



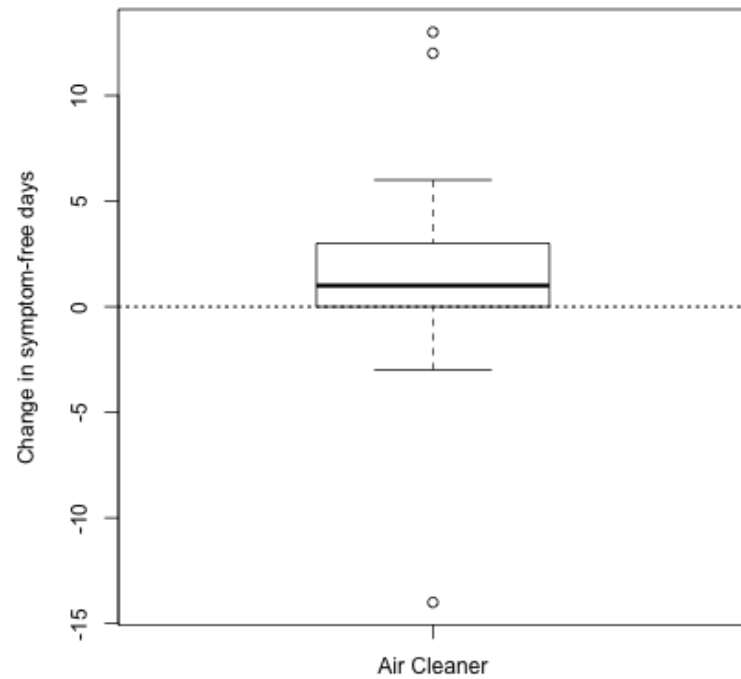
Principles of Analytic Graphics

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Principles of Analytic Graphics

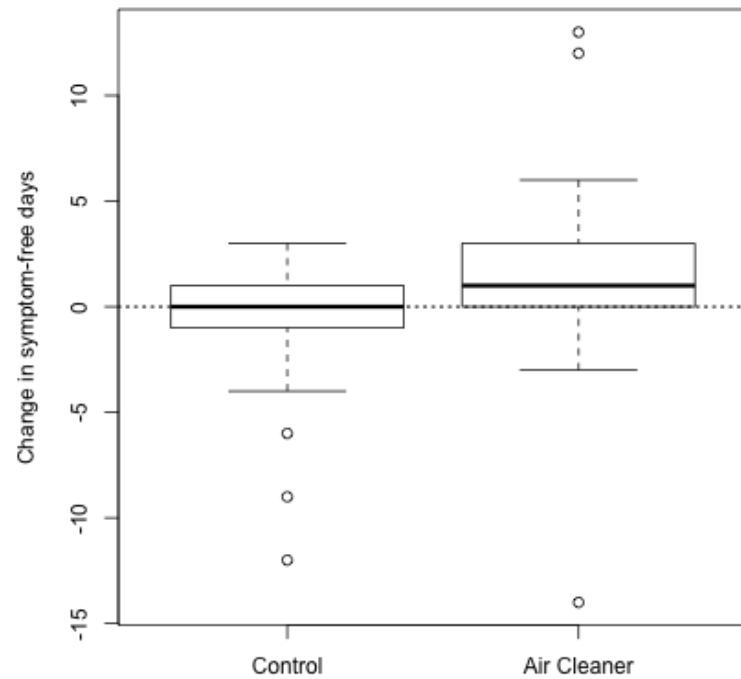
- Principle 1: Show comparisons
 - Evidence for a hypothesis is always *relative* to another competing hypothesis.
 - Always ask "Compared to What?"

