Diphtheria

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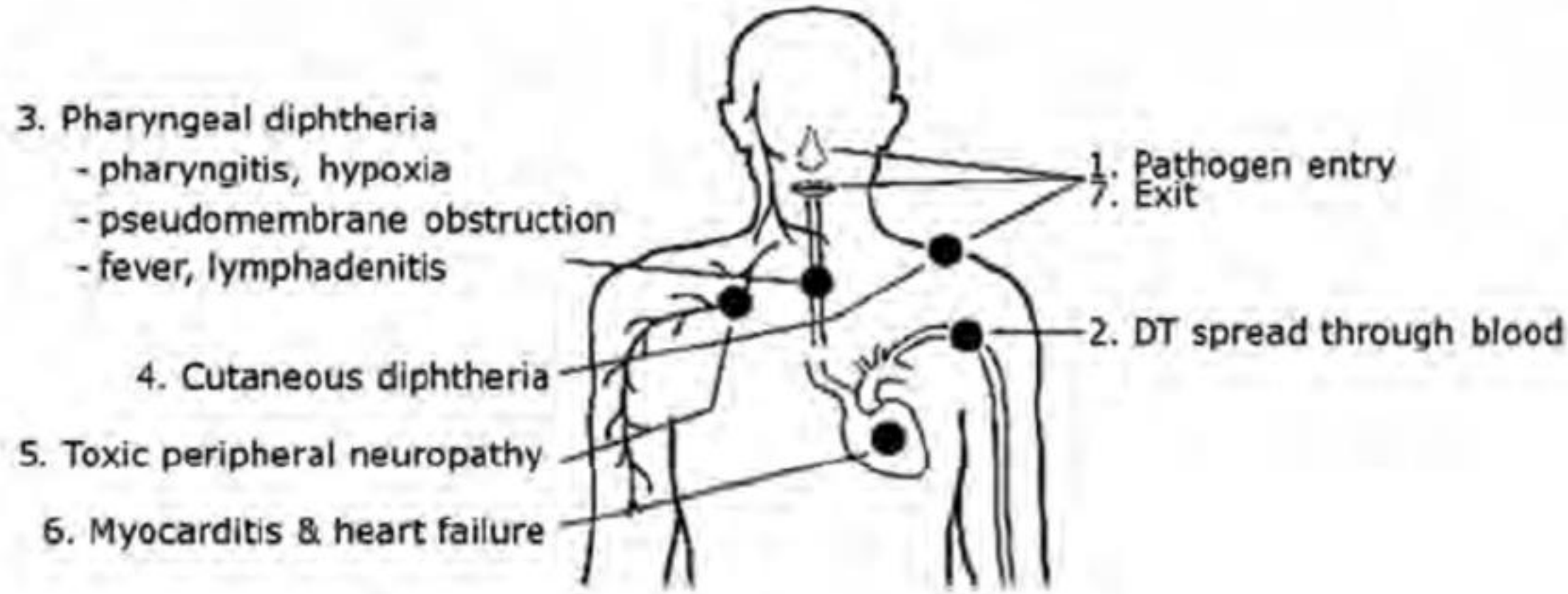
Diphtheria facts

- **Causative agent**: toxigenic strains of *Corynebacterium diphtheria (C. diphtheria)*
- **Presentation**: pharyngitis, naso-pharyngitis, tonsillitis, laryngitis (or any combination) associated with a firmly adherent pseudo-membrane over the tonsils, pharynx, larynx and/or nares
- **Transmission**: respiratory droplets or close contact with either respiratory secretions or infected skin lesions. Incubation period is 2-5 days.

Corynebacterium diphtheria

Diphtheria Pathogenesis



(Uthman et al, 2012)

‘The strangling angel of children’

Corynebacterium Diphtheriae

- Common respiratory pathogen, disease in toxigenic strains
- Causes upper-respiratory symptoms, leading to pharyngitis and a firmly-adherent pseudomembrane over tonsils
- Pseudomembrane expansion leads to airway obstruction and death
- Person-to-person spread

Long-term complications

Complication	Incidence Rate (n=6350)
Neuropathy	5%
Renal dysfunction	1-2%
Cardiac symptoms	8%
Generalized weakness/weight loss	25%
Sudden Cardiac death	0.3%

Clinical Infectious Diseases

MAJOR ARTICLE

Clinical and Epidemiological Aspects of Diphtheria: A Systematic Review and Pooled Analysis

