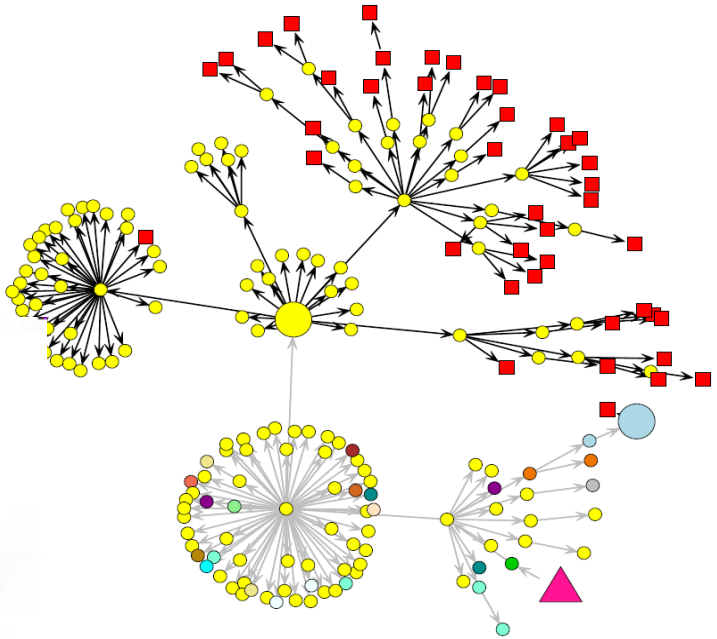
GERMAN FEDERAL INSTITUTE FOR RISK ASSESSMENT

European Food Safety Authority

Bundesinstitut für Risikobewertung

When and what to trace from public health perspective (+ synergies between public health and food safety)



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Three aspects of outbreak investigation

Epidemiological analyses	Microbiological analyses	Tracing analyses
descriptive • systematic explorative interviews of cases (and controls) **analytical** • case-control-studies • cohort studies	**detection of identical pathogen in** • food, ingredient, production environment **AND** • case OR • symptoms and timing of disease onset typical for pathogen found in the food	**trace-back** • of contaminated/suspected food leads to common source (e.g. processor, producer) **trace-forward** • does distribution of contaminated food match distribution of cases?

Evidence

Purpose of tracing

- identify source of contamination
- identify distribution of contaminated food

warning of consumers
remove contaminated food from market

- compare distribution of cases + contaminated food

strengthen epidemiological association

When and what to trace?

Tracing is resource-intensive

→ coordination of many investigators, different authorities, many counties/countries

→ decide when and what to trace

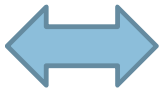
You might not have the resources to trace all suspected foods.
Some paths might be misleading.
You have to weigh the effort and benefit.

→ review all available data in a multidisciplinary team (epidemiologists, microbiologists, tracing experts)

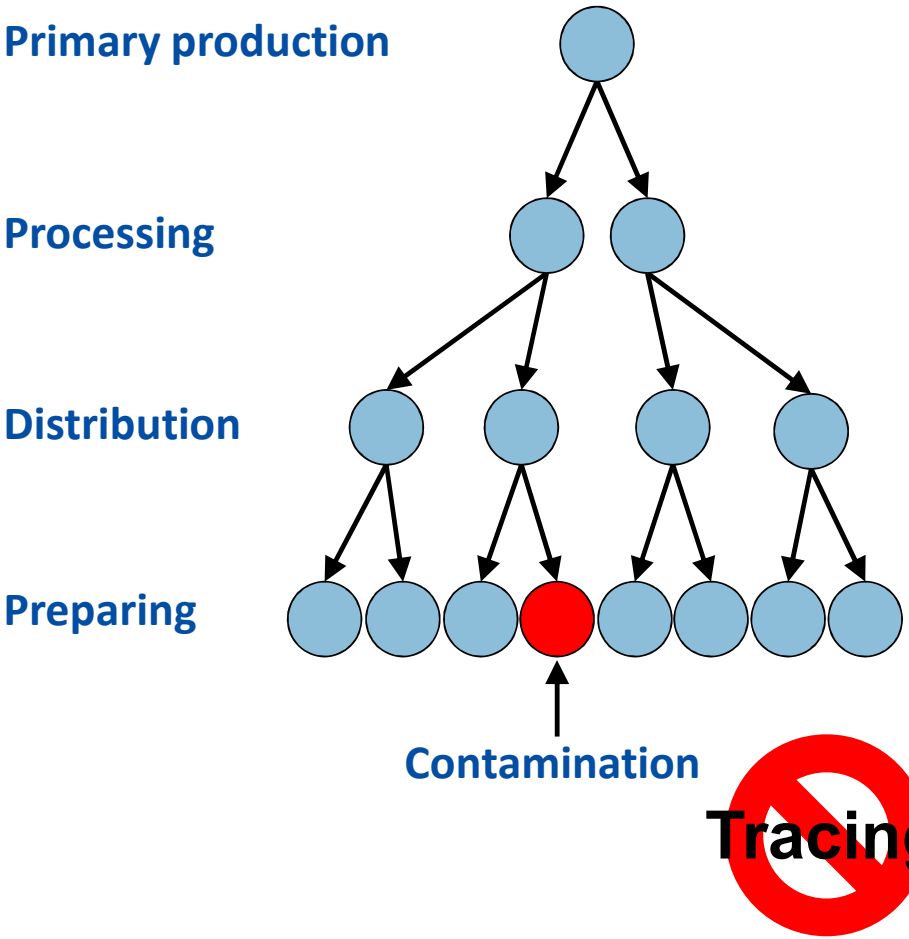
detailed information on cases, delivery dates, quantities, sources + conditions of food received, shipping containers, labels, documents, lot numbers, facilities involved, sampling results

