**High clinical concern for anaphylaxis?**

- **Yes**
  - Give epinephrine 0.01mg/kg IM (max 0.3mg) in lateral thigh
  - Repeat every 5 min as needed (can give more frequently if symptoms are severe)
  - Place on monitors, vitals every 5 minutes
  - Place patient supine if tolerated
  - Avoid sudden changes in position, especially to standing
  - Administer O2 until O2 Sat is known, and to keep O2 saturation > 90%
  - If MAP <5th %ile → place IV and administer N/S 20 cc/kg
  - If bronchospasm → place IV and give albuterol 20 mg / hr or 8 puffs

- **No**
  - Go to Lower Clinical Concern

**Observe for 5-10 mins**

Continue monitoring with vitals every 5 minutes

- **Has patient improved?**
  - **Yes**
    - Go to Mild
  - **No**
    - Go to Moderate - Severe

### Symptoms Suggestive of Anaphylaxis

**Mild Symptoms:**
- Generalized erythema, hives, angioedema

**Moderate Symptoms:**
- Chest or throat tightness
- Dyspnea, stridor, wheeze
- Nausea, vomiting, abdominal pain
- Dizziness (presyncope), diaphoresis

**Severe Symptoms:**
- Cyanosis, saturation <= 92%
- Hypotension, collapse
- Confusion, LOC
- Incontinence

### Risk Factors for Anaphylaxis

- Possible exposure to known allergen
- Home anaphylaxis management plan

*Adapted from Brown, 2004*

### Historical factors that increase risk and warrant a lower threshold for epinephrine:

- prior anaphylaxis involving respiratory distress
- hypoxia
- hypotension
- neurologic compromise

*From Wang 2017*
Inclusion Criteria
≥ 3 months with suspected anaphylaxis

Exclusion Criteria
- Blood transfusion reactions that are not anaphylaxis
- Symptoms clearly attributable to other causes

Lower clinical concern for anaphylaxis?

Yes

Use the Anaphylaxis Score Assisting Providers (ASAP)

Score
1-4

Score
≥5

Rapid symptom progression or epinephrine indicated per patient action plan?

Yes

Epinephrine is likely indicated. Huddle with team to discuss
- Give epinephrine 0.01mg/kg IM (max 0.3mg) in lateral thigh
- Repeat every 5 mins as needed (can give more frequently if symptoms are severe)

Has patient improved?

Yes

Go to Mild

No

No

Go to Mild

Go to Moderate - Severe

Symptoms Suggestive of Anaphylaxis

Mild Symptoms:
- Generalized erythema, hives, angioedema

Moderate Symptoms:
- Chest or throat tightness
- Dyspnea, stridor, wheeze
- Nausea, vomiting, abdominal pain
- Dizziness (presyncope), diaphoresis

Severe Symptoms:
- Cyanosis, saturation < 92%
- Hypotension, collapse
- Confusion, LOC
- Incontinence

Risk Factors for Anaphylaxis
- Possible exposure to known allergen
- Home anaphylaxis management plan

Adapted from Brown, 2004

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Last Updated: September 2017
Next Expected Revision: August 2022
No steroids

Assess for risk factors

- History of biphasic or severe reaction
- History of asthma or wheezing
- Time from exposure to symptom onset delayed > 1 hour or unknown

Use ED Subsequent Anaphylaxis Phase of Powerplan if patient has received epinephrine, or has cutaneous symptoms:

- cetirizine PO
- ranitidine PO
- dexamethasone PO

Evaluate and score hourly and with symptom change

! Steroids with immunotherapy

Inclusion Criteria
≥ 3 months with suspected anaphylaxis

Exclusion Criteria
- Blood transfusion reactions that are not anaphylaxis
- Symptoms clearly attributable to other causes

Resolved after epinephrine or no epinephrine given

Symptoms resolved AND risk factors absent
No steroids

Epinephrine is likely indicated. Huddle with team to discuss.

Epinephrine is likely indicated. Huddle with team to discuss.