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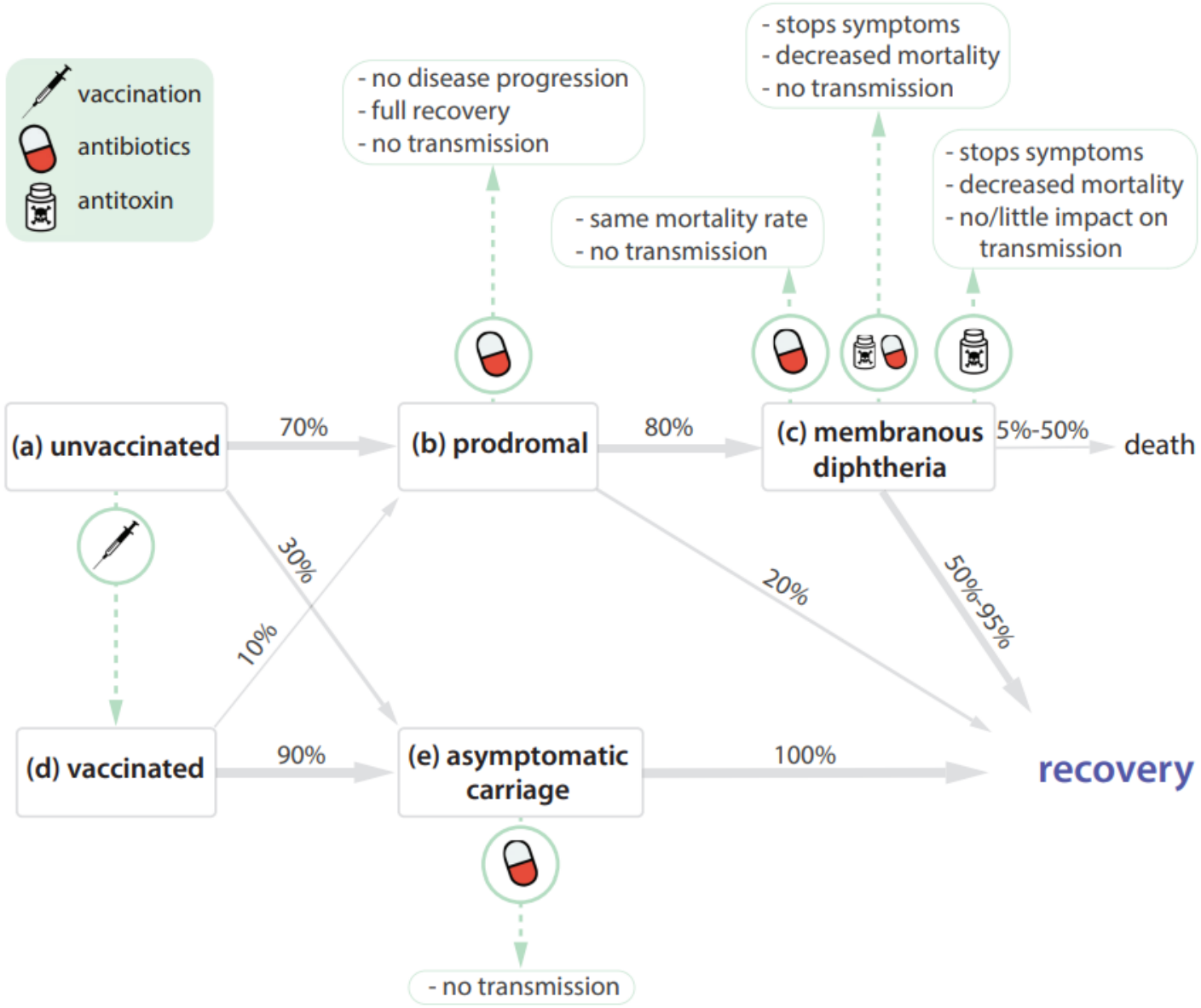
(See the Editorial Commentary by Wiedermann on pages 98–99.)



