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21 February 2022 DOC/22/22012

Coroner Simon McGregor
Coroners Court of Victoria
65 Kavanagh St
SOUTHBANK VIC 3006

By email: cpuresponses@coronerscourt.vic.gov.au

Dear Coroner McGregor

Finding into the Death of Peta Hickey, Court Reference COR 2019 2336

We write in response to Your Honour's recommendations to Ambulance Victoria (AV), made following your investigation into the death of Peta Hickey and set out in your Finding delivered on 22 November 2021. AV has considered the recommendations directed to it, at page 155 of Your Honour's Finding. They were as follows:

Recommendations regarding emergency services
24. That AV issue a practice advisory highlighting that adrenaline be administered as soon as practicable to patients who have acutely deteriorated within a short time of receiving radiological contrast at a radiology clinic.
25. That AV issue a practice advisory highlighting the possibility of beta-blocking medication being present in a patient experiencing anaphylaxis to radiological contrast whilst undergoing cardiac CT, and that consideration should be given to administering glucagon in these circumstances if the patient is unresponsive to adrenaline.

Implementation of recommendation 24: anaphylaxis risks associated with contrast media
AV has implemented recommendation 24. The AV Anaphylaxis Clinical Practice Guideline (CPG) was updated and published on 16 December 2020. It included two references to the risks of contrast media. These are listed below for ease of reference and the updated CPG is enclosed.

Common allergens

- *Exposure to an allergen may be known or unknown.*
- *Insect stings: Bees, wasps, jumping jack ants*
- *Food: Peanuts / tree nuts, egg, fish/shellfish, dairy products, soy, sesame seeds, wheat*
- *Medications: Antibiotics, anaesthetic drugs, contrast media*
- *Exercise-induced: Typically affecting young adults (rare)*
- *Idiopathic anaphylaxis: No external trigger (rare)*

Risk factors for refractory anaphylaxis or deterioration

The presence of the following risk factors may increase the risk of deterioration or symptoms refractory to initial adrenaline. Consider escalation of care (e.g. MICA):

- *Expected clinical course (e.g. history of refractory anaphylaxis / ICU admission / multiple adrenaline doses)*
- *Hypotensive BP < 90 mmHg*
- *Medication as precipitating cause (e.g. antibiotics, IV contrast medium)*
- *Respiratory symptoms / respiratory distress*
- *History of asthma or multiple co-morbidities/medications*

Implementation of recommendation 25: use of Glucagon

AV has implemented recommendation 25. The AV Anaphylaxis CPG was updated on 16 December 2020. It included the following advice in relation to the use of glucagon:

Glucagon

Glucagon has inotropic, chronotropic, and antibronchospastic effects and is indicated in patients who remain hypotensive after two doses of Adrenaline in the setting of:

- *Past history of heart failure, OR*
- *Patients taking beta-blocker medication*

Glucagon administration however must not delay continued Adrenaline administration.

This update to the CPG was communicated to staff via the enclosed Clinical Bulletin which includes ASCIA anaphylaxis information and video explanation including specific mention of these risks and therapies.

Yours sincerely

Professor Tony Walker ASM
Chief Executive Officer

Dr David Anderson
Medical Director

Enc

cc *Coroner's Team 2* *team2@courts.vic.gov.au*

Anaphylaxis CPG A0704

Care Objectives

- Adrenaline (IM) with minimal delay
- Airway and perfusion support
- Hospital-based observation (usually 4 hours) at a minimum

General Notes

Intended patient group

- All adult patients ≥ 12 years old

Definition

- Severe, potentially life-threatening systemic hypersensitivity reaction.[1]

Pathophysiology and presentation

Overview

- Anaphylaxis can exist with any combination of the signs and symptoms below, but may also be limited to a single body system (e.g. isolated hypotension or isolated respiratory distress in the setting of exposure to an antigen that has caused anaphylaxis in the patient previously).
- Rapid onset (usually within 30 minutes but may be up to 4 hours).
- Anaphylaxis can be difficult to identify. Cutaneous features are common though not mandatory. Irrespective of known allergen exposure, if 2 systemic manifestations are observed then anaphylaxis should be accepted.