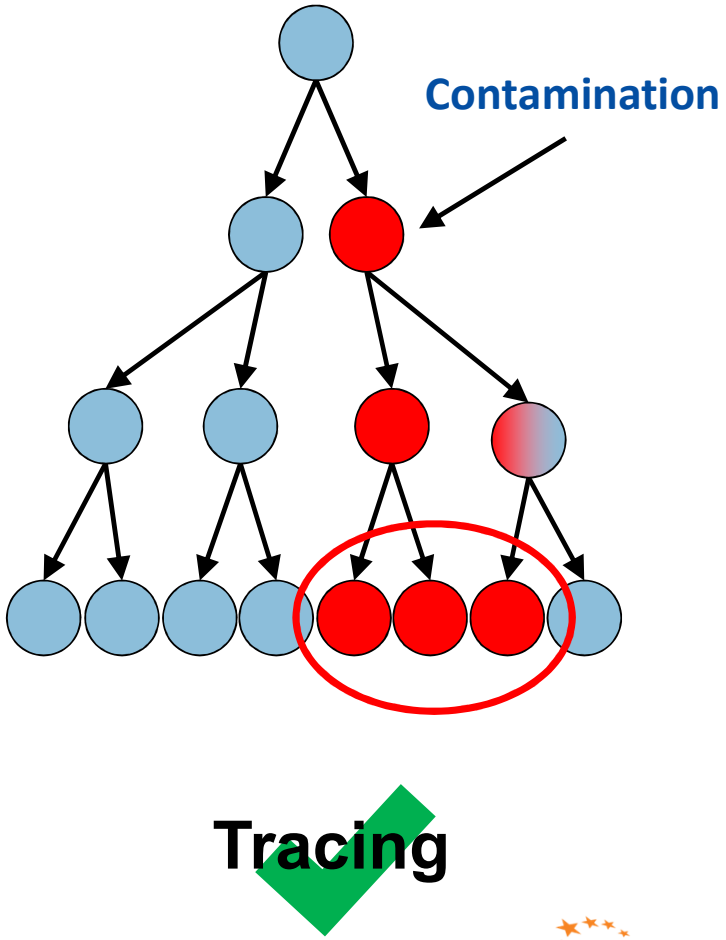
When to trace?

