

When does visual display matter for audit and feedback?

Factors affecting successful visualization of clinical
performance

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Takeaway messages

- Visual display is one of many important moderating factors in A&F
- Successful visualization of feedback depends on:
 - 1) healthcare professionals' needs and preferences
 - 2) how the visual display is used
 - 3) the design of the visual display

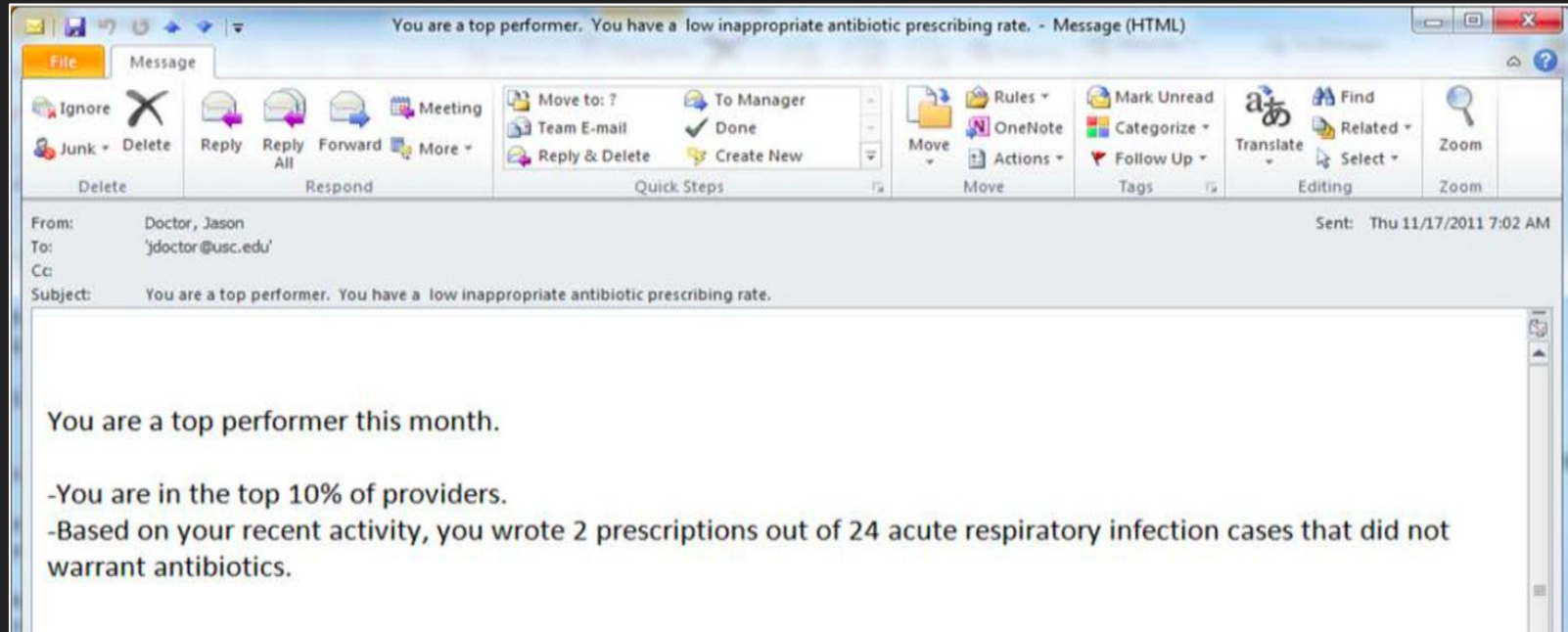
Visual displays are an important part of A&F

- Widely used in feedback reports and dashboards, via visualization software
- Can communicate performance information more efficiently than text
- Can significantly moderate comprehension and the effect of A&F on clinical practice (Hysong 2009)

However, details matter for success of visual display

- Healthcare professionals differ in their needs and preferences
- The uses of displays (i.e. cognitive task) differ
 - Look-up a value, compare values, or interpret trends
- Design of a visual display may have issues of “fit” between graphical elements and performance information

And in some cases, text may be better



Meeker D, Linder JA, Fox CR, Friedberg MW, Persell SD, Goldstein NJ, et al. Effect of Behavioral Interventions on Inappropriate Antibiotic Prescribing Among Primary Care Practices: A Randomized Clinical Trial. JAMA. 2016 Feb 9;315(6):562–70.