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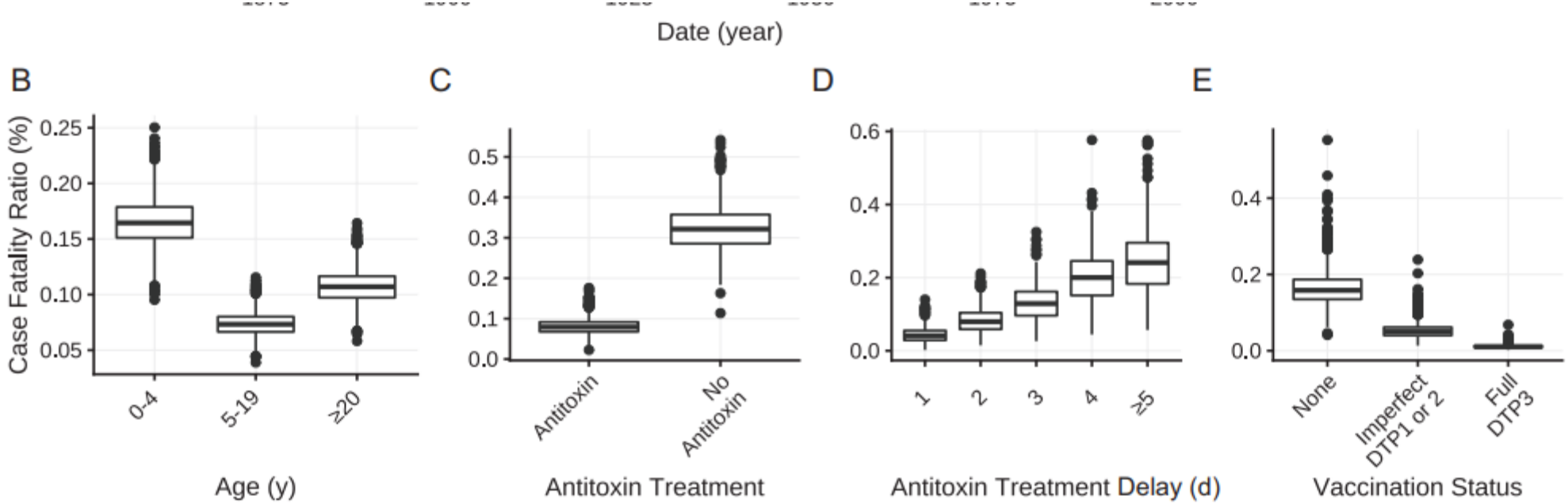


