin 2% oint [nitro-bid] topical ntg x28 days off from midnight to 0600
18. nitroglycerin infusion (100mg/250ml) iv cont now x5 days
-titrate
up until chest pain relieved or systolic bp <100 mmhg; requires stepdown status
19. nitroglycerin sublingual [nitrostat] 0.4 mg subling q5mprn prn x28 d
for chest pain per chest pain protocol
20. all formulary nitrates »
Beta-blockers

AFTER

NITRATES
17. nitroglycerin 2% oint [nitro-bid] topical ntg x28 days off from
18. nitroglycerin infusion (100mg/250ml) iv cont now x5 days
19. nitroglycerin sublingual 0.4 mg sl q5min x3 prn chest pain per
20. all formulary nitrates >>
BETA-BLOCKERS

Increase meaning using visual relationships

- Consistency of format – In some ways, it is more important than the format itself… but "proper" formatting (eliminating typos and adhering to conventions of spelling and grammar) creates the professional appearance clinicians expect and engenders trust in the accuracy of the clinical contents. Note that difference of structure implies difference of meaning, even when there is no such difference.

- BEFORE

RADIOLOGY
(if fluctuant) ultrasound of affected area
(if history of trauma) plain radiograph

AFTER

RADIOLOGY
(if fluctuant) ultrasound
(if history of trauma) plain radiograph

- BEFORE

23. expressed breast milk (no adds) po
24. expressed breast milk (with additives)

AFTER

23. expressed breast milk (no additives)
24. expressed breast milk (with additives)

- Align common text to highlight the differences. Watch for redundant phrases that can be either aligned or extracted.

- BEFORE

1. peds hem-onc admission (if not already done) >>
2. peds line draw (if not already done)
3. enter bsa (if not already done)
4. enter dosing weight (if not already done)

AFTER

1. (if not already done) peds hem-onc admission >>
2. (if not already done) peds line draw
3. (if not already done) enter bsa
4. (if not already done) enter dosing weight

- BEFORE

3. weight: obtain on admission (in kg)
4. weight (kg): estimate only & defer measurement

AFTER

3. weight (kg): obtain on admission
4. weight (kg): estimate only & defer measurement

- Structure conveys relationships with less text – Emphasize similar meaning by using similar structure; conversely, when meaning is different, be sure the structure does not imply nonexistent similarity.

- BEFORE

Consider Pediatric Infectious Diseases consult if:
Immunocompromised patient, alternative antibiotics needed for allergies, comorbid conditions, clinical failure after 48 hrs of treatment
17. pediatric infectious disease consult
Consider Pediatric General Surgery consult if:
Parapneumonic effusion, necrotizing pneumonia, abcess
18. pediatric general surgery consult

AFTER

CONSULTS
If immunocompromised, allergic & needing alternative antibiotics, comorbid conditions, clinical treatment failure after 48 hrs:
17. pediatric infectious disease consult
If parapneumonic effusion, necrotizing pneumonia, abscess:
18. pediatric general surgery consult

Conclusion

The human eye and mind are remarkably facile at recognizing patterns and inferring meaning from them; in the never-ending quest to make CPOE both faster and safer, optimal formatting of text can help guide them to their targets. Meaning occurs in layers beyond the literal words themselves: how the words are formatted can say as much as the words themselves. The central challenge is balancing the need for clarity (for the sake of quality and accuracy) against the demand for conciseness (for the sake of speed and efficiency); achieving the optimal balance requires an understanding of the information-processing needs of clinicians. Conveying the same information with fewer words (or symbols) improves the signal-to-noise ratio and is thus favorable in almost all cases. Good text formatting can go a long way toward increasing usability, which is a necessary (but not sufficient) step toward craft-

ing information systems than can help meet the many challenges faced by our struggling healthcare system.

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