



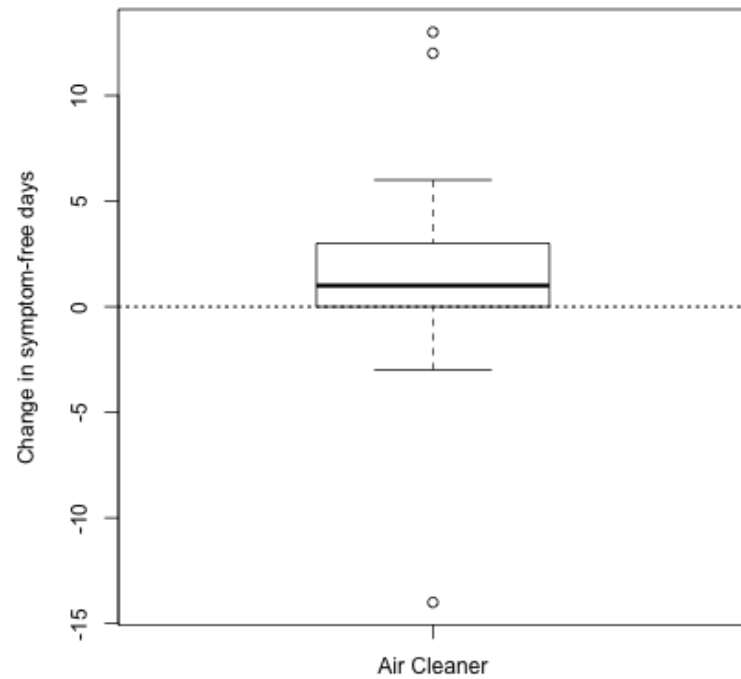
Principles of Analytic Graphics

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Principles of Analytic Graphics

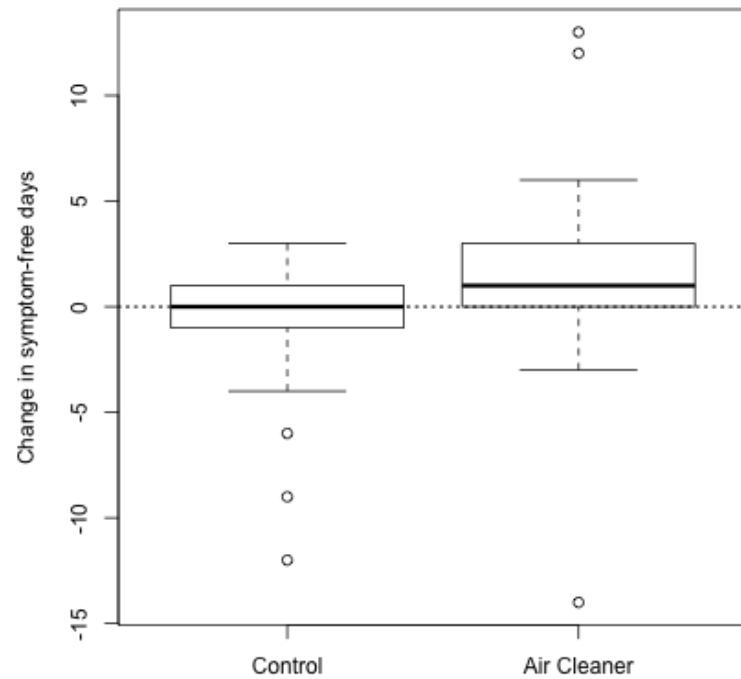
- Principle 1: Show comparisons
 - Evidence for a hypothesis is always *relative* to another competing hypothesis.
 - Always ask "Compared to What?"

Show Comparisons



Reference: Butz AM, *et al.*, *JAMA Pediatrics*, 2011.

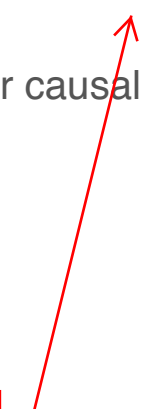
Show Comparisons



Reference: Butz AM, *et al.*, *JAMA Pediatrics*, 2011.