Local foodborne outbreak



Diffuse FBO affecting multiple locations/countries





When to trace? Further indications

Pathogen

→ is uncommon

→ is emerging/re-emerging

→ limited knowledge about pathogen → gain experience about its ecology

→ causes severe diseases

Food

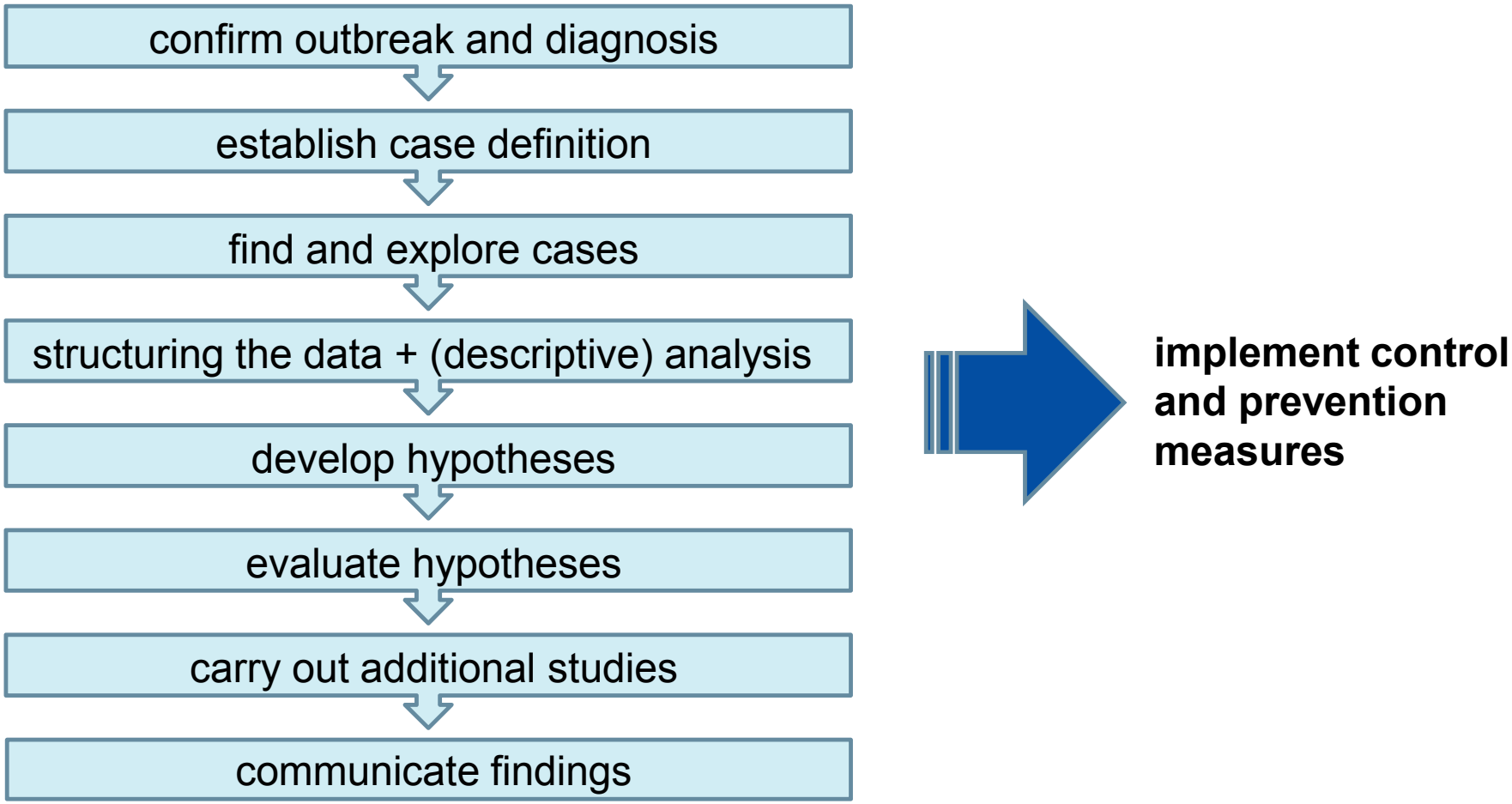
→ expected to be eaten raw or lightly heated (vegetables, shell eggs, shellfish)

