

Coursework 1 - Brandon Curran

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DATA ANALYSIS & VISUALISATION

Coursework 1



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Task 1: Critique of the Workplace Well-being Infographic

Introduction

This critique examines the Workplace well-being infographic produced by the global wellness institute which aims to present the history, current practices and trends of workplace wellness. Its purpose is to highlight milestones throughout the years for employee wellbeing.

The infographic is primarily targeted at HR professionals, managers and organisational leaders although it can also appeal to employees interested in workplace culture & wellbeing.

This critique aims to assess the colour, text, graphs, graphics and cognitive design by drawing on established principles of information visualisation. I will also look to propose practical improvements to enhance the clarity, accessibility and engagement of the infographic.

1. Summary of the Infographic

The infographic presents the history, current practice and future trends of workplace wellbeing, it covers key milestones in workplace wellness throughout the years and appears to target general employees in particular HR, managers and organisational leaders interested in employee wellbeing.

2. Colour

The colour scheme uses a palette of calming and professional colours appropriate to the theme and content presented. Some visually impaired users may find that the poster lacks contrast making text or graphics harder to read.

However, I do feel that the poster makes a good use of colour to guide the user's attention to highlight key points, while it borders on excessive at the beginning, I believe they pull it back to an acceptable amount there for aligning with Colin Ware's recommendations from Ware, C. (2012). Information Visualization: Perception for Design.

3. Text

The infographic uses a mix of font styles and sizes; the text is mostly clear however there are sections where font size may appear too small or change abruptly making it hard to follow. Consistent use of fonts and adequate spacing would help make the document appear more uniform, improve legibility and reduce overall cognitive load.

Quote from Stephen Few:

"Consistency in the use of fonts, font sizes, and styles throughout a display is essential. Unnecessary variation distracts and confuses, while consistency helps viewers focus on the data itself."

(Source: Few, S. (2012). Show Me the Numbers: Designing Tables and Graphs to Enlighten, 2nd Edition, Analytics Press.)

4. Graphs

The infographic leans to timelines and blocks of information] rather than traditional graphs, this approach remains effective and simple to understand for the average reader, while it conveys the key milestones I feel we lack statistics that could be better displayed in a traditional graph which could allow for data to be more engaging and easily ingested more efficiently and quickly.

My biggest critique is when the graph is first presented, it has you working from present day to the past, I feel like the graph would flow a lot better in reverse order from its current format and would really show the progress that has been made trending toward improvement.

Direct Quote from Tufte (2001):

"Graphical excellence is the well-designed presentation of interesting data - a matter of substance, of statistics, and of design. Graphical excellence consists of complex ideas communicated with clarity, precision, and efficiency."

(Source: Tufte, E. R. (2001). The Visual Display of Quantitative Information, 2nd Edition, Graphics Press.)

5. Graphics

The use of icons and visual blocks help to break up the text and guide the viewers eye. However some decorative elements such as background patterns or excessive icons may distract from the main message, I found in particular the top of the infographic had a background that was disorderly, the contrast was lacking, the colour choice was poor and the pink looked out of place.

Direct Quote from Knaflitz (2015):

"Decorative elements should not distract from or overwhelm the data. The focus should remain on the information being communicated, not on unnecessary embellishments."

(Source: Knaflitz, C. N. (2015). *Storytelling with Data: A Data Visualization Guide for Business Professionals*, Wiley.)

Direct Quote from Cleveland & McGill (1984):

"Graphical perception is the visual decoding of the quantitative information encoded on graphs. The effectiveness of a graph depends on how accurately and efficiently the information can be extracted by the viewer."

(Source: Cleveland, W. S., & McGill, R. (1984). Graphical Perception: Theory, Experimentation, and Application to the Development of Graphical Methods. *Journal of the American Statistical Association*, 79(387), 531–554.)

6. Cognition

The infographic presents a lot of information in a compact poster style space, which can be overwhelming for some viewers. Grouping related content more clearly and using more white space would help to reduce cognitive load and make it easier to absorb the information.

Cognitive load theory suggests that when displays are cluttered, viewers spend more effort filtering rather than understanding (Sweller, 1988). Presenting the timeline chronologically would also align with natural processing, reducing unnecessary mental effort (Mayer, 2009)

Direct Quote from Ware (2012) on Cognitive Load and Design:

"Good design reduces the cognitive load required to interpret a display and allows viewers to process information efficiently."

(Source: Ware, C. (2012). *Information Visualization: Perception for Design*, 3rd Edition, Morgan Kaufmann.)