Cutaneous Diphtheria

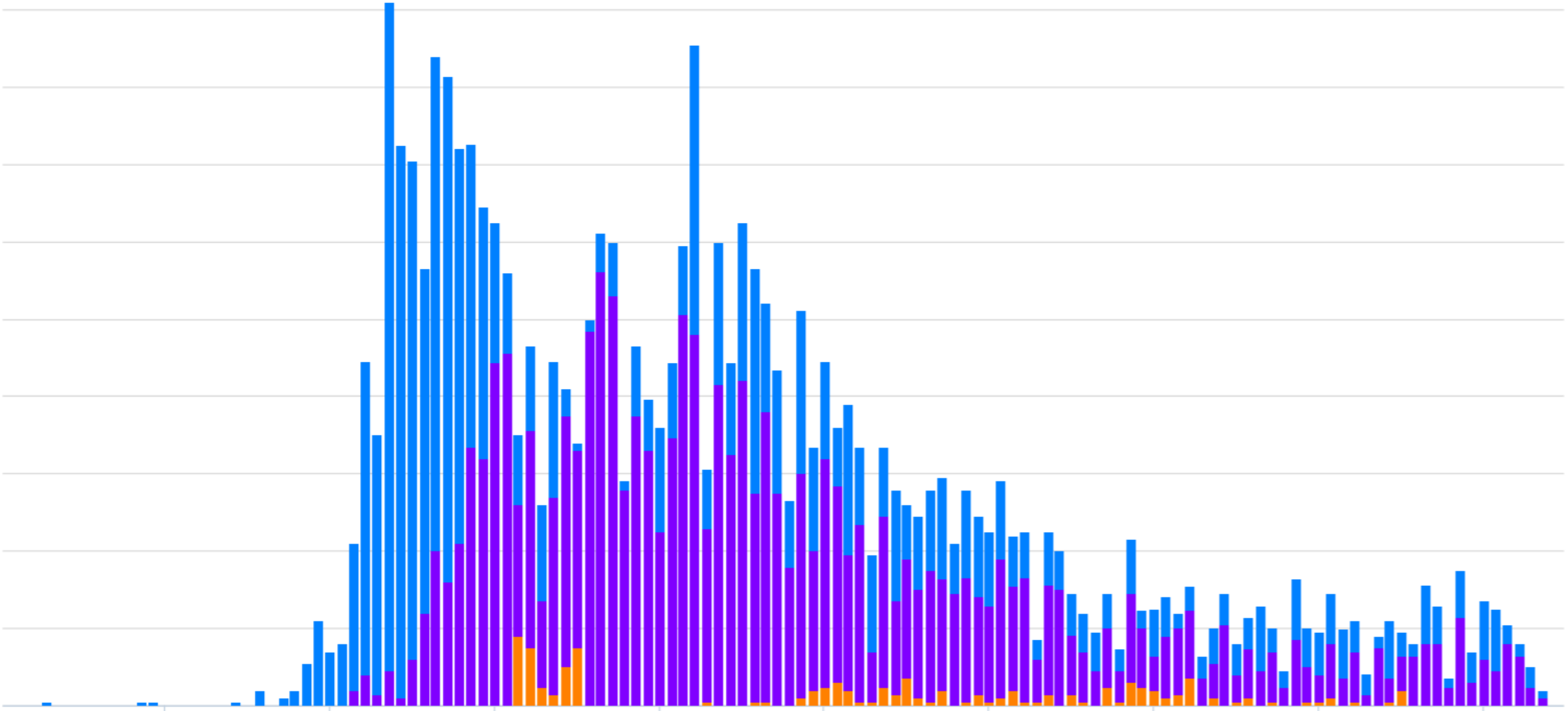
Pseudomembranes

‘Bull neck’

Presenting symptoms

Sign	Incidence (n=6350)
Fever	84.7%
Difficulty swallowing	31%
Pseudomembrane	37%
Gross lymphadenopathy	31.1%

Diphtheria cases – 2018:2019, CXB



Diphtheria Management - Principles

- Antibiotics
- DAT
- **Supportive care**
- Tracing of contacts for vaccination/post-exposure prophylaxis

IMMEDIATELY REFER TO NEAREST DIPHTHERIA TREATMENT CENTRE

Pseudo-Membrane

Are there Clinical Warning Signs?

Stridor
Fast Respiratory Rate
Chest in-drawing
Restlessness or lethargy
Bull neck
Delayed capillary refill
Fast Heart rate and cold extremities
Central Cyanosis