→ unlicensed, illegally sold food involved

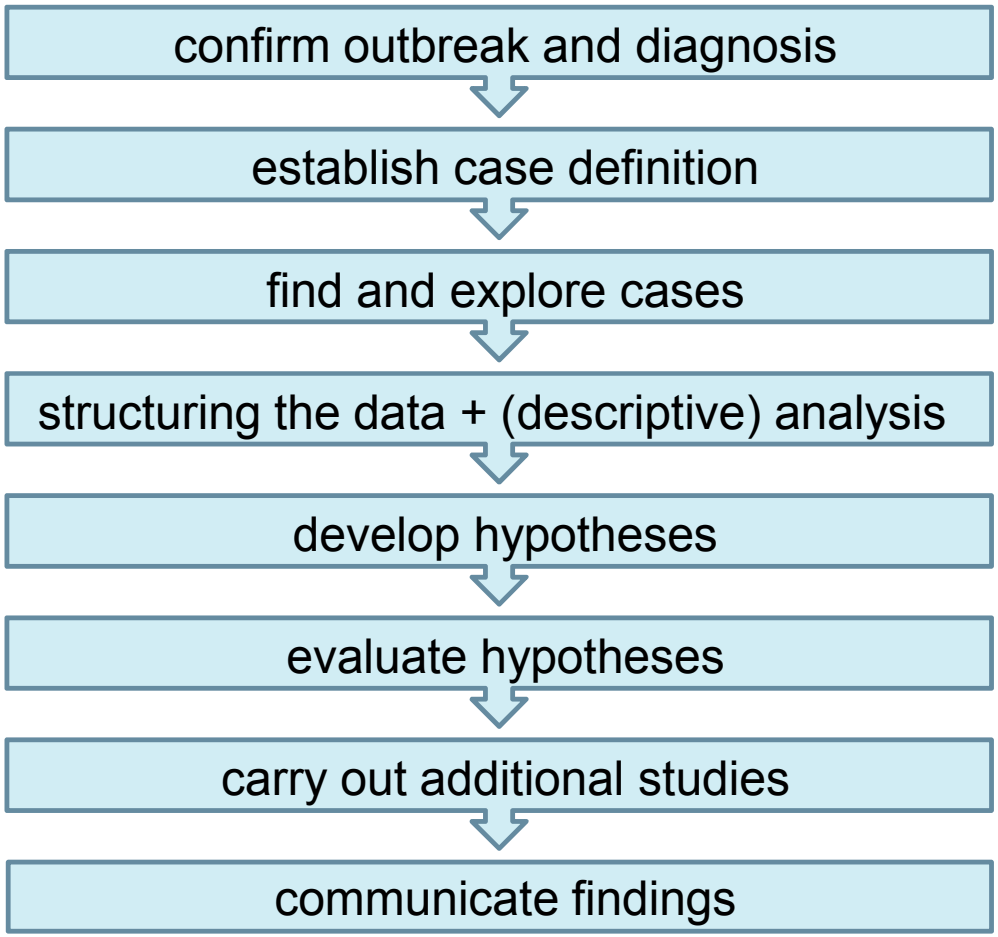
→ food is adulterated

New or unusual vehicle

Steps of an outbreak investigation



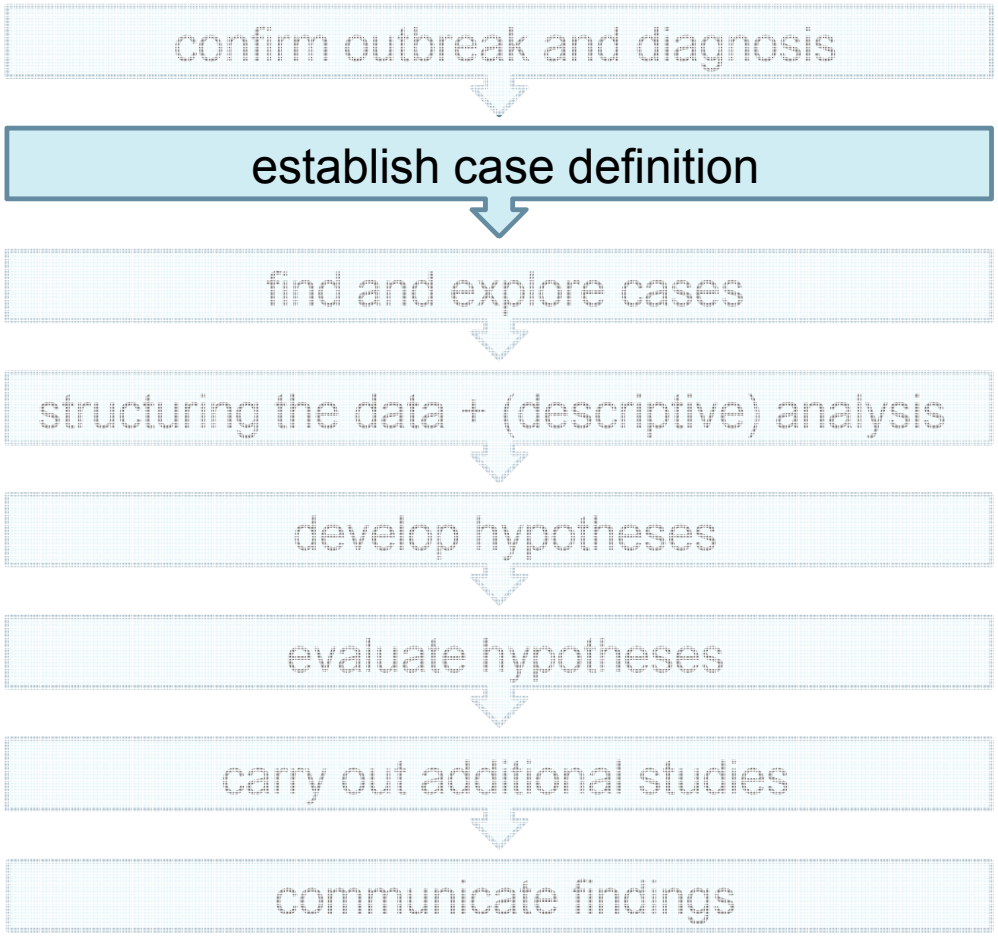
Steps of an outbreak investigation



Food/feed safety partners often not primarily involved at those steps (public health/microbiologist competence)

