

hg C.difficile

Clostridium difficile

- Causes *C. difficile Infection* (CDI) = diarrhoea
- The leading cause of hospital-acquired diarrhoea
- Spreads quickly around healthcare facilities and infects others
- Huge costs to healthcare systems!

→ a negative result is extremely important!

Colonisation vs. infection

If a patient has C. difficile it does not mean they definitely have CDI

- *C. difficile* can be either non-toxigenic OR toxigenic

IMPORTANT

Up to 20% of people carry *C. difficile*

BUT

If it is toxigenic they are 6x more likely to develop CDI¹

(HG C. difficile only detects toxigenic strains)

¹Zacharioudakis et al, 2015

How to sell HG C. difficile?

1. Single-step screening test for patients suspected of having CDI
2. As part of a multistep testing process for people suspected of having CDI

Who to approach?

1. **Infection control department**
2. Intensive care unit
3. Wards containing elderly patients
4. Wards containing immune-compromised patients
5. Cancer department

CDI diagnostic methods

Method	Sensitivity	Specificity	Time to result	Difficulty
<i>C. difficile</i> culture	Low	Moderate	48 –72 hours	High
Toxigenic culture	High	High	48 – 72 hours	High
CCNA*	High	High	48 – 72 hours	High
GDH**	High	Low	10 minutes	Low
Toxin EIA***	Low	High	1 hour	Medium
Molecular	High	High	1 hour	Low

Molecular is the only suitable method to be used as a single-step screening method for CDI

**C. difficile* cytotoxin neutralization assay

**Glutamate dehydrogenase (enzyme produced by *C. difficile*)

***Enzyme immunoassay

CDI diagnostic methods

Method	Function
<i>C. difficile</i> culture	Detects all strains → no diagnostic use
Toxigenic culture	Reference & epidemiological method → limited diagnostic use
CCNA	Reference method → limited diagnostic use
GDH	Detects all strains → rapid 1 st step screening method, <u>needs confirmation</u> by 2 nd step
Toxin EIA	Detects toxins, low sensitivity → requires supporting diagnostic method
Molecular	Detects toxigenic strains, highly sensitive → suitable as single-step screening method OR as part of a multi-step screening approach. Useful for detecting acute disease

CDI diagnosis algorithms (1-step)