Respiratory

- Respiratory distress, shortness of breath, wheeze, cough, stridor
  - Due to inflammatory bronchoconstriction or upper airway oedema

Abdominal

- Pain / cramping
- Nausea / vomiting / diarrhoea
  - Particularly to insect bites and systemically administered allergens (e.g. IV medications)

Skin

- Hives, welts, itching, flushing, angioedema (e.g. lips, tongue)

- Due to vasodilation and vascular hyperpermeability

Cardiovascular

- Hypotension
  - Due to vasodilation and vascular hyperpermeability

Common allergens

Exposure to an allergen may be known or unknown.

- **Insect stings:** Bees, wasps, jumping jack ants
- **Food:** Peanuts / treenuts, egg, fish/shellfish, dairy products, soy, sesame seeds, wheat
- **Medications:** Antibiotics, anaesthetic drugs, contrast media
- **Exercise-induced:** Typically affecting young adults (rare)
- **Idiopathic anaphylaxis:** No external trigger (rare)

Further information

Anaphylaxis and asthma

- Asthma, food allergy and high risk of anaphylaxis frequently occur together, often in adolescence. Bronchospasm is a common presenting symptom in this group, raising the likelihood of mistaking anaphylaxis for asthma. A history of asthma increases the risk of fatal anaphylaxis. [2]
- Maintain a high index of suspicion for anaphylaxis in patients with a history of asthma or food allergy.

Other causes of angioedema

- Several types of non-allergic angioedema exist including ACE-inhibitor induced angioedema, hereditary angioedema (HAE) and its broader categorisation: bradykinin-mediated angioedema.
- These may present with similar symptoms to anaphylaxis including abdominal signs and symptoms and laryngeal swelling however will not respond to anaphylaxis management. Urticaria and itching are typically absent and the onset of symptoms is slower than anaphylaxis (several hours).
- Where HAE or bradykinin-mediated angioedema is identified **AND** the patient has their own medication to manage this, follow the patient's treatment plan and use the patient's own medication.
- Otherwise strongly consider standard anaphylaxis management if indicated.

Risk factors for refractory anaphylaxis or deterioration

The presence of the following risk factors may increase the risk of deterioration or symptoms refractory to initial adrenaline. Consider escalation of care (e.g. MICA):

- Expected clinical course (e.g. history of refractory anaphylaxis / ICU admission / multiple adrenaline doses)
- Hypotensive BP < 90 mmHg
- Medication as precipitating cause (e.g. antibiotics, IV contrast medium)
- Respiratory symptoms / respiratory distress
- History of asthma or multiple co-morbidities/medications

OR

- No response to initial dose of IM Adrenaline

Adrenaline

- The primary treatment agent for anaphylaxis.
- **Administration site:** anterolateral mid-thigh.
- Deaths from anaphylaxis are far more likely to be associated with delay in management rather than inadvertent administration of Adrenaline.
- Patients with known anaphylaxis may carry their own Adrenaline autoinjector. If the patient responds well to their own autoinjector dose, further Adrenaline may not be required. Closely monitor for deterioration and transport to hospital.
- Patients should carry their Adrenaline auto-injector with them to hospital.
- **Adrenaline infusion:**
  - Where the initial two doses of IM Adrenaline have not been effective. IM Adrenaline every 5 minutes is appropriate if MICA is not available or while the infusion is being prepared.
  - An infusion is the preferred method of administering IV adrenaline.
- **IV Adrenaline bolus:**
  - Only administer if extremely poor perfusion or cardiac arrest is imminent.
  - IV Adrenaline should be subsequent to IM Adrenaline in all cases with an initial IM therapy option selected for every anaphylaxis patient regardless of presentation.
- **Adrenaline toxicity:** Where the patient develops nausea, vomiting, shaking, tachycardia or arrhythmias but has **some improvement in symptoms and a normal or elevated BP**, consider the possibility of adrenaline toxicity rather than worsening anaphylaxis. Consider whether further doses of adrenaline are appropriate.