→ but implications on tracing investigations

Steps of an outbreak investigation – implications on tracing



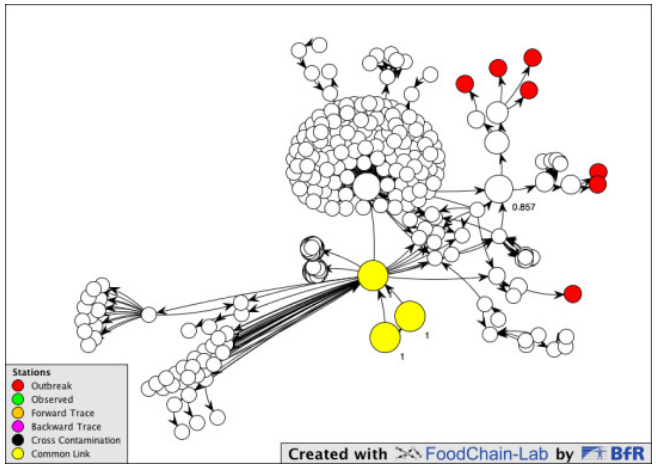
Case definition – which cases to trace back?

Exclusion criteria:

- genotype of isolate different from outbreak strain
- secondary cases
  - infection transmitted person-to-person
  - no exposure to contaminated food item
- (travel-related cases)
  - travel history abroad prior to a certain period of time before onset of symptoms
  - relevant for e.g. HAV outbreak

If many cases: select the most promising cases/clusters to trace back

- e.g. EHEC outbreak 2011 → 4000 cases → only 7 clusters traced back (well described; most different from each other; in part travel groups)