Selection criteria

3 unformed stools in 24 hours

Unformed stool sample

hg C.difficile

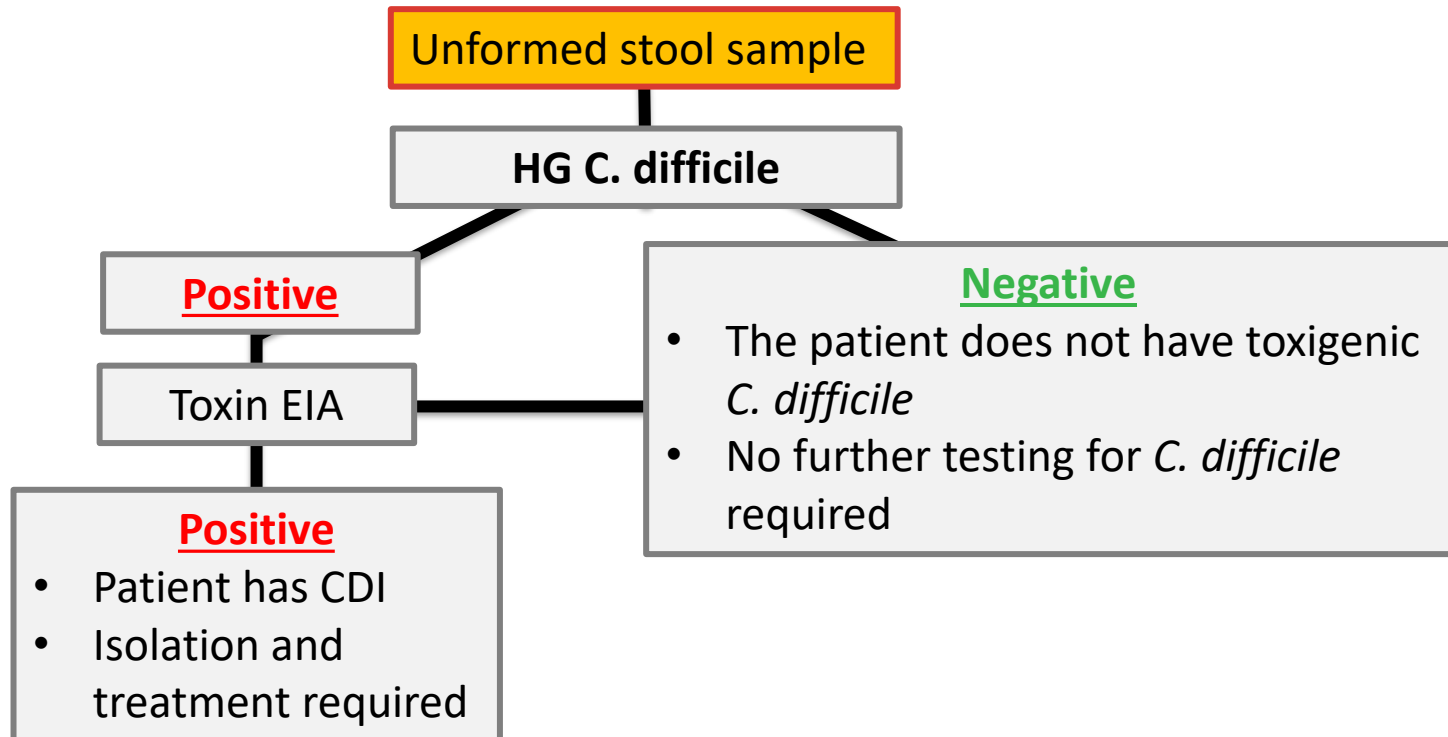
Positive

- The patient has toxigenic *C. difficile*
- Highly likely that they have CDI
- Need to be isolated to prevent outbreak
- Additional toxin test optional