Healthcare professionals' needs and preferences

Examples of needs:

- Nurses' graph literacy and numeracy influenced comprehension of visualized quality data (Dowding 2018)
- Under time pressure, effort required for graph comprehension may be critical

Examples of preferences:










- Bar charts and pictographs were preferred by anesthesia providers (Petit-Monéger 2017)
- Organizational precedent can establish preference for bar charts, histograms

The uses of a display (i.e. cognitive task)

Key question: What will the recipient be using the display to do?

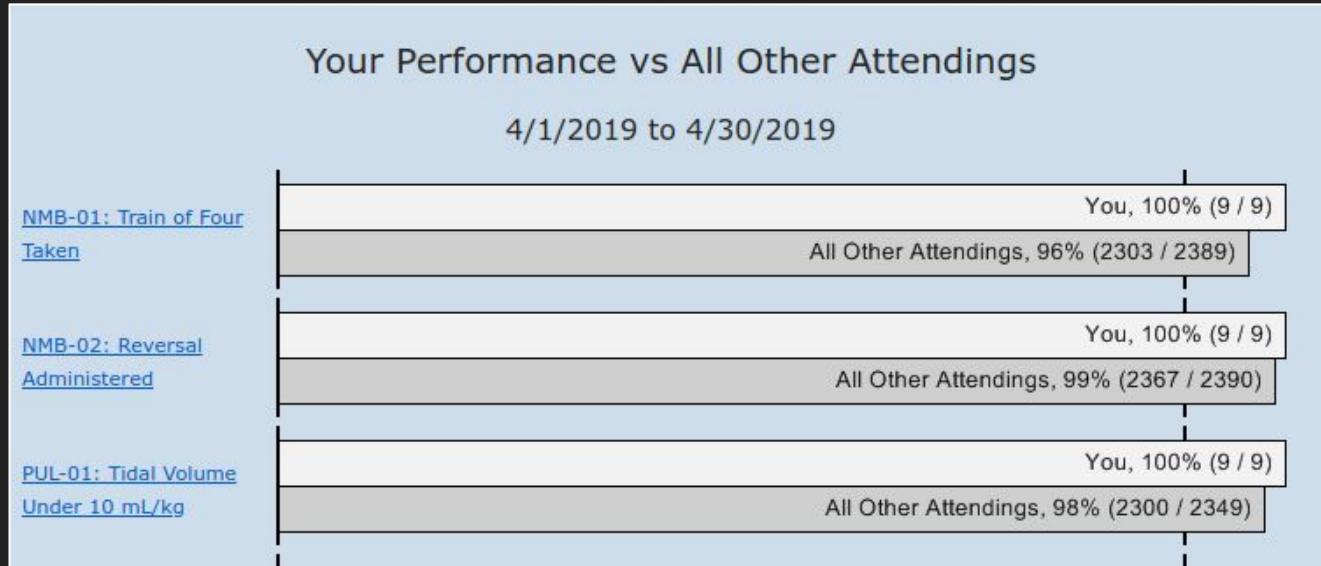
- Look-up a value or a flagged measure that needs further attention
- Compare performance with a benchmark or goal, or between measures
- See what is changing over time, detect a trend