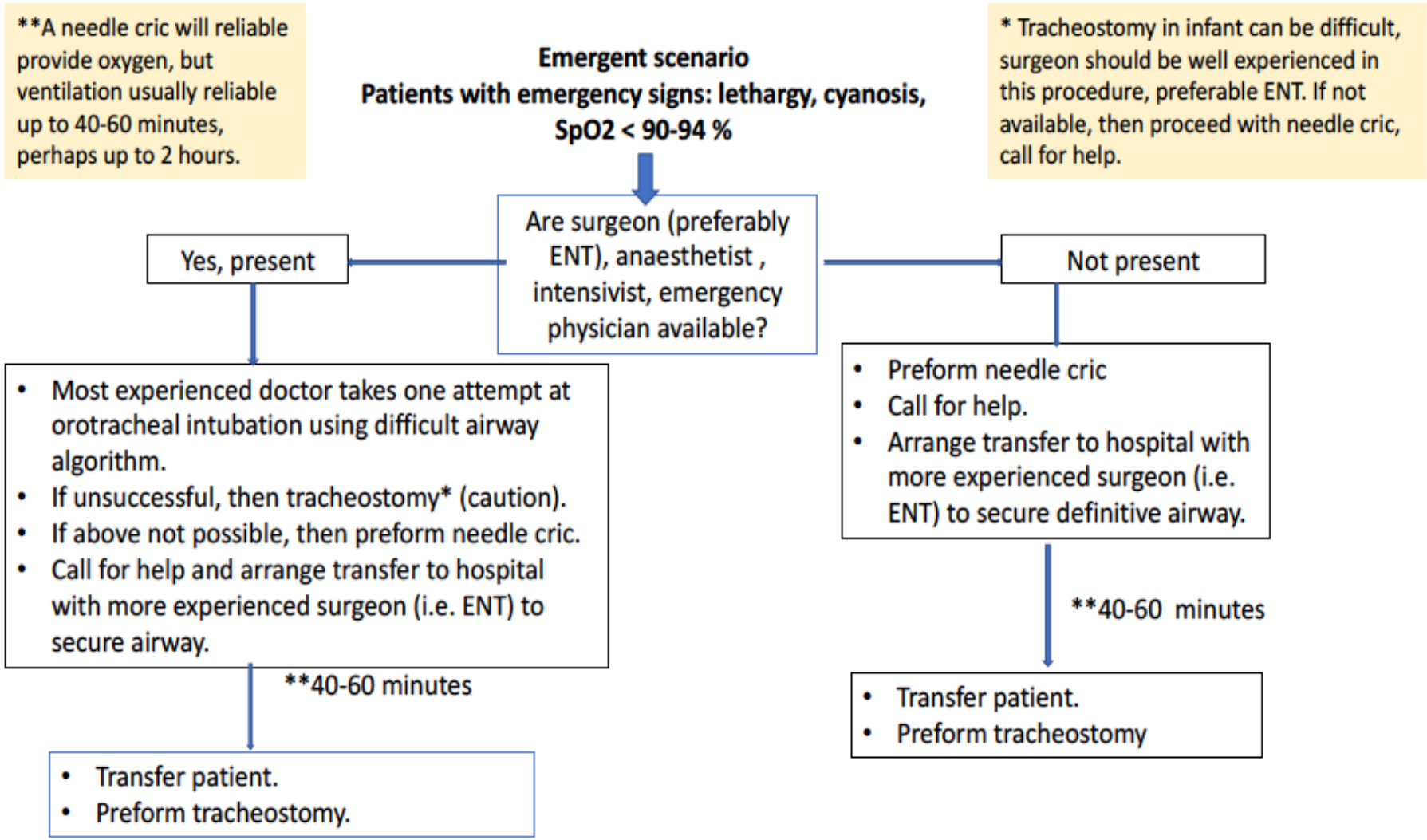
Bull Neck

Yes

DAT (give as soon as possible)
Antibiotics (give as soon as possible)

No

Antibiotics (give as soon as possible)
DAT (20-40,000IU) if pseudomembrane


**A needle cric will reliable provide oxygen, but ventilation usually reliable up to 40-60 minutes, perhaps up to 2 hours.
Emergent scenario
Patients with emergency signs: lethargy, cyanosis, SpO2 < 90-94 %
* Tracheostomy in infant can be difficult, surgeon should be well experienced in this procedure, preferable ENT. If not available, then proceed with needle cric, call for help.
Are surgeon (preferably ENT), anaesthetist , intensivist, emergency physician available?
Yes, present
Not present
• Most experienced doctor takes one attempt at orotracheal intubation using difficult airway algorithm.
• If unsuccessful, then tracheostomy* (caution).
• If above not possible, then preform needle cric.
• Call for help and arrange transfer to hospital with more experienced surgeon (i.e. ENT) to secure airway.
**40-60 minutes
• Transfer patient.
• Preform tracheostomy.
• Preform needle cric
• Call for help.
• Arrange transfer to hospital with more experienced surgeon (i.e. ENT) to secure definitive airway.
**40-60 minutes
• Transfer patient.
• Preform tracheostomy

Clinical management of diphtheria

Guideline

2 February 2024

World Health Organization

Diphtheria Management - Principles

- **Antibiotics**
- DAT
- Supportive care
- Tracing of contacts for vaccination/post-exposure prophylaxis

Recommendation: Antibiotics

Strong recommendation for

In patients with suspected or confirmed diphtheria, WHO recommends using macrolide antibiotics (azithromycin, erythromycin) in preference to penicillin antibiotics [Strong recommendation, low certainty evidence].

Remarks:

- Antibiotics should be administered alongside DAT and should not be delayed.
- Recent evidence suggests that there is increasing resistance to penicillins and less resistance to macrolide antibiotics. Local antimicrobial susceptibility testing is vital to ensure the ongoing appropriate use of antibiotics. Advice on laboratory testing in outbreaks is available here.
- The choice of macrolide will depend on availability and feasibility.