Show Comparisons



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

Show Comparisons

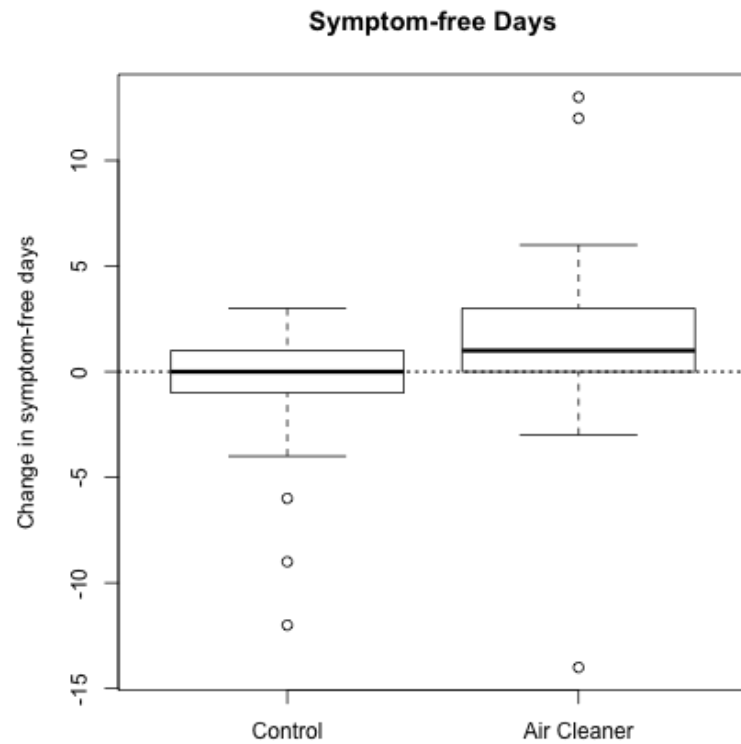


Reference: Butz AM, *et al.*, *JAMA Pediatrics*, 2011.

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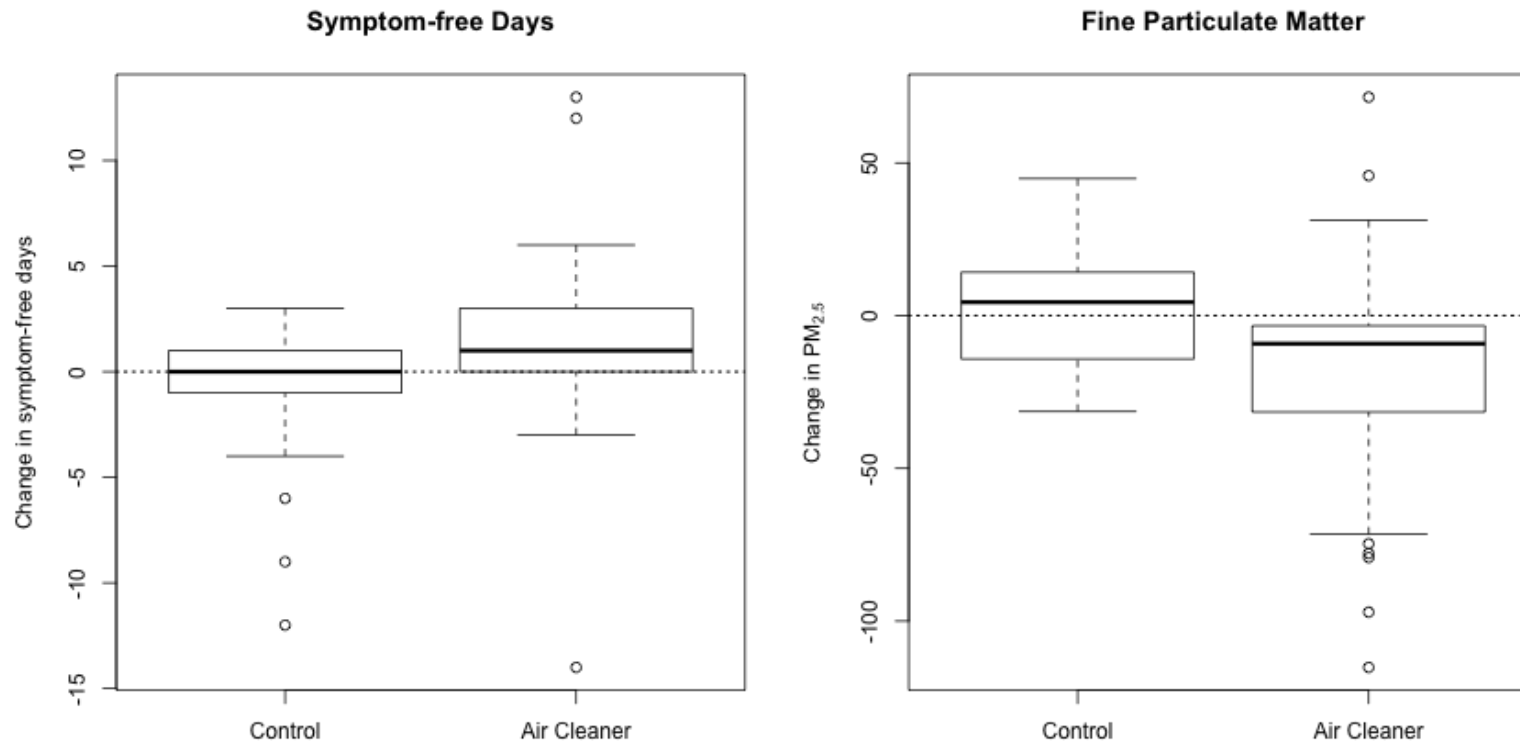
- Principle 1: Show comparisons
 - Evidence for a hypothesis is always *relative* to another competing hypothesis.
 - Always ask "Compared to What?"
- Principle 2: Show causality, mechanism, explanation, systematic structure
 - What is your causal framework for thinking about a question?

