ASTHMA… CAUSE OF MORTALITY SINCE 400 B.C.

TIM GILMORE, PHD, RRT, RRT-NPS, RRT-ACCS, CPFT, AE-C
ASSOCIATE PROFESSOR
CARDIOPULMONARY SCIENCE
LOUISIANA STATE UNIVERSITY HEALTH
SHREVEPORT, LOUISIANA

OBJECTIVES

- Discuss the incidence of asthma and asthma-related deaths
- Discuss brief history of asthma care
- Describe current literature and treatment options for severe asthma
- Analyze clinical indications of fatal asthma risk
  - Unusual case of severe refractory asthma

Asthma Defined

Heterogenous disease, usually characterized by chronic **airway inflammation** (usually associated with airway **hyperresponsiveness**), defined by the history of respiratory symptoms: **wheeze**, **SOB**, **chest tightness**, and **cough** that may vary over time and in intensity, together with *variable expiratory flow limitation**

Global Initiative for Asthma (GINA) Main Report 2022

Asthma Defined

common **chronic** disorder of the airways that is **complex** and characterized by variable and recurring symptoms, *airflow obstruction*, *bronchial hyperresponsiveness*, and an underlying *inflammation**

**NHLBI, NAEPP, 2007*

REPORTS

The *Global Strategy for Asthma Management and Prevention* incorporates new scientific information about asthma based on a review of recent scientific literature by an international panel of experts on the GINA Science Committee. This comprehensive and practical resource about one of the most common chronic lung diseases worldwide contains extensive citations from the scientific literature and forms the basis for other GINA documents and programs.

2022 GINA MAIN REPORT | 2022 GINA POCKET GUIDE | 2022 GINA APPENDIX

WHAT'S NEW IN 2022 – SLIDE SET

GLOBAL STRATEGY FOR ASTHMA MANAGEMENT AND PREVENTION

Updated 2022

© 2022 Global Initiative for Asthma

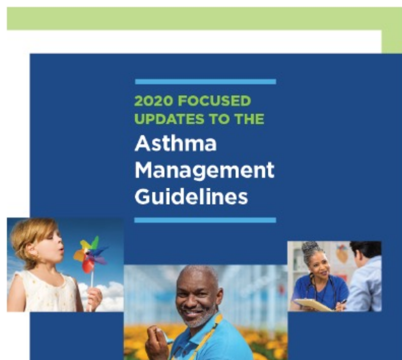
nhlbi.nih.gov/resources/2020-focused-updates-asthma-management-guidelines

U.S. Department of Health & Human Services

NIH National Heart, Lung, and Blood Institute

Health Topics | The Science | Grants and Training | News and Events | About NHLBI

Home / Health Topics / NHLBI Publications and Resources / All NHLBI Publications and Resources / 2020 Focused Updates to the Asthma Management Guidelines: A Report from the Nation
Prevention Program Coordinating Committee Expert Panel Working Group



NHLBI PUBLICATIONS AND RESOURCES

2020 Focused Updates to the Asthma Management Guidelines: A Report from the National Asthma Education and Prevention Program Coordinating Committee Expert Panel Working Group

DOWNLOAD

PDF

A Report from the National Asthma Education and Prevention Program Coordinating Committee Expert Panel Working Group

U.S. Department of Health and Human Services
National Institutes of Health
National Heart, Lung, and Blood Institute

Asthma Myths:

Asthma “*goes away*”

Asthma is “*not that bad*” ….it’s mostly psychosomatic

Mild cases of asthma are simply a nuisance

Albuterol is always the solution

History of **Asthma**

aazein - “to pant”, “to exhale with open mouth, sharp breath”

Corpus Hippocraticum *(460 – 360 BC)*

- *asthma* first used as a medical term

Aretaeus of Cappadocia (100 AD)

- first clinical description of asthma

Galen (130-200 AD)

- description of asthma as “bronchial obstructions”

Ebers Papyrus (c. 1500 BC)

THE PAPYRUS EBERS

Translated from the German Version

By

CYRIL P. BRYAN
M.B., B.CH., B.A.O.
Demonstrator in Anatomy, University College, London

With an Introduction by

PROFESSOR G. ELLIOT SMITH
M.D., D.SC., LITT.D., F.R.C.P., F.R.S.
Professor of Anatomy, University College, London

A mixture of herbs heated on a brick so that the sufferer could inhale their fumes.