Additional therapies

- Adrenaline remains the absolute priority.
- *Additional therapies* may be administered concurrently or in order of clinical need but **must not** delay continued Adrenaline administration.

Bronchospasm

- Where bronchospasm persists despite the administration of adrenaline, administer salbutamol, ipratropium bromide and dexamethasone. These medications should never be the first line treatment for bronchospasm associated with anaphylaxis.

Circulation - Hypotension

- Where hypotension (e.g. BP < 90 mmHg) persists despite initial Adrenaline therapy, IV fluid may be required to support vasopressor administration.

Glucagon

- Glucagon has inotropic, chronotropic, and antibronchospastic effects and is indicated in patients who remain hypotensive after two doses of Adrenaline in the setting of:
  - Past history of heart failure, **OR**
  - Patients taking beta-blocker medication
- Glucagon administration however must not delay continued Adrenaline administration.

Management plans

- Many patients presenting with anaphylaxis will be under the care of a medical specialist and have a prescribed anaphylaxis action plan. Where possible, paramedics should consider the action plan and align the care in accordance to specialist recommendations.

Transport

- All patients with suspected or potential anaphylaxis must be advised that they should be transported to hospital regardless of the severity of their presentation or response to management.
- Hospital-based observation is required for a minimum of **four hours** in case of a biphasic reaction, where symptoms return after an initial resolution. This occurs in approximately 20% of cases.