Diphtheria Management - Principles

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Recommendation: DAT sensitivity testing

Strong recommendation against

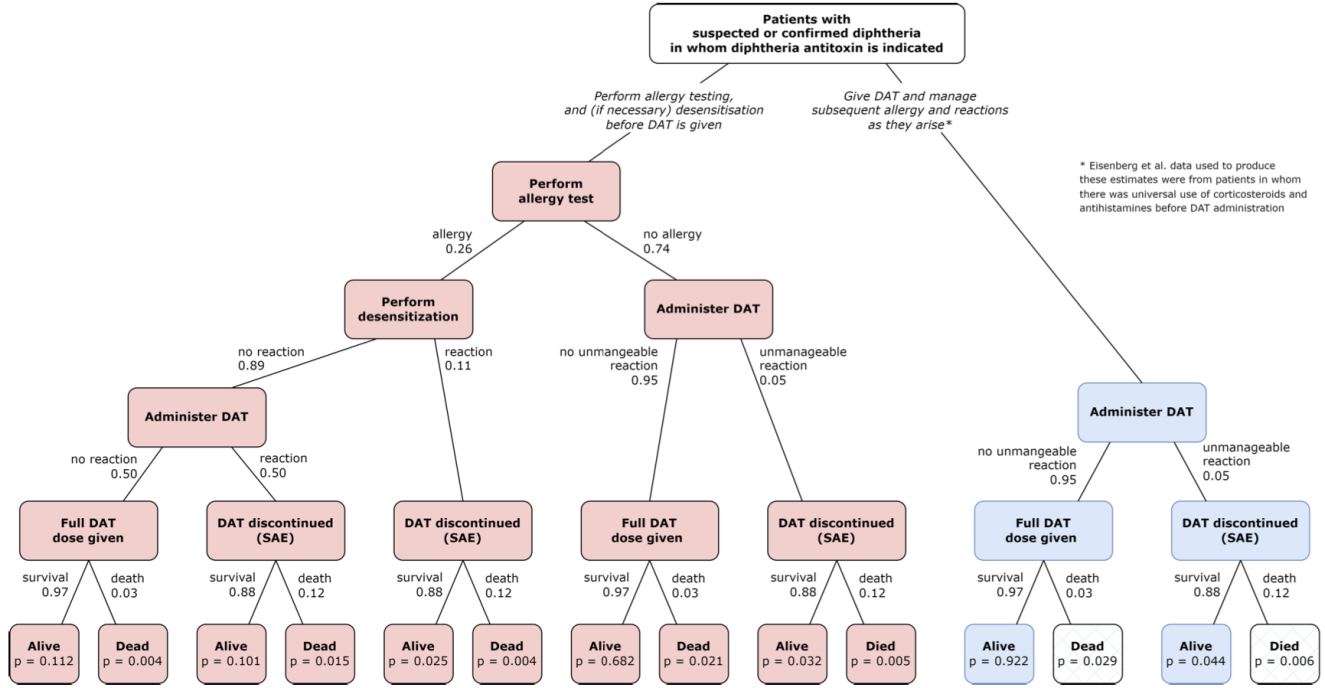
In patients with suspected or confirmed diphtheria, WHO recommends not to perform routine sensitivity testing prior to administration of diphtheria antitoxin [Strong recommendation, moderate certainty evidence].

Remarks:

- Due to the risk of allergic reaction, ensure sufficient trained staff and equipment are available and the patient is cared for in an area where they can be monitored closely.

Recommendation: DAT sensitivity testing

Figure: Outcome probabilities based on alternative strategies



Red boxes (left side of diagram) represent the probability tree where allergy testing and (where necessary) desensitisation is performed before DAT is administered.

Blue boxes (right side of diagram) represent the probability tree where DAT is given, and allergies are treated as they arise (with no allergy testing, and no desensitisation).

Recommendation: DAT dosing

Conditional recommendation for

In patients with suspected or confirmed symptomatic diphtheria, WHO suggests administration of a single dose of diphtheria antitoxin with choice of dose based on disease severity and time since symptom onset, in comparison with a fixed dose for all patients [Conditional recommendation, very low certainty evidence].

Remarks:

- DAT must be administered as soon as possible as early administration of DAT is associated with improved clinical outcomes. *(8)* Early treatment may reduce overall DAT usage by avoiding the higher doses required once disease has progressed.

Recommendation: DAT dosing

Characteristic of diphtheria disease	Dose of diphtheria antitoxin (IU)
• Laryngitis **or** pharyngitis **and** • Duration < 48 hours	20 000
• Nasopharyngeal disease (extensive pseudomembrane) **and** • Duration < 48 hours	40 000
One or more of: • Diffuse swelling of the neck • Any disease ≥ 48 hours • Severe disease (respiratory distress, shock)	80 000

Diphtheria Management - Principles

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Upcoming recommendations

- Should close contacts receive prophylaxis?
- How long do contacts receive prophylaxis?
- How long should infected be isolated?
- What is the optimal early airway management strategy?

Thank you