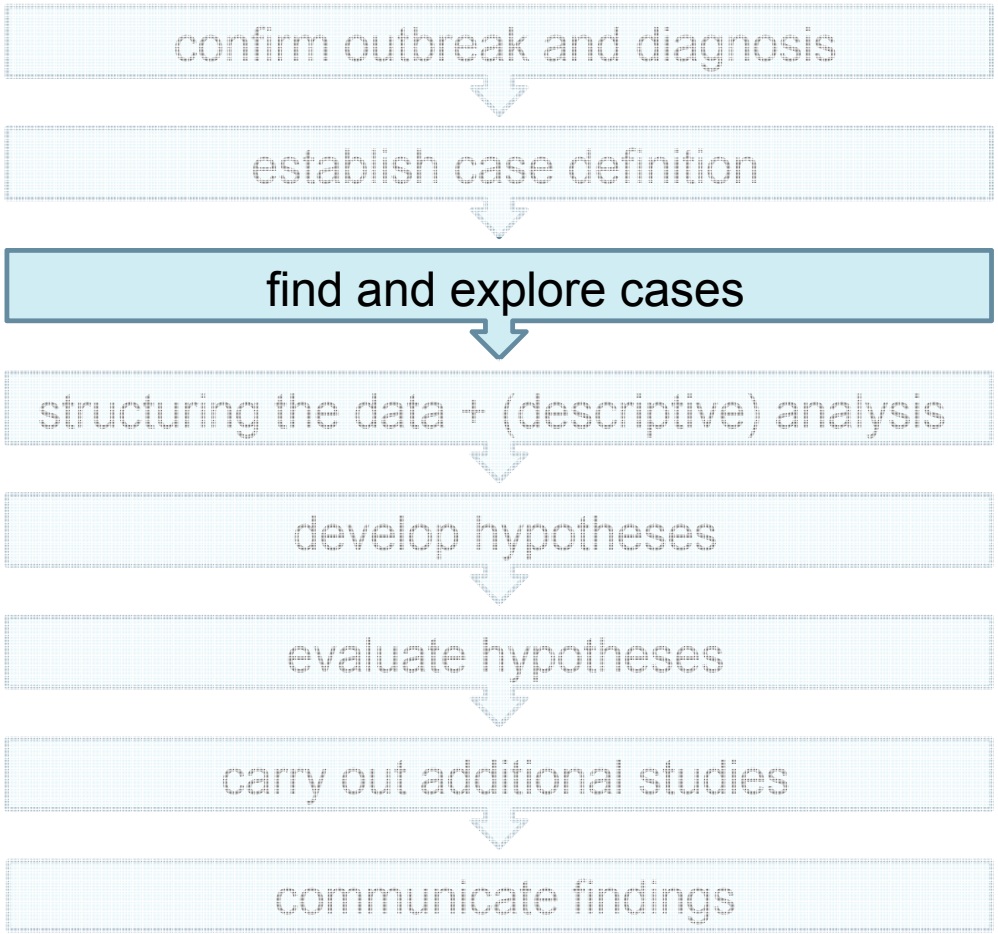


Case definition – which cases to trace back?

- Focus on e.g.
  - → Confirmed cases
  - → Well-described cases
    - → Detailed information on diet
    - → Limited period of when products were bought/restaurant was visited
    - → Kitchens with well-defined menus (catering, restaurants, community catering (schools/elderly homes/hospitals/meals-on-wheels) → person-specific information on consumed food)
  - → Retained samples (voluntary)
  - → Evidence higher for clusters of diseased persons than for single diseased persons

CAVE: All outbreaks are different!

Steps of an outbreak investigation – implications on tracing



Explore cases

- ask for relevant exposure (food intake (what/where), other diseases, travel history, sexual contacts) → identify what is common to all cases

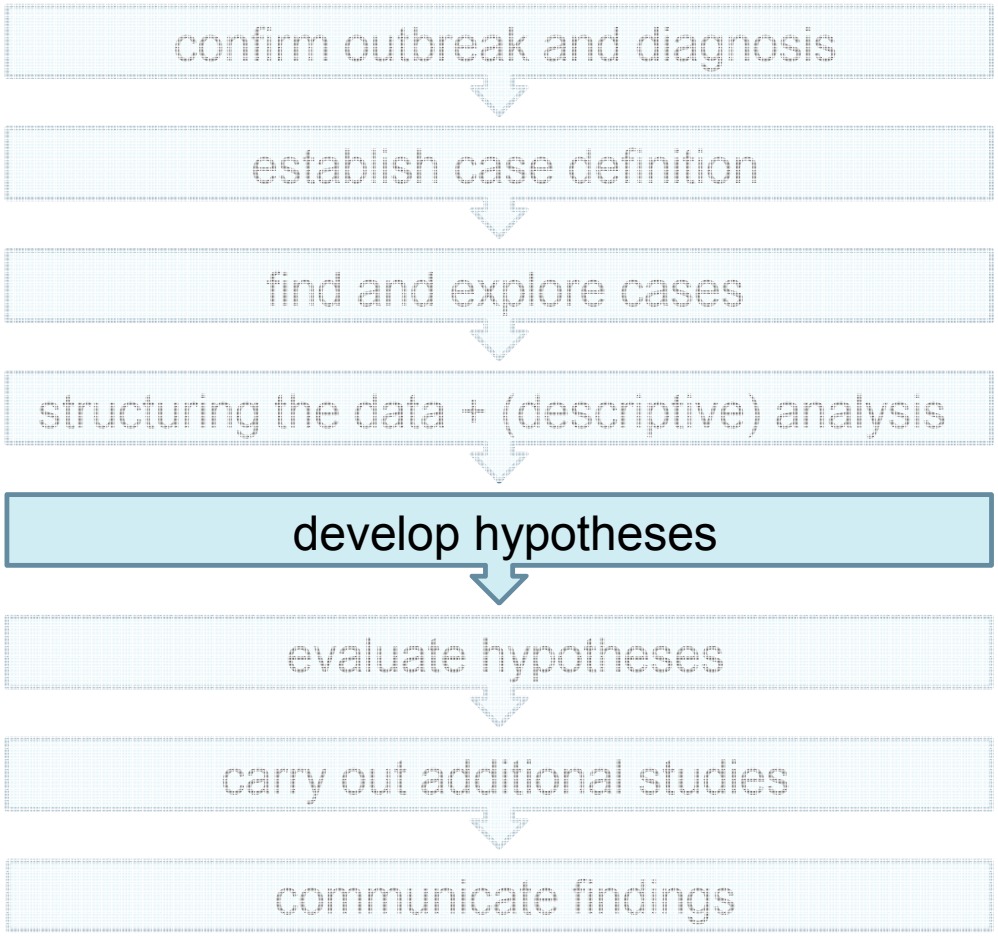
For traceback analyses:

Who ate what, when, how much and how?