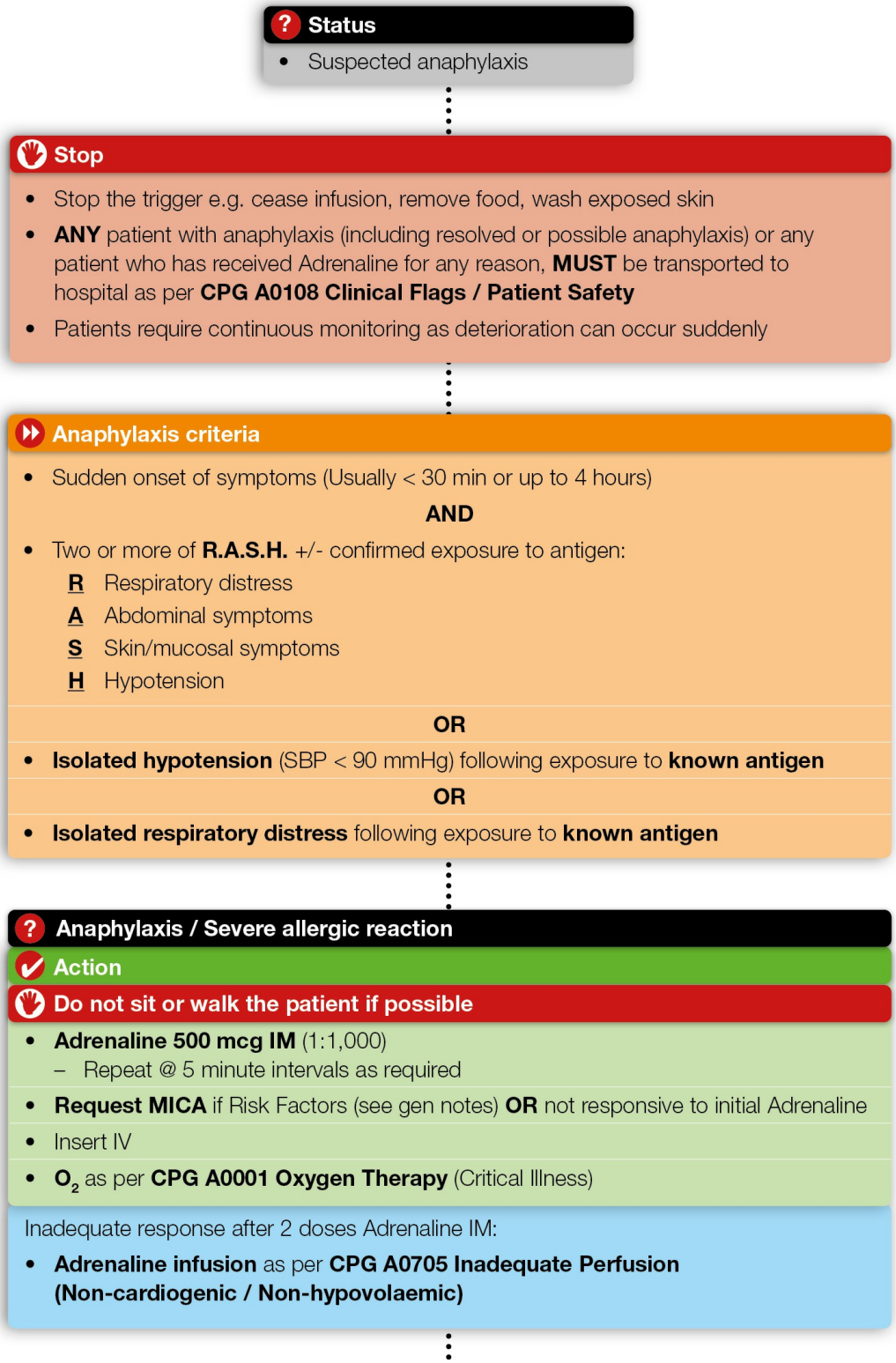
Medication preparation

Adrenaline infusion

(Via syringe pump)

- Dilute **Adrenaline 3 mg** (3 mL of 1:1000) to 50 mL with **5% Dextrose** or **Normal Saline** (in a 50 mL syringe)
- 1 mL = 60 mcg
- 1 mL/hr = 1 mcg/min

Flowchart


Status
Suspected anaphylaxis
Stop
Stop the trigger e.g. cease infusion, remove food, wash exposed skin
ANY patient with anaphylaxis (including resolved or possible anaphylaxis) or any patient who has received Adrenaline for any reason, MUST be transported to hospital as per CPG A0108 Clinical Flags / Patient Safety
Patients require continuous monitoring as deterioration can occur suddenly
Anaphylaxis criteria
Sudden onset of symptoms (Usually < 30 min or up to 4 hours)
AND
Two or more of R.A.S.H. +/- confirmed exposure to antigen:
R Respiratory distress
A Abdominal symptoms
S Skin/mucosal symptoms
H Hypotension
OR
Isolated hypotension (SBP < 90 mmHg) following exposure to known antigen
OR
Isolated respiratory distress following exposure to known antigen
Anaphylaxis / Severe allergic reaction
Action
Do not sit or walk the patient if possible
Adrenaline 500 mcg IM (1:1,000)
– Repeat @ 5 minute intervals as required
Request MICA if Risk Factors (see gen notes) OR not responsive to initial Adrenaline
Insert IV
O2 as per CPG A0001 Oxygen Therapy (Critical Illness)
Inadequate response after 2 doses Adrenaline IM:
Adrenaline infusion as per CPG A0705 Inadequate Perfusion (Non-cardiogenic / Non-hypovolaemic)

Additional therapies (in order of clinical need)

Prioritise repeat Adrenaline doses

Airway oedema / stridor:

- **Adrenaline 5 mg nebulised**
  - Consult with Clinician for repeat dose if required
  - Notify receiving hospital

Bronchospasm:

- **Salbutamol 5 mg Nebulised** or **pMDI 4 – 12 doses**
  - Repeat at 20-minute intervals if required
- **Ipratropium Bromide 500 mcg Nebulised** or **pMDI 8 doses**
- **Dexamethasone 8 mg IV / Oral**

Cardiovascular – Hypotension (BP < 90) despite initial adrenaline:

- **Normal Saline IV (max. 40 mL/kg)** titrated to response
  - Consult if further fluid is required. If consult unavailable repeat **Normal Saline 20 mL/kg IV**