Go to ED Disposition

Go to Moderate - Severe

Symptoms persist OR risk factors present
dexamethasone PO

NOT worse or score 1-4

worse or score ≥5

Inclusion Criteria
≥ 3 months with suspected anaphylaxis

Exclusion Criteria
- Blood transfusion reactions that are not anaphylaxis
- Symptoms clearly attributable to other causes

Resolved after epinephrine or no epinephrine given

Symptoms resolved AND risk factors absent
No steroids

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Symptoms persist OR risk factors present
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Exclusion Criteria
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Symptoms persist OR risk factors present
dexamethasone PO

NOT worse or score 1-4

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Go to ED Disposition

Go to Moderate - Severe

Symptoms persist OR risk factors present
dexamethasone PO

NOT worse or score 1-4

worse or score ≥5

Inclusion Criteria
≥ 3 months with suspected anaphylaxis

Exclusion Criteria
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Resolved after epinephrine or no epinephrine given

Symptoms resolved AND risk factors absent
No steroids

Epinephrine is likely indicated. Huddle with team to discuss.

Epinephrine is likely indicated. Huddle with team to discuss.

Go to ED Disposition

Go to Moderate - Severe

Symptoms persist OR risk factors present
dexamethasone PO

NOT worse or score 1-4

worse or score ≥5

Inclusion Criteria
≥ 3 months with suspected anaphylaxis

Exclusion Criteria
- Blood transfusion reactions that are not anaphylaxis
- Symptoms clearly attributable to other causes

Resolved after epinephrine or no epinephrine given

Symptoms resolved AND risk factors absent
No steroids

Epinephrine is likely indicated. Huddle with team to discuss.

Epinephrine is likely indicated. Huddle with team to discuss.

Go to ED Disposition

Go to Moderate - Severe

Symptoms persist OR risk factors present
dexamethasone PO

NOT worse or score 1-4

worse or score ≥5
Epinephrine given

Inclusion Criteria
≥ 3 months with suspected anaphylaxis

Exclusion Criteria
• Blood transfusion reactions that are not anaphylaxis
• Symptoms clearly attributable to other causes

Epinephrine has been given & observed for 5-10 mins

Score patient using ASAP

Improved or score 1-4

NOT improved or score ≥5

Give epinephrine 0.01mg/kg IM (max 0.3mg) in lateral thigh

Use ED Subsequent Anaphylaxis Phase of Powerplan
• cetirizine PO (unless unable to tolerate PO, then diphenhydramine IV)
• ranitidine IV
• MethylPrednisolone IV

Observe for 5-10 min -continue monitoring, vitals every 5 minutes

Improved or score 1-4

NOT improved or score ≥5

• Consider epinephrine 0.01mg/kg IM (max 0.3mg) in lateral thigh
• Repeat every 5 min as needed (can give more frequently if symptoms are severe)
• Start epinephrine drip after 3rd IM dose
• PICU consult, admit to PICU

! Steroids with immunotherapy

Go to Mild

Go to ED Disposition

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Last Updated: September 2017
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PICU Criteria
- Persistent MAP <5%
- Altered mental status after 1 epinephrine
- > 3 doses of epinephrine given with persistent symptoms beyond rash/angioedema
- Persistent cardiovascular compromise
- Persistent respiratory distress
- Continuous albuterol for > 1 hour

Discharge Instructions
- Provide anaphylaxis discharge materials e.g. FARE Field Guide and Anaphylaxis Emergency Care Plan
- Rx epinephrine auto-injector and provide training
- RASH Hx, discharge with
  - Cetirizine prn
  - Ranitidine prn
- No RASH Hx, discharge with no meds
- Recommend allergist referral
- F/U PCP within 3 days

Discharge Criteria
- Score 1-4, no symptom progression during observation period
- Teaching completed
- Tolerating PO intake

Assessment
Observe for 4 hours from the latest of: exposure, epinephrine administration, or any worsening of symptoms

Meet admission Criteria?
- YES: Acute Care
- NO
  - Patient received epinephrine?
    - NO
      - Observe for 1 hour if symptoms are stable, or 1 hour after any symptom progression.
      - If anaphylaxis high risk by history: observe for 4 hours from either exposure or any symptom progression.
    - YES
      - Meets admission Criteria?
        - YES
          - PICU
        - NO
          - Acute Care