- gather information on (suspect) product→ as detailed as possible

  →**product name**, **lot number**, **best before date**, **print code** (eggs), egg packer (eggs), **date and place of shopping or restaurant visit**, package size …
- usual consumption and shopping habits
- photos of fridge content
- photos of packaging of (suspect) product → product name, weight, lot number, best before date, …
- limit shopping date/date of restaurant visit as much as possible

Steps of an outbreak investigation – implications on tracing



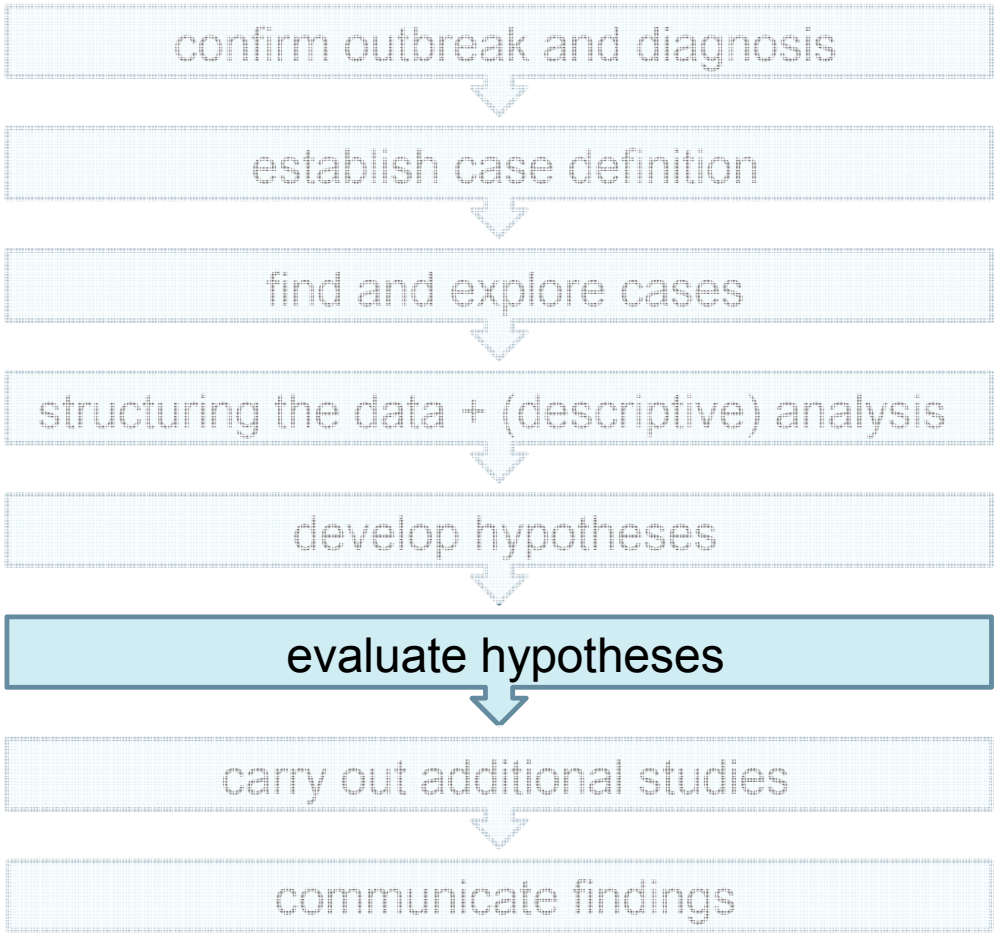
Food and feed safety partners involved as soon as food is suspected as vehicle of infection

visit kitchen/food company

interviews with caterers, kitchen staff

tracing

Steps of an outbreak investigation – implications on tracing



Evaluate hypotheses

Interpreting example from EHEC, 2011:

b. **Matched case control study** in 3 hospitals focussed on fruits and vegetables, May – June 2011