GEOFFREY BLES
22 SUFFOLK STREET, PALL MALL
LONDON, S.W.1

MERCK'S 1899 MANUAL

Alcohol: in combination with amyl nitrite in spasmodic asthma.

Ammonia Vapor.

Anesthetics: as a temporary remedy in severe cases.

Arsenic: in small doses in cases associated with bronchitis or simulating hay fever, or in the bronchitis of children, or in the dyspeptic asthma. Inhaled as cigarettes with caution.

Atropine.

Cannabis Indica: sometimes useful in chronic cases.

Chloroform: relieves when inhaled from tumbler or with warm water.
Cocaine.
Coffee: very strong, during paroxysm.

Morphine: combined with belladonna, very useful.
Nitroglycerin: in bronchitic, nephritic and spasmodic asthma.

Caffeine: 1 to 5 grn.

Tobacco: smoking is sometimes beneficial.

25 STÜCK
OTTO
BROSIG
MÜNCHEN
Best.: Fol.
stramon.
BROSIG's
ASTHMA-
ZIGARETTEN
12/41

Kellogg's
ASTHMA
CIGARETTES
CONTAINS
20
CIGARETTES
Northrop & Lyman Co.
Limited
Toronto Canada

SOLUTION
ADRENALIN CHLORIDE
PARKE, DAVIS & CO.

Primatene®
MIST
Epinephrine Inhalation Aerosol
0.125 mg per spray
Bronchodilator
For Oral
Inhalation Only
For TEMPORARY relief
of MILD symptoms
of INTERMITTENT asthma
Suspension:
Shake then Spray
into the air before
each inhalation.
NEW FORMULATION:
See Important Usage
Information on Insert
and on Side Panels
160 Metered Sprays
Net Weight: 11.7g

VAPORIZER

The NEW ENGLAND JOURNAL of MEDICINE

200 NEJM ANNIVERSARY ARTICLE

A Patient with Asthma Seeks Medical Advice in 1828, 1928, and 2012

Erika von Mutius, M.D., and Jeffrey M. Drazen, M.D.

N Engl J Med 2012: 366(9)

WHERE ARE WE NOW?

Morbidity & Mortality

> 8% of the US population has **asthma**[1,2]

[1]CDC, US DHH (2011)

[2]Schiller et al.; National Health Interview Survey (2011)

Asthma control in the United States, 2008-2010: Indicators of poor asthma control

Julia F. Slejko, PhD,[a] Vahram H. Ghushchyan, PhD,[b] Brandon Sucher, PharmD, CDE, AE-C,[c] Denise R. Globe, PhD,[d]* Shao-Lee Lin, MD, PhD,[d]‡ Gary Globe, PhD, MBA,[d] and Patrick W. Sullivan, PhD[c] *Seattle, Wash, Yerevan, Armenia, Denver, Colo, and Thousand Oaks, Calif*

N = 102,544

4.8% self-reported asthma exacerbation in last 1 year
28% had never used long-term control medication

J Allergy Clin Immunol, 2014; 133(6)

Coexisting chronic conditions associated with mortality and morbidity in adult patients with asthma

Kaharu Sumino, MD, MPH[1,2], Katiuscia O'Brian, MA[1,2], Brian Bartle, MPH[3], David H. Au, MD, MS[4,5], Mario Castro, MD, MPH[1], and Todd A. Lee, PharmD, PhD[6]

N = 25,975

13 most prevalent comorbidities:
hypertension, IHD, osteoarthritis, RA, DM, mental disorders, substance/drug abuse, enlarged prostate, depression, CA, EtOH, HIV, heart failure;   sleep apnea, GERD, rhinitis, sinusitis