7. Improvements

To enhance the effectiveness of the Workplace Well-being Infographic, practical changes should focus on clarity and accessibility, increasing contrast between text and background and using consistent fonts would reduce distraction and improve legibility (Few, 2012). Simplifying decorative elements would work to minimise unnecessary cognitive load therefore allowing viewers to focus on the data itself (Knaflitz, 2015). Adding more whitespace and clearer sectioning would guide the eye more effectively, while reordering the timeline chronologically would make the narrative flow more intuitive (Ware, 2012)

- **Increase contrast between text and background:**
This will make the text easier to read, especially for viewers with visual impairments or in low-light conditions. Improved contrast helps ensure that key information stands out and is accessible to all.
- **Use a consistent font style and size throughout:**
Consistency in typography reduces distraction and cognitive load, allowing viewers to focus on the content rather than adjusting to different fonts or sizes. As Few (2012) notes, unnecessary variation in text style can confuse and distract the audience.
- **Simplify graphics to focus on key data points:**
Removing decorative or non-essential graphics will help direct attention to the most important information. This makes the infographic clearer and reduces the risk of viewers missing critical data.
- **Add more white space and clearer sectioning to reduce clutter:**
Adequate white space separates different sections and prevents the design from feeling overcrowded. Clear sectioning guides the viewer's eye and makes the infographic easier to navigate.
- **Consider accessibility by choosing colours and fonts that are easy to read for all viewers:**
Selecting colour palettes that are accessible for those with colour vision deficiencies and using legible fonts ensures the infographic can be understood by a wider audience.
- **Reverse the pathway so it reads from past to present:**
Presenting the timeline chronologically from past to present would better align with how most viewers process historical information, making the narrative flow more intuitive.

8. Conclusion

In conclusion, the workplace well-being infographic provides a useful overview of wellness initiatives throughout the years but provides some clear weaknesses in visual design. While its colour palette and use of graphics help guide the viewers attention, inconsistent typography, cluttered graphics and a non-intuitive timeline reduce it's overall impact and readability.

Applying established principles of visualisation, such as improving contrast, simplifying decorative elements and presenting the information in a chronological order would significantly improve clarity and accessibility for all audiences allowing for better engagement and ensuring that the workplace wellbeing initiatives are well understood, adopted and sustained.

By refining its design, the infographic could better accomplish its goal of informing and persuading organisational leaders and employees about the importance of workplace wellness.

9. References

Ware, C. (2012). *Information Visualization: Perception for Design*. 3rd ed. Burlington, MA: Morgan Kaufmann.

Few, S. (2012). *Show Me the Numbers: Designing Tables and Graphs to Enlighten*. 2nd ed. Burlingame, CA: Analytics Press.

Tufte, E.R. (2001). *The Visual Display of Quantitative Information*. 2nd ed. Cheshire, CT: Graphics Press.

Knaflitz, C.N. (2015). *Storytelling with Data: A Data Visualization Guide for Business Professionals*. Hoboken, NJ: Wiley.

Cleveland, W.S. and McGill, R. (1984). Graphical perception: Theory, experimentation, and application to the development of graphical methods. *Journal of the American Statistical Association*, 79(387), pp.531–554.

Sweller, J. (1988). Cognitive load during problem solving: Effects on learning. *Cognitive Science*, 12(2), pp.257–285.

Mayer, R.E. (2009). *Multimedia Learning*. 2nd ed. Cambridge: Cambridge University Press.



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Task 2: Data Analysis and Infographic Creation

1. How has the total number of patients seen in each area varied over Quarter 1 2025?

Across Wales, the total number of patients attending A&E fluctuated over the three months:

- January 2025: 85,070 patients
- February 2025: 80,106 patients
- March 2025: 96,305 patients

Most health boards saw a dip in February and a peak in March.
For example, Swansea Bay University LHB:

- January: 10,851 patients
- February: 9,967 patients
- March: 12,287 patients

2. How have the proportions of patients treated within 4 hours, 8 hours, 12 hours, and over 12 hours varied over Quarter 1 2025?

Within 4 hours

- January 2025: 67.64% of patients across Wales were treated within 4 hours (57,541 out of 85,070 attendances)
- February 2025: 67.78% (54,293 out of 80,106)
- March 2025: 66.90% (64,432 out of 96,305)

This means just over two-thirds of all A&E attendees received treatment within the target time, but around one-third waited longer. The proportion remained fairly stable, with a slight dip in March.

Within 8 hours

- January 2025: 81.76% (69,554 out of 85,070)
- February 2025: 82.79% (66,318 out of 80,106)
- March 2025: 82.85% (79,791 out of 96,305)

The proportion rises by about 15 percentage points compared to the 4-hour target, showing that many patients who missed the 4-hour target were still treated within 8 hours.