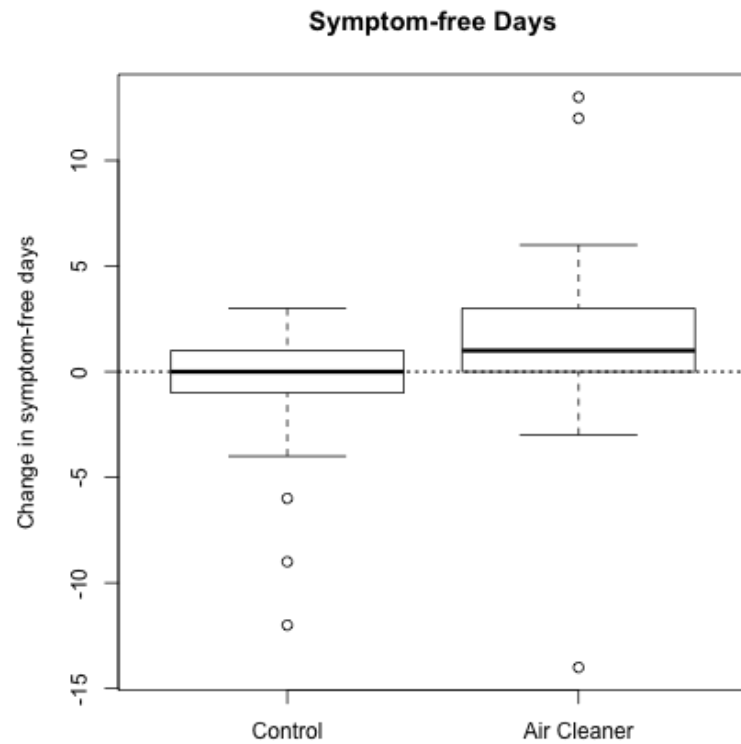
Principles of Analytic Graphics

- Principle 1: Show comparisons
 - Evidence for a hypothesis is always *relative* to another competing hypothesis.
 - Always ask "Compared to What?"
- Principle 2: Show causality, mechanism, explanation, systematic structure
 - What is your causal framework for thinking about a question?



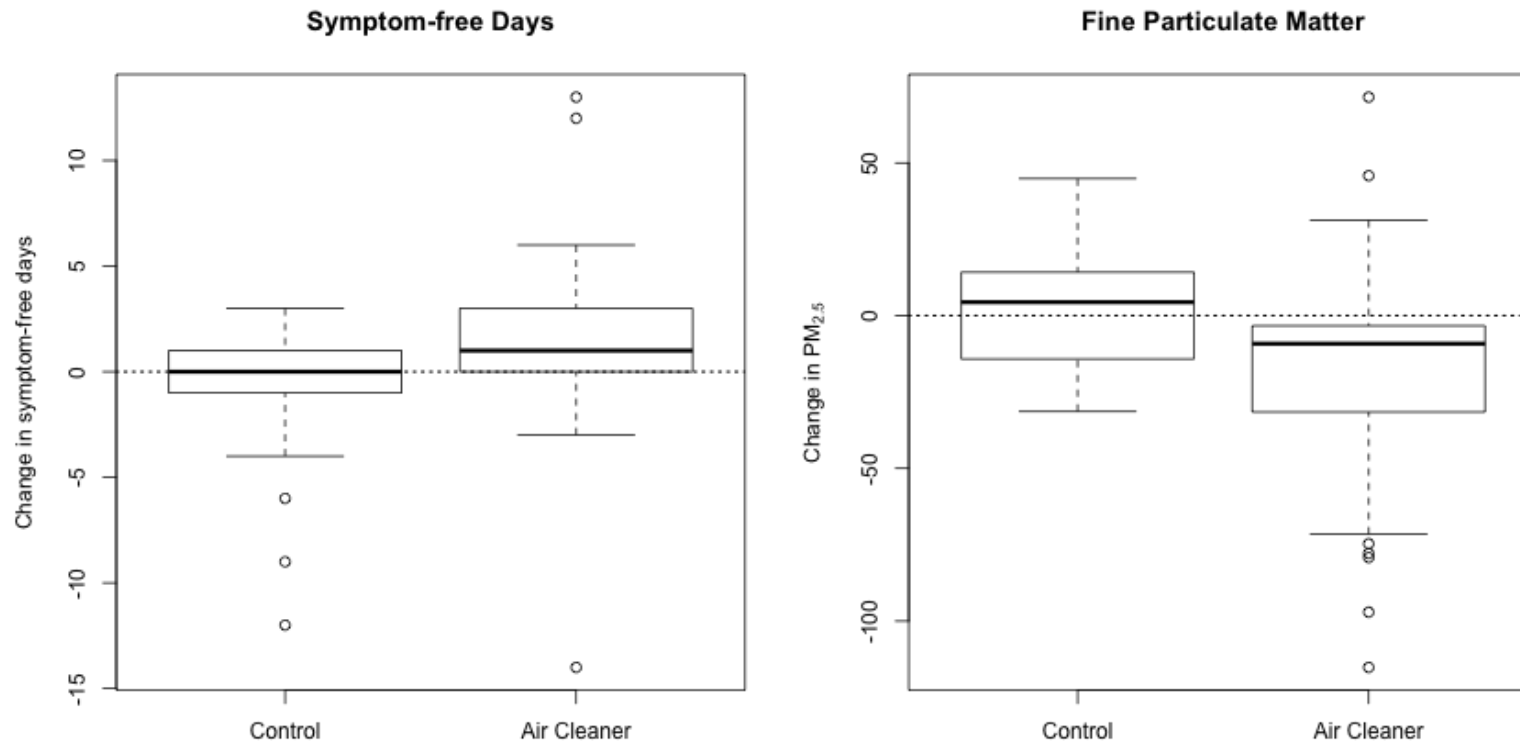
not need to be
formal at this
phase but show
what you believe
and suggest the
possible
explanation