Using a table for looking-up values, indicators

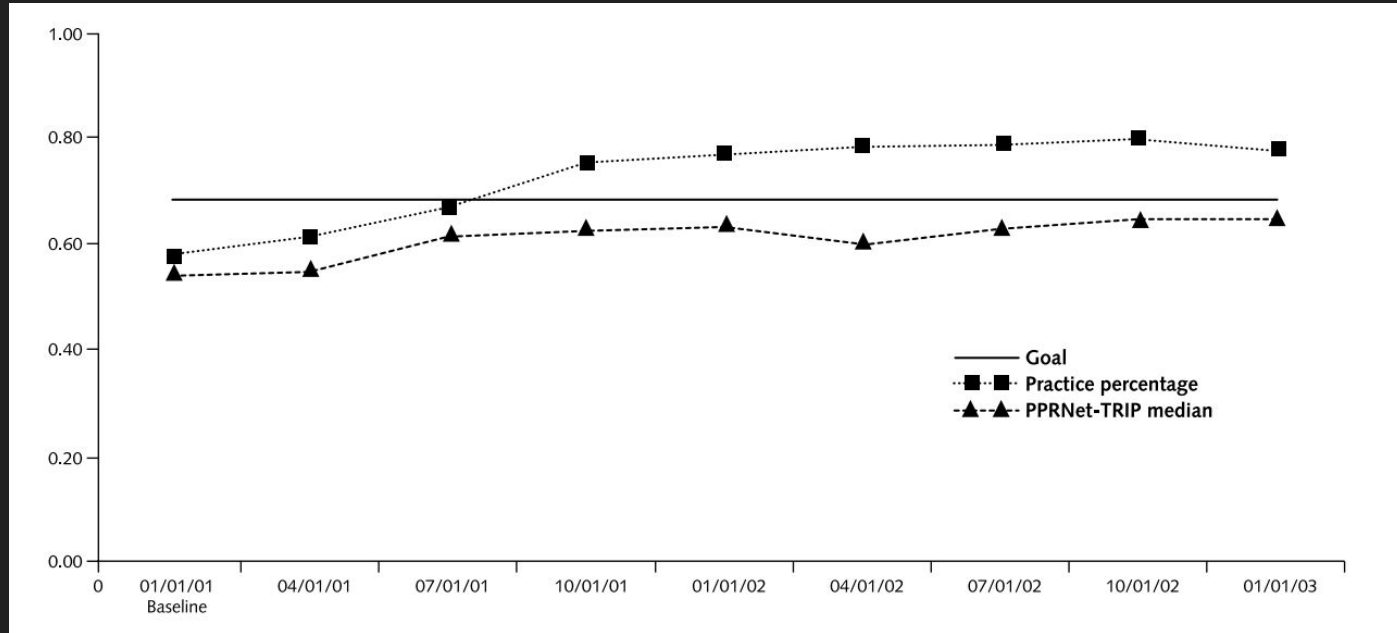
Process		
1. Complete data on psychological functioning	82%	
2. Complete data on social functioning	78%	
3. Complete data on lifestyle factors	34%	
4. Disease specific education completed	41%	
5. Lifestyle modification programme completed	46%	
18. Median time between hospital discharge and intake within 2-4 weeks	60%	
19. Patients are offered a rehabilitation plan tailored to their needs	89%	
20. Rehabilitation evaluated at discharge	74%	
21. Cardiologist and GP receive a report after CR	69%	

Gude WT, van Engen-Verheul MM, van der Veer SN, Kemps HM, Jaspers MW, de Keizer NF, Peek N. Effect of a web-based audit and feedback intervention with outreach visits on the clinical performance of multidisciplinary teams: a cluster-randomized trial in cardiac rehabilitation. *Implementation Science*. 2016 Dec;11(1):1-6.