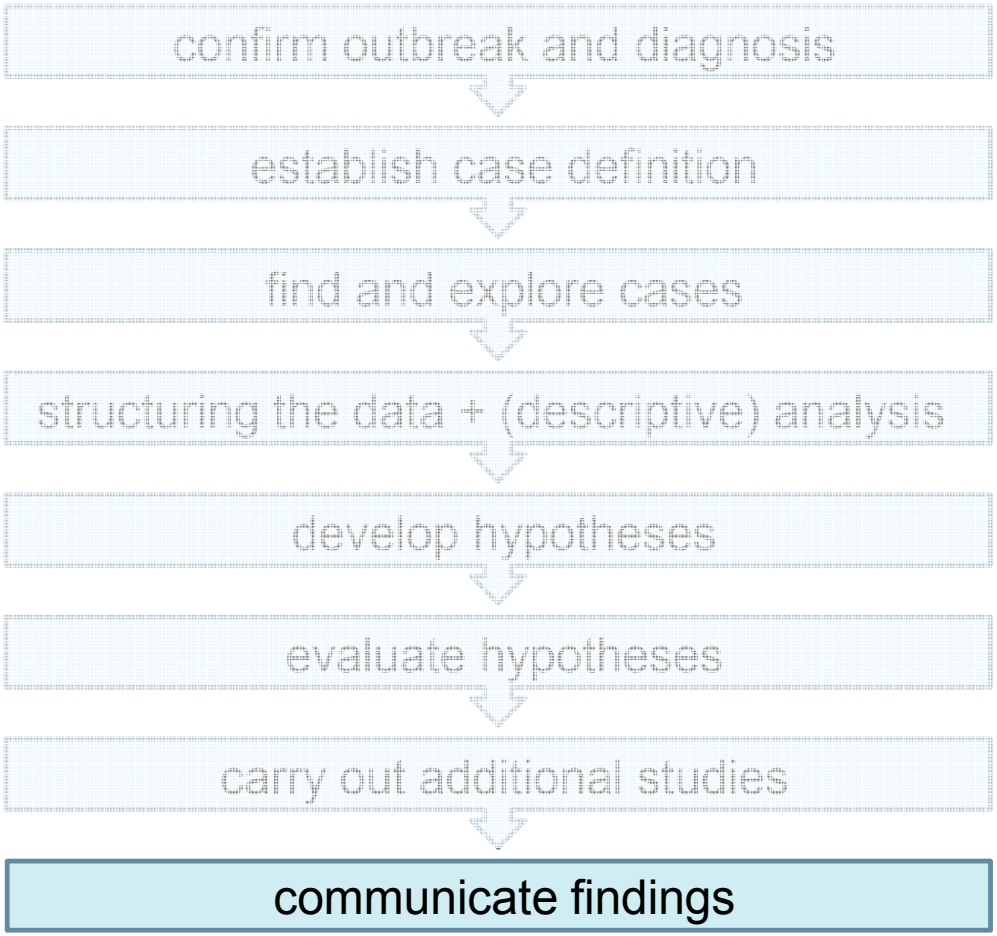
Table 1. Vegetables or Fruits Evaluated in a Case–Control Study in the German Outbreak.*

Food Item	Case Subjects Exposed	Control Subjects Exposed	Matched Odds Ratio (95% CI)	P Value
	no./total no. (%)			
Sprouts	6/24 (25)	7/80 (9)	4.35 (1.05–18.0)	0.04
Cucumbers	22/25 (88)	52/79 (66)	3.53 (0.96–12.9)	0.06
Apples	22/24 (92)	57/81 (70)	3.91 (0.86–17.7)	0.08
Peppers	16/24 (67)	35/80 (44)	2.66 (0.90–7.9)	0.08
Strawberries	19/26 (73)	43/81 (53)	2.33 (0.90–6.0)	0.08

Buchholz et al., N Engl J Med 2011; 365:1763-1770

What food item would you like to trace?

Steps of an outbreak investigation – implications on tracing



Communication to public/media: implications on companies vs. authorities

Tracing investigations → irreparable reputational damage to food companies

→ Be careful with interpretations (common source or just high market share)

→ every investigation step (also epidemiological, microbiological) + communication to media/public must be accurate

→ otherwise: legal disputes, compensation claims

E.g. EHEC outbreak 2011 → communication error on Spanish cucumbers

© BILD newspaper: „The deadly germ comes from Spain“

Communication between authorities during investigation

public health authorities **food safety authorities**

discuss available information

prioritize (what to trace?)

agree on investigation plan

regularly share updates on tracing investigation

joint interpretation of results (how do tracing results relate to epi-, lab-, environmental results?)

re-evaluate (tracing) investigation strategy based on multidisciplinary results

Ideally even before crisis:

build functional network, set up contact list, set up tracing system, develop joint protocols, training

Summary

- Tracing is resource-intensive
  → Focus on promising starting points for tracing

- Use synergies between public and food safety authorities
  → E.g. for interviewing the cases

- Regularly share updates on your analyses with multidisciplinary team
  → Facilitates interpretation of results + re-evaluation of strategy

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Thank you for your attention

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