Show causality, mechanism



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Show causality, mechanism

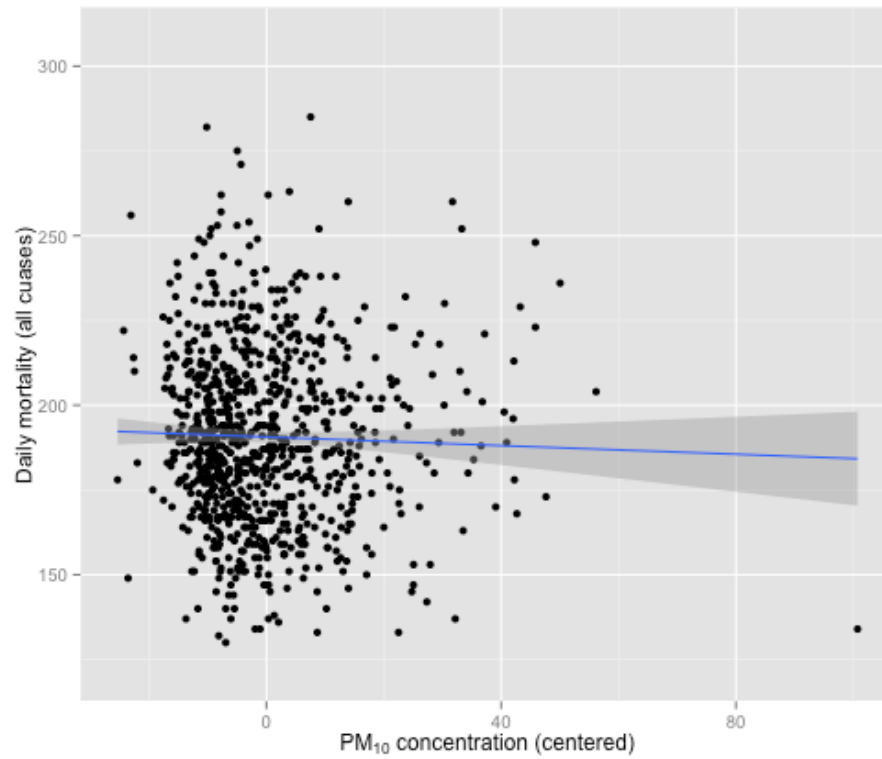


Reference: Butz AM, *et al.*, *JAMA Pediatrics*, 2011.