Horizontal bars for comparison with goals, benchmarks



Using a line chart to show and compare trends

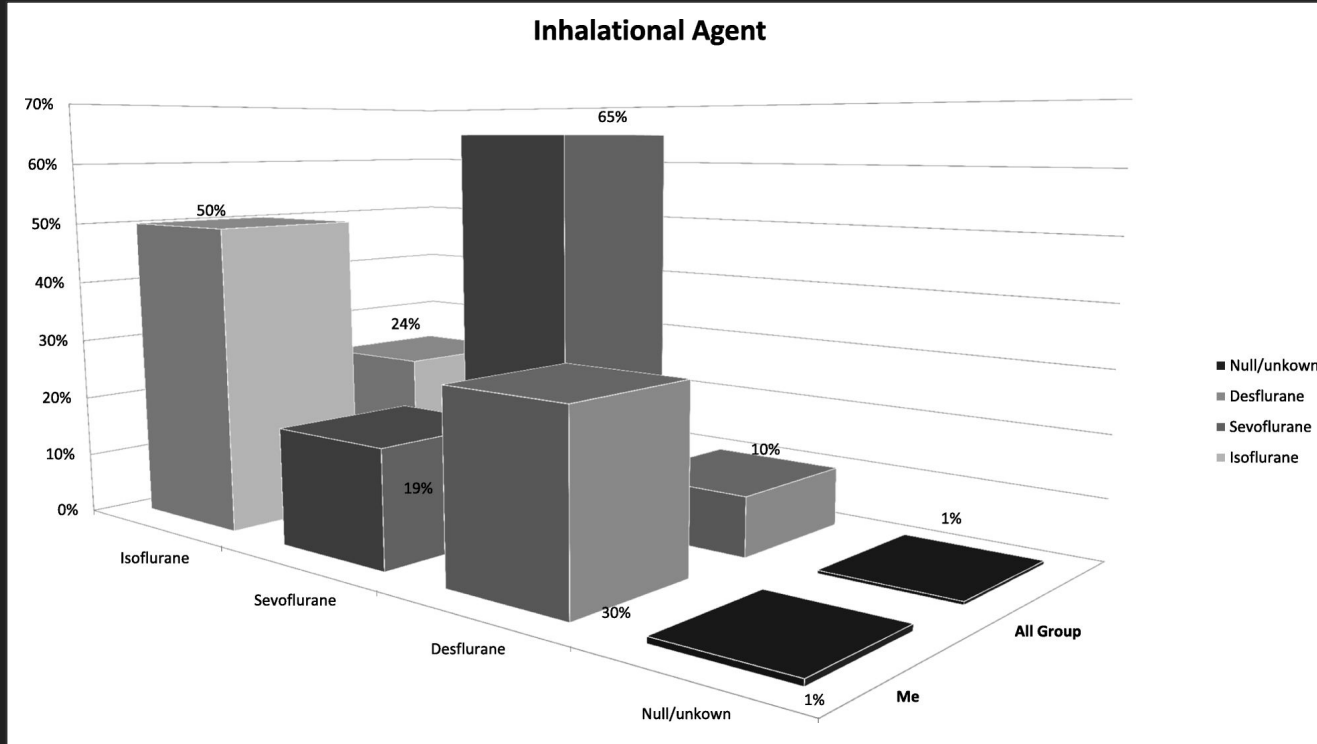


Ornstein S, Jenkins RG, Nietert PJ, Feifer C, Roylance LF, Nemeth L, Corley S, Dickerson L, Bradford WD, Litvin C. A multimethod quality improvement intervention to improve preventive cardiovascular care: a cluster randomized trial. *Annals of internal medicine*. 2004 Oct 5;141(7):523-32.

The design of the visual display

- Some graphical conventions are best avoided
- Usability becomes critical with increasing scale of A&F
- User-centered design methods can help arrive at a useful design

3-D graphics add unnecessary information



An accurate and timely pie chart



Shower Thoughts
@TheWeirdWorld

...

A pizza is a real time pie chart of how much pizza is left.

5:31 PM · Jun 30, 2018 · Buffer

990 Retweets 36 Quote Tweets 6,033 Likes

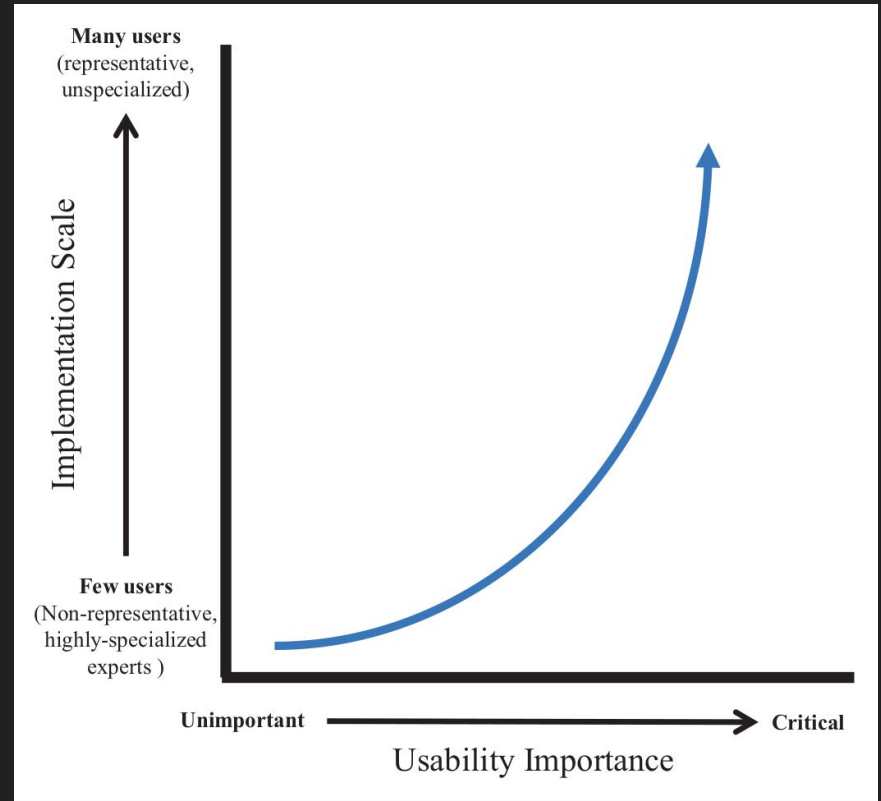
Tweet: <https://twitter.com/TheWeirdWorld/status/1013173077943955462>