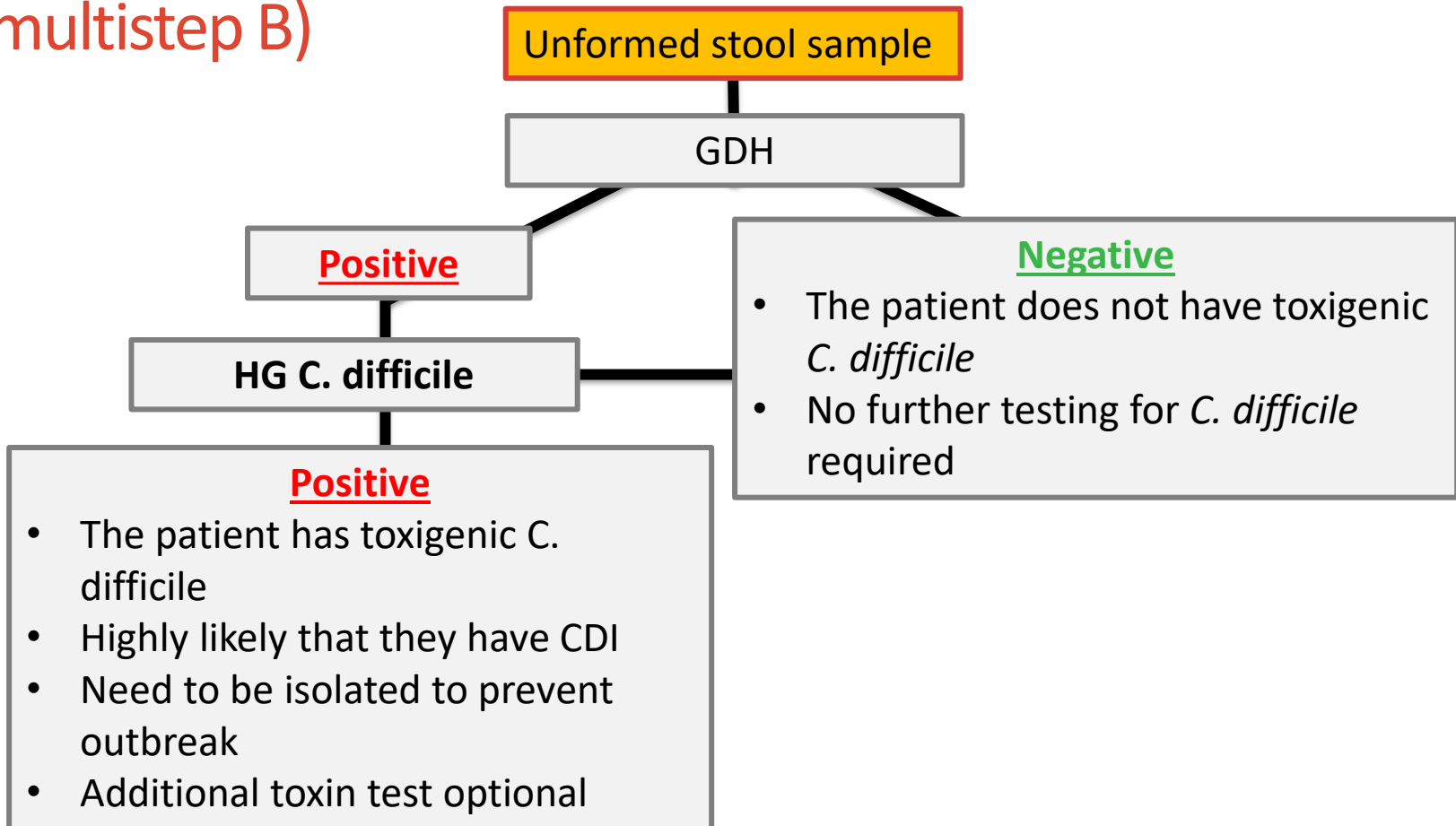
Negative

- The patient does not have toxigenic *C. difficile*
- No further testing for *C. difficile* required