Within 12 hours

- January 2025: 87.79% (74,681 out of 85,070)
- February 2025: 88.83% (71,162 out of 80,106)
- March 2025: 89.22% (85,925 out of 96,305)

The increase from 8 to 12 hours is smaller, indicating that most patients who were not treated within 8 hours had to wait significantly longer, potentially over 12 hours but the majority of patients were still seen within 12 hours with only a small portion going over.

Over 12 hours

- January 2025: 12.21% (10,389 out of 85,070)
- February 2025: 11.17% (8,944 out of 80,106)
- March 2025: 10.78% (10,380 out of 96,305)

This is the smallest group, but it still represents thousands of individuals each month who experienced extended waits in A&E. The increase from 12 to over 12 hours is larger than the rise from 8 to 12 hours, suggesting that patients not treated within 8 hours are more likely to wait more than 12 hours

Conclusion

Each time target 4, 8, 12 hours is cumulative, so the percentage treated within 12 hours includes those treated within 4 hours and 8 hours.

The figures show that while most patients are treated within the recommended timeframes, a notable minority experience longer waits, especially in busier departments or health boards (Betsi Cadwaladr University Health Board, Cwm Taf Morgannwg University Health Board) and if the wait is longer than 8 hours, its more likely to be longer than 12 hours than under 12 hours.

3. Do health boards with smaller patient numbers have better treatment times?

Yes, there is a clear trend, health boards with fewer attendances generally achieve better treatment times.

- Powys Teaching Health Board with attendances as low as 925 in January achieved 100% of patients treated within 4, 8, and 12 hours at its minor injury units.
- In contrast, larger health boards such as Betsi Cadwaladr University Health Board with 18,832 attendances in January had only 58.5% treated within 4 hours overall, and just 45% in major departments.

This suggests that lower patient volumes allow for more efficient treatment and less overcrowding.

4. Assuming that they have an injury that could be treated at any hospital, in which health board area are they most likely to have to wait over 12 hours?

Patients are most likely to wait over 12 hours in major emergency departments of health boards with high attendances and lower performance.

An example of this would be Betsi Cadwaladr University Health Board major departments:

Only 73.9-76.7% of patients were treated within 12 hours, meaning up to 26% waited longer than 12 hours.

Another example of longer wait times in major departments is Hywel Dda University Health Board major departments also had lower performance, with 84.4-87.2% treated within 12 hours.

Therefore, Betsi Cadwaladr and Hywel Dda major departments are the areas where patients are most likely to wait over 12 hours when choosing a health board to attend, this indicates either low facility capacity or a population too large for the existing facility.

5. Assuming that they have an injury that could be treated at any hospital, in which health board area are they most likely to be treated within 4 hours?

Powys Teaching Health Board minor injury unit consistently achieved 100% of patients treated within 4 hours for all three months.

Other minor injury units across Wales also performed very well, with over 95% treated within 4 hours.

For major departments, Aneurin Bevan University Health Board which had a relatively higher proportion of patients, only 52.9-54.3% were treated within 4 hours.

Therefore, Powys minor injury units are the best performing, followed by other minor units in Wales, major injury departments/units, understandably are behind.

Primary dataset & publisher

StatsWales (2025). *Performance against 4 hour waiting times target by hospital*.
NHS Wales Informatics Service.

<https://statswales.gov.wales/Catalogue/Health-and-Social-Care/NHS-Hospital-Waiting-Times/emergency-department/performanceagainst4hourwaitingtimetarget-by-hospital>

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GRADEMARK REPORT

FINAL GRADE

GENERAL COMMENTS

58/100

Generic Assessment Criteria	Marks available	Marks awarded
1. Engagement with Literature Skills		
Good amount and quality / credibility of sources. Referenced throughout the text however not using IEEE standards. Referencing within text should be numbered inside square brackets and the numbers should correspond to the numbering in the bibliography.	10	6
2. Knowledge and Understanding Skills		
Reasonable consideration of some good and bad points to the infographic. A more detailed discussion with better flow (interrupted	15	8

by the citations a little) to create a narrative. That being said, the citations provide some good justification to the points raised and lead into the improvements, and knowledge is demonstrated through research.		
3. Cognitive and Intellectual Skills		
Some reasonably good recommendations for improvements based on points raised. Whilst the narrative is good, maybe a little more detail to the improvements would have been beneficial to include more consideration of cognition and visualisation of data.	1 5	6
4. Practical Application Skills		
Good use of colour, and contrast keeping a cognitive interest. Does the message in the infographic answer all the questions clearly? Some of the text may detract from the message and place cognitive load more than it could. Good use of visualisations and innovative ideas.	5 0	3 3
5. Transferable Skills for Life and Professional		

Practice		
A reasonably well presented and sectioned document with all the expected elements. First person terminology such as using 'I' and 'we' should be avoided to make the report more objective and research based in a third person terminology.	10	5

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