Urgent Care Transfer Recommendations
Transfer patients who have received IM Epinephrine to the Emergency Department
- Patients should be transported by ALS (or an ambulance crew who is able to give IM epinephrine)
- Patients who have low BP or require more than one dose of epinephrine, consider calling 911 (or Code Blue)
- Patient requiring observation after 1 hour transfer to ED

High risk by history:
- History of anaphylaxis
- History of life-threatening allergies (versus environmental)
- Two systems involved at any point

! If not improving, consider alternate diagnoses
Use Admit Phase of Anaphylaxis Powerplan

Patients to receive adjunctive medications below:
- Prednisone/prednisolone daily
- If persistent cutaneous symptoms:
  - Cetirizine PRN
  - Ranitidine PRN

PRN medications:
- Epinephrine 0.01mg/kg IM (max 0.3mg) in lateral thigh for anaphylaxis
- Albuterol 8 puffs for bronchospasm
- Ondansetron for nausea or vomiting

Be prepared for epinephrine administration – have acute anaphylaxis kit readily available (Omicell)

Symptoms Suggestive of Anaphylaxis

Mild Symptoms:
- Generalized erythema, hives, angioedema

Moderate Symptoms:
- Chest or throat tightness
- Dyspnea, stridor, wheeze
- Nausea, vomiting, abdominal pain
- Dizziness (presyncope), diaphoresis

Severe Symptoms:
- Cyanosis, saturation <= 92%
- Hypotension, collapse
- Confusion, LOC
- Incontinence

Acute Anaphylaxis Score

Assisting Providers
- Consider using as a supplemental aid to help in the recognition of anaphylaxis

D/C Criteria
- >12 hours since last epinephrine
- Teaching completed
- PCP F/U arranged within 72 hours
- Allergist referral initiated
- Tolerating PO intake

If risk of allergen re-exposure:
- FARE Field Guide
- Anaphylaxis Emergency Care Plan

Discharge Epinephrine:
- Epi Auto-injector in hand (not sent to outside pharmacy) pharmacy to train in use; watch video on Get Well/FRC

Discharge Medications:
- If rash or wheezing:
  - Prednisone x3 days

Discharge:
- For patients admitted with anaphylaxis

Inclusion Criteria
- > 3 months with suspected anaphylaxis

Exclusion Criteria
- Blood transfusion reactions that are not anaphylaxis
- Symptoms clearly attributable to other causes

If persistent wheezing without other anaphylaxis symptoms, evaluate for treatment of asthma (off pathway)

0-4 hours after epinephrine or symptom progression
- CR and O2 sat monitoring
- Vitals (BP, HR, RR) and skin check Q 2 hours
- See above for symptoms of anaphylaxis

4-8 hours
- O2 sat monitoring if respiratory symptoms
- Routine Vitals and skin check Q 4 hours
- See above for symptoms of anaphylaxis

8-16 hours, no epinephrine for 8 hours
- O2 sat monitoring if respiratory symptoms
- See above for symptoms of anaphylaxis

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Epinephrine should be Pre-ordered and readily available
- High-risk medications with epinephrine in orderset
- Recent (~24h) exposure to known allergen
- Diagnosis of anaphylaxis this admission
- Home Rx for Epinephrine auto-injector
- Home anaphylaxis action plan

Continue to observe for further signs and symptoms

Epinephrine should be Pre-ordered and readily available

Give epinephrine 0.01mg/kg (max 0.3mg) intramuscularly (IM) in lateral thigh; repeat as needed
DO NOT DELAY WHILE WAITING FOR TEAM OR RRT TO ARRIVE

Call Code Blue
Code Team to give IM epinephrine or providers can order/give epinephrine before they arrive

Call RRT Call provider with STAT page

Observe for 5-10 mins
Continue monitoring with vitals every 5 minutes

Anaphylaxis Resolved

If not already done, order one dose each of cetirizine + ranitidine + corticosteroid
Go to the Inpatient Continued Management