Show causality, mechanism



Reference: Butz AM, *et al.*, *JAMA Pediatrics*, 2011.

Show causality, mechanism

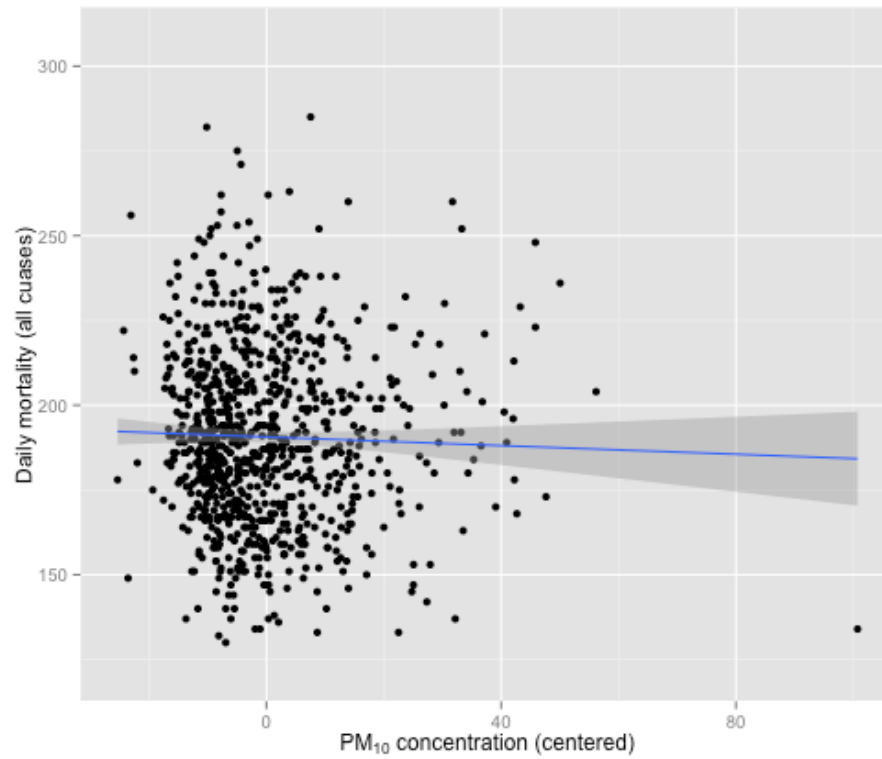


Reference: Butz AM, *et al.*, *JAMA Pediatrics*, 2011.