Inadequate response to Adrenaline with history of heart failure **OR** taking beta blockers:

- **Glucagon 1 mg IV / IM**
  - Repeat once @ 5 minutes if required

Extremely poor perfusion OR impending cardiac arrest

Action

- **Bolus Adrenaline IV** as per **CPG A0705 Inadequate Perfusion (Non-cardiogenic / Non-hypovolaemic)**
- Consider intubation

Related Resources

- CPG Walkthrough: Anaphylaxis
- https://www.bettersafercare.vic.gov.au/resources/clinical-guidance/emergency-care/anaphylaxis-adults
- http://www.allergy.org.au/hp/hp-e-training
- https://av-digital-cpg.web.app/assets/pdf/MAC/4.1.2 (a) Anaphylaxis CPG Review 2020 MAC FINAL.pdf

References

1. Safer Care Victoria. Anaphylaxis clinical care standard. 2019 Feb. Available from: https://www.bettersafercare.vic.gov.au/resources/clinical-guidance/emergency-care/anaphylaxis-adults
2. Australasian Society for Clinical Immunology and Allery. Acute management of anaphylaxis. 2019. Available from: https://www.allergy.org.au/hp/papers/acute-management-of-anaphylaxis-guidelines

Ambulance Victoria

Clinical Bulletin

Author: David Anderson, Medical Director (Acting) 16 December 2020

Summary:

- Adrenaline remains the priority.
- Adrenaline doses have been simplified.
- There is clear criteria for escalation of care.
- Consider an adrenaline infusion after 2 IM doses if there has been an inadequate response.
- Ipratropium and dexamethasone have been added for persistent bronchospasm.
- Indications for glucagon have been clarified.

The Medical Directorate has released the following updates to the adult and paediatric anaphylaxis guideline:

Adrenaline: Remains the foundation of anaphylaxis management and is the absolute priority in all cases. Adrenaline doses have been simplified in line with peak body guidelines.

Adults ≥ 12 yrs	500 mcg IM for all adults	**Frailty / elderly dose has been removed**
Paeds < 12 yrs	10 mcg / kg IM	**Capped at 500 mcg regardless of weight**

Diagnosis: Isolated respiratory distress in the setting of exposure to a known antigen is now part of the criteria for diagnosing anaphylaxis.

Escalation of care: Clear criteria for when to call MICA are now included.

Entry point for adrenaline infusions: MICA paramedics should consider an adrenaline infusion if there is an inadequate response to two doses of IM adrenaline. The indication in this circumstance is an ongoing need to treat persistent severe symptoms, similar to the asthma CPG. An adrenaline infusion does not require that the patient be hypotensive.

Persistent bronchospasm: Ipratropium and dexamethasone are now added to the guideline in addition to salbutamol for patients with persistent bronchospasm following adrenaline.

Glucagon: Indications for glucagon are now clarified for adults. It is specifically indicated where the patient is taking beta blockers or has a history of heart failure. It has been removed from the paediatric guideline for simplicity.

These updates align with Safer Care Victoria's Anaphylaxis Clinical Care Standard and ASCIAs Guidelines for Acute Management of Anaphylaxis. These resources, the MAC paper and pdf copies of the new CPG are attached.

The changes to the paediatric guideline are included in the current Continuing Education program. As the changes are similar to those in the adult guideline, both CPGs will be updated concurrently.

Please note that the mock-up graphics used in the Paediatric and Adolescent Continuing Education program have been updated to include the finalised CPGs. For those who have already completed the Anaphylaxis module, you can go back in and review the module at any time.

Supporting resources

Additional revision on anaphylaxis pathophysiology and management, can be found via the following links (consider that these resources may differ subtly from the AV CPGs):

- The Resus Room – Anaphylaxis: podcast and quiz

- Khan Academy: Overview of Anaphylaxis

Need further support?

If you have any queries please contact us on the 'Clinical Practice Guidelines' Workplace group or via clinicalguidelines@ambulance.vic.gov.au.