Place supine
Provide O2 if sats < 90% or in distress
If MAP <5% place IV and administer N/S 20 cc/kg
If bronchospasm place IV and give albuterol 8 puffs

Repeat epinephrine 0.01mg/kg (max 0.3mg) intramuscularly (IM) in lateral thigh
Plan for PICU transfer

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Last Updated: September 2017
Next Expected Revision: August 2022
1. If the patient is clearly in anaphylaxis:
   GIVE EPINEPHRINE FIRST
   DO NOT WAIT TO SCORE THE PATIENT

2. Use the score:
   a) To aid in the diagnosis of anaphylaxis and need for epinephrine, for patients where the diagnosis is unclear.
   b) To obtain a symptom score, sometimes after treatment is initiated, in order to track symptom severity over time.

**Actions based on Anaphylaxis Score:**

**SCORE 1 - 4 pt. Acute anaphylaxis may still be developing.** Routine use of epinephrine is not indicated, but may be appropriate if symptoms are recent and progressing rapidly, or if indicated per the patient’s anaphylaxis action plan. Place on monitors, observe closely in an environment with staff trained to monitor and treat for anaphylaxis, prepare to treat if needed.

**SCORE ≥ 5 pts. Acute anaphylaxis is very likely.** In the appropriate clinical context, epinephrine is indicated.

This score is only a guide. The decision to give epinephrine is a clinical decision that may vary by patient.

### ANAPHYLAXIS SCORE ASSISTING PROVIDERS (ASAP)

***SCORE ONLY CURRENT SYMPTOMS AND SIGNS***

| SKIN & MUCOSA | 0 Absent: No signs or symptoms  
|               | 1 Mild: mild itching; >3 hives; erythema or hives that resolved in past 1 hour after antihistamine  
|               | 2 Moderate (Mod): severe itching; >3 hives; areas of erythema or raised rash; face or lip edema, angioedema, red eyes  
|               | 3 Severe: rapid (<1 hour) whole body erythema or hives; tongue or intraoral edema  
| RESPIRATORY   | 0 Absent: No signs or symptoms  
|               | 1 Mild: occasional sneezing or cough; mild nasal congestion or runny nose; throat tickle; hoarseness  
|               | 2 Mod: frequent sneezing or cough; severe nasal congestion or runny nose; trouble swallowing; throat or chest tightness; chest pain; coarse breath sounds  
|               | 3 Severe: stridor, wheeze, drooling, sniff position, dyspnea, diminished breath sounds, hypoxia  
| CARDIOVASCULAR| 0 No symptoms, normal pulse, no hypotension (MAP = 5th %ile)  
|               | 1 Mild: tired; lightheaded; mildly dizzy; unexplained tachycardia; delayed capillary refill.  
|               | 2 Mod: very dizzy/near fainting; pallor; weak pulse; sweaty; somnolent. Infants: listless or lethargic  
|               | 3 Severe: Hypotension (MAP <5th %ile); cyanosis; confusion; fainting; loss of consciousness, bradycardia, arrest.  
| ABDOMINAL     | 0 Absent: No signs or symptoms  
|               | 1 Mild: nausea without vomiting; mild abdominal cramps or pain; uterine cramps; urinary incontinence  
|               | 2 Mod: mod-severe pain; or vomiting and/or diarrhea =3 total, in past 1 hour (or since epinephrine if it was given in past hour)  
|               | 3 Severe: vomiting and/or diarrhea >3 total, in past 1 hour (or since epinephrine if it was given in past hour)  
| NEUROLOGICAL | 0 Absent: No signs or symptoms  
|               | 1 Mild: anxious (without explanation); headache  
|               | In infants: persistent crying or irritability  
|               | 2 Mod: feeling of impending doom (like something terrible is about to happen)  
| RISK FACTORS | 0 Absent: No suspected exposure, no history of allergies  
|               | 1 Moderate Risk: symptom onset 1-10 hours after possible exposure AND no allergy history  
|               | 2 High Risk: rapid onset, e.g. = 1 hour post exposure (food, drugs, contrast); OR known allergies with possible exposure  