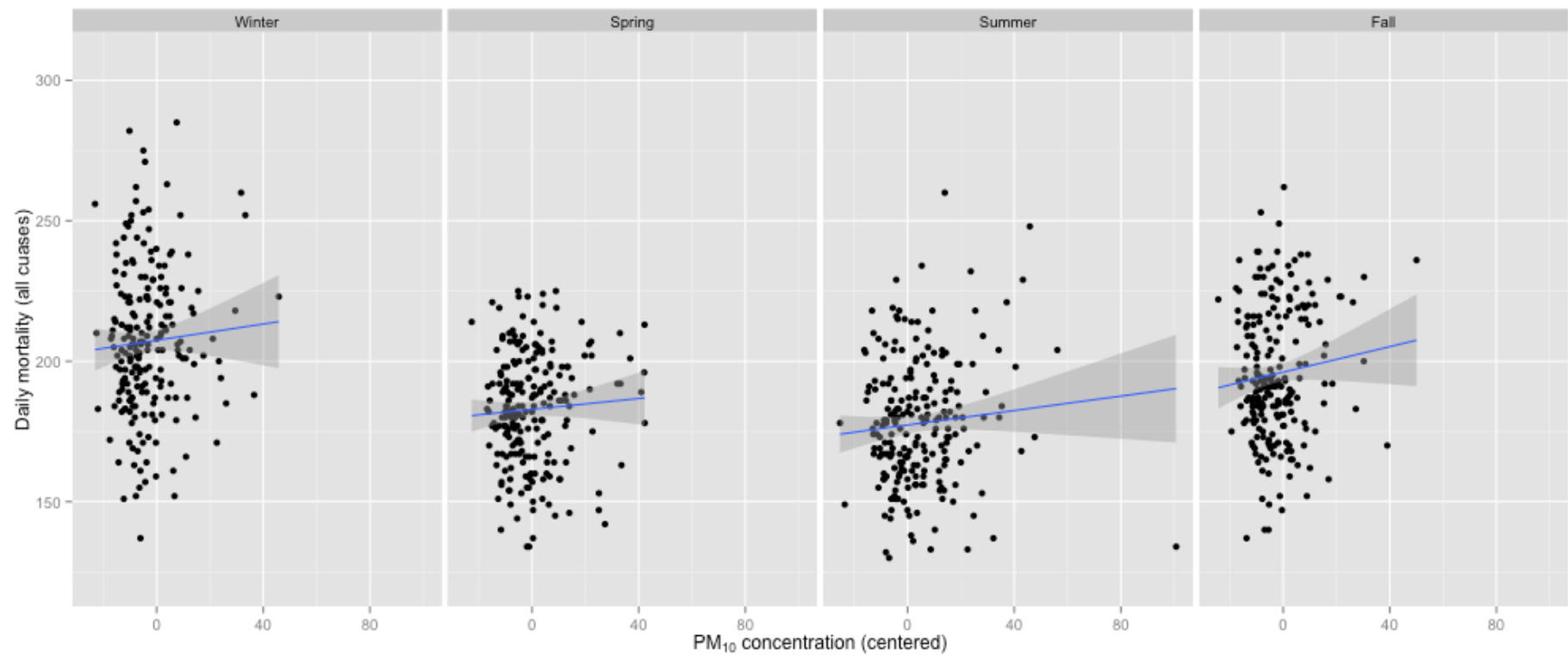
Principles of Analytic Graphics

- Principle 1: Show comparisons
 - Evidence for a hypothesis is always *relative* to another competing hypothesis.
 - Always ask "Compared to What?"
- Principle 2: Show causality, mechanism, explanation, systematic structure
 - What is your causal framework for thinking about a question?
- Principle 3: Show multivariate data
 - Multivariate = more than 2 variables
 - The real world is multivariate
 - Need to "escape flatland"