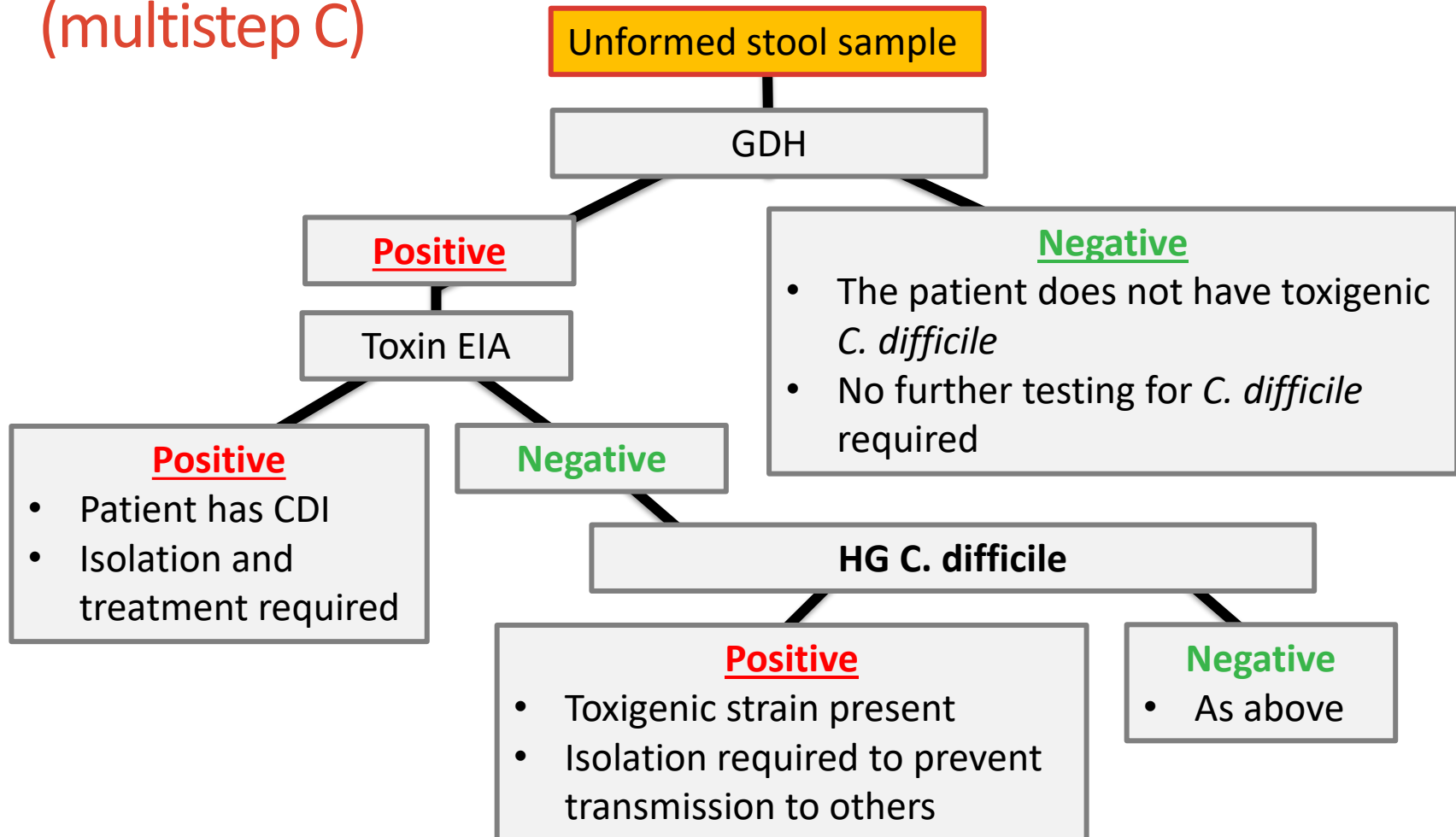
CDI diagnosis algorithms (multistep A)



CDI diagnosis algorithms (multistep B)



CDI diagnosis algorithms (multistep C)



Does HG C. difficile detect strains which only produce the B toxin? YES!!

A+/B+



hg C.difficile

A-/B+



hg C.difficile

HG C. difficile detects a portion of the tcdA gene which is present in all toxigenic strains

Competition

Company	System	Advantage of HG Swift
Cepheid	<i>GeneXpert</i>	<ul style="list-style-type: none"> ➤ Lower price ➤ Much lower level of invalid results (GeneXpert cartridges can get clogged and produce invalid results) ➤ No calibration & no maintenance ➤ Easier to identify and solve problems
Meridian	<i>Illumigene</i>	<ul style="list-style-type: none"> ➤ Real-time results ➤ HG Swift can be stopped when sample is positive ➤ Touchscreen
GenePOC	<i>Revogene</i>	<ul style="list-style-type: none"> ➤ Lower price ➤ Much lower level of invalid results (1µl too much can cause an invalid)

HG C.difficile Cheat Sheet

Can people carry toxigenic *C.difficile* asymptotically?

Yes, but they are 6x more likely to develop *C.difficile* infection (CDI) and they can pass the bacteria to other people who will develop CDI.

Molecular tests are too expensive and too sensitive

The price of the test is low compared to the cost of outbreaks in the hospital.

It is important to isolate people who are carrying toxigenic *C.difficile* to prevent outbreaks, even if they do not have CDI.

When to use HG C.difficile?

1. Single-step screening test for symptomatic patients
2. Confirmatory test for GDH-positive patients
3. Confirmatory test for GDH-positive + Toxin-negative patients