**TOTAL SCORE**
Patient Position in Anaphylaxis

Guidelines (i.e. Lieberman 2010) recommend that patients in anaphylaxis be placed supine, based on a pathology study that primarily involved adults:

Pathology series of 214 anaphylaxis deaths (including children)
- 38 anaphylactic shock deaths occurred outside hospital
- 10 had info on postural history
  - 4 died within seconds of a change to more upright posture
  - 6 died after they were propped in a sitting position after loss of consciousness
- Age not mentioned, none reported to be children

“During anaphylactic shock, the capacity of the veins and capillaries expands greatly. While a shocked person is lying down, sufficient blood might return to the vena cava to maintain a reduced circulation, but on the person’s sitting up or standing, this venous return stops; the vena cava will then become empty within seconds. There is then no flow through the right side of the heart, and within a few seconds more, no blood will return to the left side of the heart from the lungs. Pulseless electric activity continues, but in the absence of left ventricular filling there can be no contractions; this prevents coronary arterial flow and leads to myocardial ischemia. In less extreme cases, too, the coronary circulation, which is dependent on the diastolic pressure, is likely to become inadequate, because the blood pressure is the product of the cardiac output and the systemic vascular resistance, both of which are low in cases of anaphylactic shock. If this hypothesis is correct, once the vena cava is empty, epinephrine—no matter where or how it is given—could not circulate and so could not reverse the shock.”

Lieberman J Allergy Clin Imm 2010; Pumphrey J Allergy Clin Imm 2003
**Bronchospasm** or a bronchial spasm is a sudden constriction of the muscles in the walls of the bronchioles. It is caused by the release (degranulation) of substances from mast cells or basophils under the influence of anaphylatoxins. It causes difficulty in breathing which can be very mild to severe.

**Inflamed airways and bronchoconstriction in asthma.** Airways narrowed as a result of the inflammatory response cause wheezing.

Bronchospasms appear as the feature of asthma, chronic bronchitis and anaphylaxis.

Alternate diagnoses for the patients with mild symptoms:

- **Resp**: choking event, asthma
- **Cardiac**: vagal syncope, dehydration
- **GI**: gastroenteritis
- **Neurologic**: seizure, postural orthostatic tachycardia (POTS)
- **Infectious**: viral syndrome
- **Allergic**: simple hives, angioedema
- **Psychiatric**: psychogenic stridor, panic attack

Alternate diagnoses for patients with mod/severe symptoms:

- **Resp**: epiglottitis, foreign body aspiration, pulmonary embolism
- **Cardiac**: myocarditis, infarction, other heart disease
- **GI**: caustic ingestion, gastroenteritis
- **Neurologic**: seizure, stroke, increased ICP
- **Infectious**: sepsis, toxic shock syndrome
- **Toxicologic**: exposure (organophosphate) overdose (sedative-hypnotic, ACE inhibitor), scombroid poisoning
- **Psychiatric**: psychogenic stridor, panic attack
Before starting corticosteroids on a hematology/oncology patient, please contact the Hematology-Oncology team to see if there is a contraindication due to current therapy, such as immunotherapy.
What is a Biphasic reaction?

- A second wave of reaction after the first wave improved
- Estimated 15% of pediatric anaphylaxis

8 hours after exposure  | 4 hours after epi  | Next morning

- Can be less severe, as severe or more severe than the initial reaction
- Up to 25% of fatal and near-fatal food reactions
- Most within 10 hours, reported up to 72 hours after the initial reaction
- If no biphasic reaction by ED discharge (3.5 - 6 hr observation), the chance after that is 4%


Observation

- How long to observe: 4 hours from latest of symptoms, epinephrine, any worsening

- Indications for Extended Observation
  - Severe reaction of slow onset
  - History of previous biphasic reaction
  - Marked asthmatic component
  - Slow response to treatment
  - Ingested antigen (continuous absorption)
  - Long distance from care
Evidence Ratings

This pathway was developed through local consensus based on published evidence and expert opinion as part of Clinical Standard Work at Seattle Children’s. Pathway teams include representatives from Medical, Subspecialty, and/or Surgical Services, Nursing, Pharmacy, Clinical Effectiveness, and other services as appropriate.