Show Multivariate Data



Show Multivariate Data

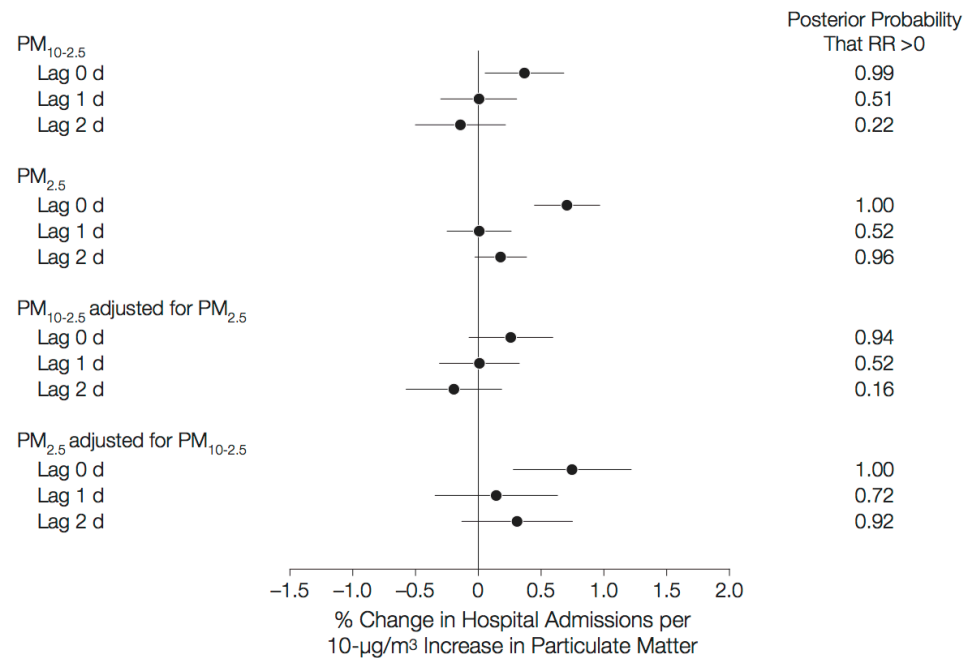


Principles of Analytic Graphics

- Principle 4: Integration of evidence
 - Completely integrate words, numbers, images, diagrams
 - Data graphics should make use of many modes of data presentation
 - Don't let the tool drive the analysis

Integrate Different Modes of Evidence

Figure 2. Percentage Change in Emergency Hospital Admissions Rate for Cardiovascular Diseases per a $10\text{-}\mu\text{g}/\text{m}^3$ Increase in Particulate Matter




Estimates are on average across 108 counties. PM_{2.5} indicates particulate matter is $2.5\text{ }\mu\text{m}$ or less in aerodynamic diameter; PM₁₀, particulate matter is $10\text{ }\mu\text{m}$ or less in aerodynamic diameter; PM_{10-2.5}, particulate matter is greater than $2.5\text{ }\mu\text{m}$ and $10\text{ }\mu\text{m}$ or less in aerodynamic diameter; RR, relative risk. Error bars indicate 95% posterior intervals.

Principles of Analytic Graphics

- Principle 4: Integration of evidence
 - Completely integrate words, numbers, images, diagrams
 - Data graphics should make use of many modes of data presentation
 - Don't let the tool drive the analysis
- Principle 5: Describe and document the evidence with appropriate labels, scales, sources, etc.
 - A data graphic should tell a complete story that is credible

Principles of Analytic Graphics

- Principle 4: Integration of evidence
 - Completely integrate words, numbers, images, diagrams
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- Principle 5: Describe and document the evidence with appropriate labels, scales, sources, etc.
 - A data graphic should tell a complete story that is credible
- Principle 6: Content is king
 - Analytical presentations ultimately stand or fall depending on the quality, relevance, and integrity of their content



when making plots and graphs, first think what's the content you are gonna present, what's the story and what's the data you have. And then think about what the best way to present it and how to present

Summary

- Principle 1: Show comparisons
- Principle 2: Show causality, mechanism, explanation
- Principle 3: Show multivariate data
- Principle 4: Integrate multiple modes of evidence
- Principle 5: Describe and document the evidence
- Principle 6: Content is king

References

Edward Tufte (2006). *Beautiful Evidence*, Graphics Press LLC. www.edwardtufte.com