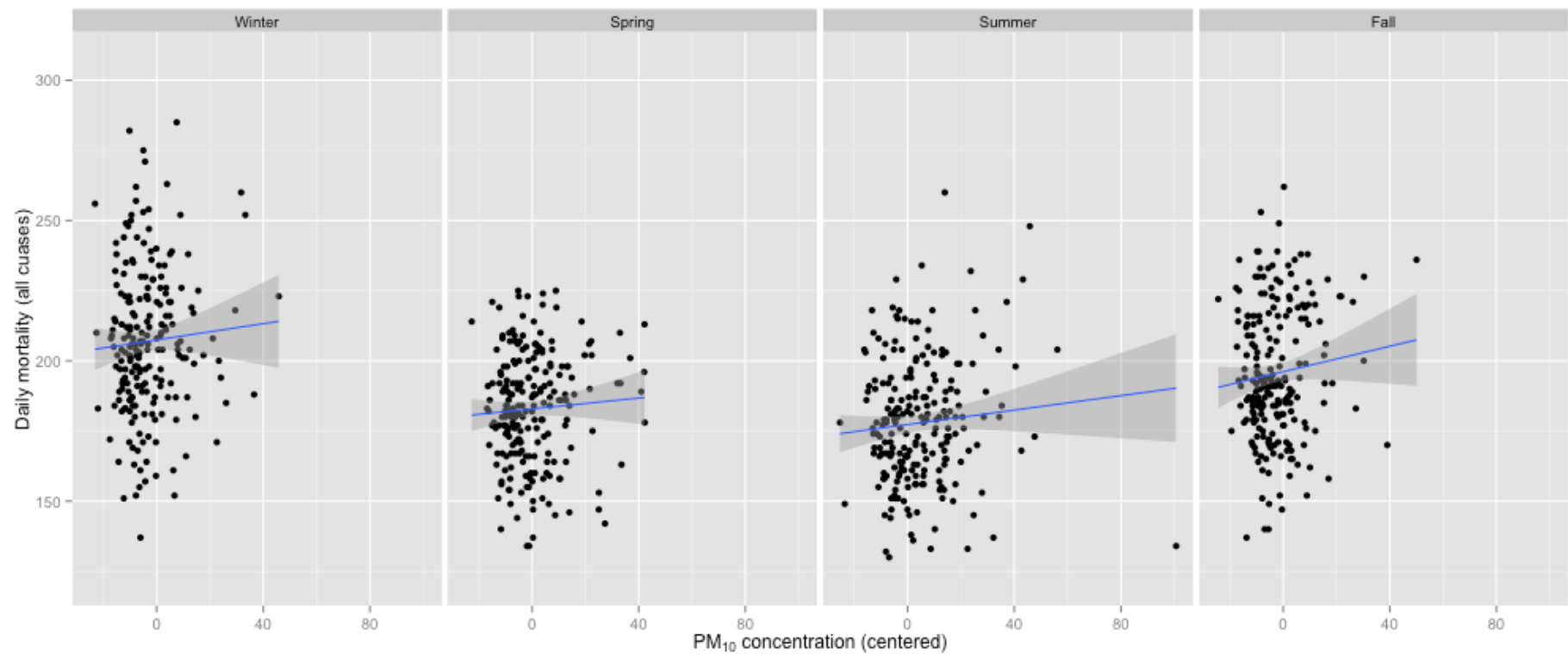
Principles of Analytic Graphics

- 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

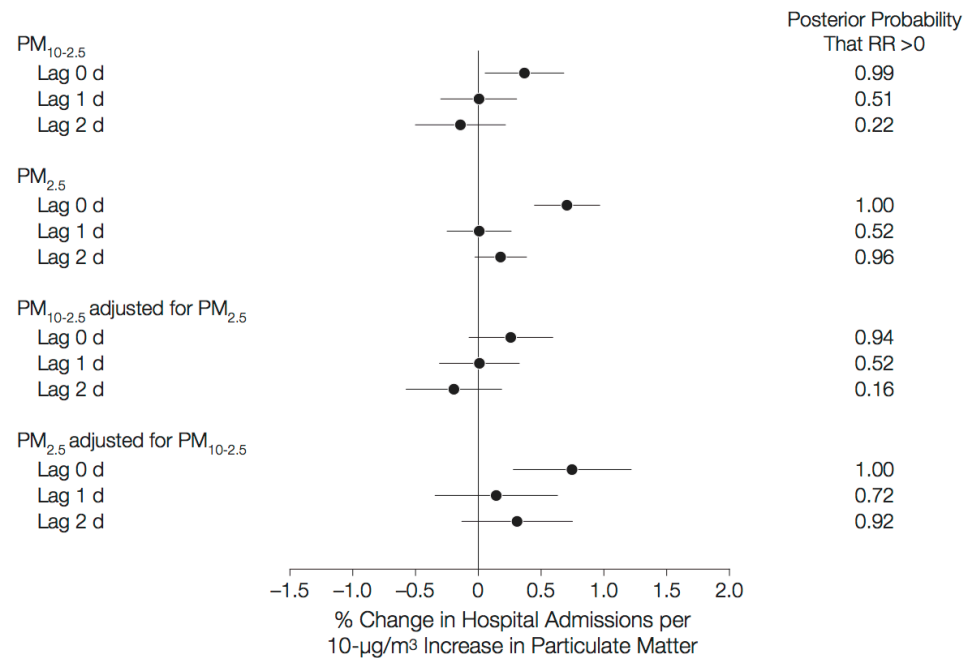


Principles of Analytic Graphics

- 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
 - 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
- Principle 6: Content is king
 - Analytical presentations ultimately stand or fall depending on the quality, relevance, and integrity of their content

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