When possible, we used the GRADE method of rating evidence quality. Evidence is first assessed as to whether it is from randomized trial or cohort studies. The rating is then adjusted in the following manner (from: Guyatt G et al. J Clin Epidemiol. 2011;4:383-94.):

Quality ratings are *downgraded* if studies:
- Have serious limitations
- Have inconsistent results
- If evidence does not directly address clinical questions
- If estimates are imprecise OR
- If it is felt that there is substantial publication bias

Quality ratings are *upgraded* if it is felt that:
- The effect size is large
- If studies are designed in a way that confounding would likely underreport the magnitude of the effect OR
- If a dose-response gradient is evident

Guideline – Recommendation is from a published guideline that used methodology deemed acceptable by the team.

Expert Opinion – Our expert opinion is based on available evidence that does not meet GRADE criteria (for example, case-control studies).

**Quality of Evidence:**
- ⭐⭐⭐⭐ High quality
- ⭐⭐⭐⭐ Moderate quality
- ⭐⭐⭐ Low quality
- ⭐⭐⭐⭐⭐ Very low quality

Guideline
Expert Opinion
Summary of Version Changes

- Version 1.0 (08/29/17): Go live
- Version 1.1 (09/1/17): Administrative changes/edits
Medical Disclaimer

Medicine is an ever-changing science. As new research and clinical experience broaden our knowledge, changes in treatment and drug therapy are required.

The authors have checked with sources believed to be reliable in their efforts to provide information that is complete and generally in accord with the standards accepted at the time of publication.

However, in view of the possibility of human error or changes in medical sciences, neither the authors nor Seattle Children's Healthcare System nor any other party who has been involved in the preparation or publication of this work warrants that the information contained herein is in every respect accurate or complete, and they are not responsible for any errors or omissions or for the results obtained from the use of such information.

Readers should confirm the information contained herein with other sources and are encouraged to consult with their health care provider before making any health care decision.
Anaphylaxis Approval & Citation

Approved by the CSW Anaphylaxis for August 29, 2017 Go Live date

CSW Anaphylaxis Team:

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Executive Approval:

<table>
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<td>Bob Sawin, MD</td>
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</tbody>
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Retrieval Website: [http://www.seattlechildrens.org/pdf/Anaphylaxis-pathway.pdf](http://www.seattlechildrens.org/pdf/Anaphylaxis-pathway.pdf)

Search Methods, Anaphylaxis, Clinical Standard Work

Studies were identified by searching electronic databases using search strategies developed and executed by a medical librarian, Jackie Morton. Searches were performed in November, 2016. The following databases were searched – on the Ovid platform: Medline, Cochrane Database of Systematic Reviews; Cochrane Central Register of Controlled Trials; elsewhere – Embase, National Guideline Clearinghouse, TRIP and Cincinnati Children’s Evidence-Based Care Guidelines. In Medline and Embase, appropriate Medical Subject Headings (MeSH) and Emtree headings were used respectively, along with text words, and the search strategy was adapted for other databases using their controlled vocabularies, where available, along with text words.

In Medline and Embase, appropriate Medical Subject Headings (MeSH) and Emtree headings were used respectively, along with text words, and the search strategy was adapted for other databases using their controlled vocabularies, where available, along with text words. The time frame searched for some clinical questions was 2006 to the date the search was conducted and included all levels of evidence currently in place for Clinical Effectiveness pathways. Some clinical questions were searched for 1996 to the date of the search and included all levels of evidence currently in place for Clinical Effectiveness pathways. Some clinical questions were searched for 2006 to the date of the search and have no levels of evidence applied. Concepts searched were the diagnosis, grading and treatment of anaphylaxis including the broader concept of hypersensitivities. The search strategy does not include the concept of severity or grade of acuteness; this is to be determined during the review process. All retrieval was limited to English language. The team added 38 citations not retrieved with the search strategy limitations.

Jackie Morton, MLS
May 24, 2017

Flow diagram adapted from Moher D et al. BMJ 2009;339:bmj.b2535


Bibliography


Bibliography