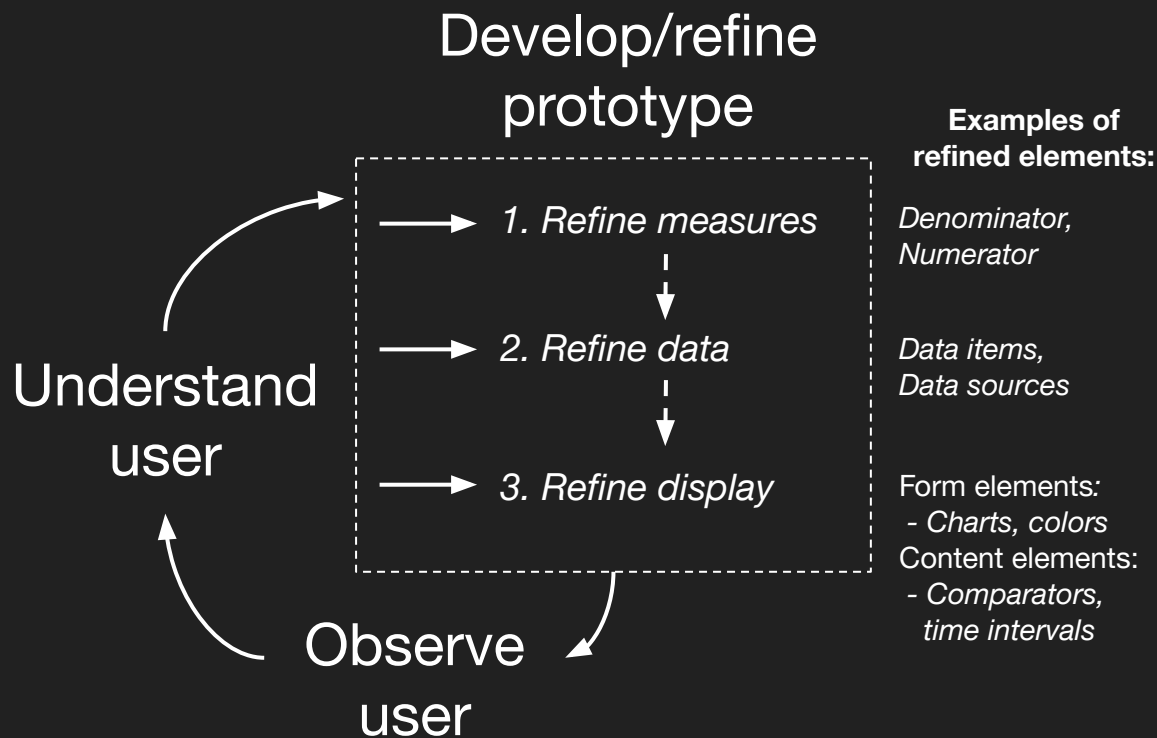
Photo: <https://commons.wikimedia.org/wiki/File:Pizza-3007395.jpg>

Usability is critical for A&F at scale

- A&F is increasingly electronic, delivered via dashboards and email
- When used by larger numbers of providers, small usability problems become amplified

Lyon, A. R., Brewer, S. K., & Areán, P. A. (2020). Leveraging human-centered design to implement modern psychological science: Return on an early investment. *American Psychologist*, 75(8), 1067-1079. <http://dx.doi.org/10.1037/amp0000652>





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Thank you

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DISPLAY Lab: <https://github.com/Display-Lab>

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Glossary

- Visual display: An information visualization, such as a chart or table
- Table: A visual display containing cells in rows and columns
- Chart: A kind of visual display that contains graphical elements, such as points, lines and areas
- Graph: A kind of chart that contains an x and y axis
- Hybrid display: A chart that includes graphical elements in a table

References

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