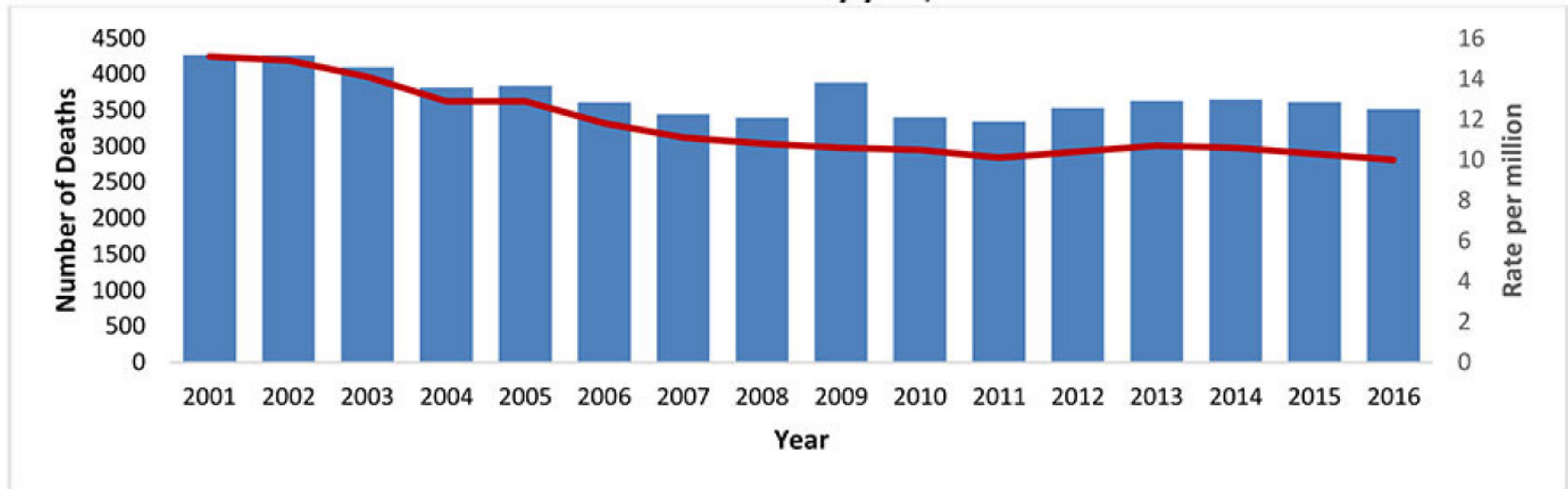
J Asthma, 2014; 51(3)

American Journal of Respiratory and Critical Care Medicine

U.S. Health Care Spending on Respiratory Diseases, 1996-2016

Kevin I Duan , Maxwell Birger , David H Au , Laura J Spece , Laura C Feemster ; Joseph L Dieleman

Asthma deaths have decreased over time



Centers for Disease Control and Prevention
CDC 24/7: Saving Lives, Protecting People™

How Many People Die From Asthma?

- On average, 11 people in the U.S. die from asthma each day. In 2020, 4,145 people died from asthma. Nearly all of these deaths are avoidable with the right treatment and care.[8]
    - In 2020, deaths due to asthma rose for the first time in 20 years.[8]
- Adults are five times more likely to die from asthma than children.[8]
- Female adults are more likely to die from asthma than male adults, and male children are more likely than female children.[8]
- Black people in the U.S. are nearly three times more likely to die from asthma than white people in the U.S.[8]
- When sex is factored in, Black females have the highest rate of fatality due to asthma. In 2020, Black females were nearly four times more likely to die from asthma than white males.[8]

2020 FOCUSED UPDATES TO THE Asthma Management Guidelines

A Report from the National Asthma Education and Prevention Program Coordinating Committee Expert Panel Working Group

U.S. Department of Health and Human Services
National Institutes of Health
National Heart, Lung, and Blood Institute

Prior Recommendations of **Asthma** Treatment

- SABA
- ICS
  - Low, Med, High
- Alternative Rx
  - Leukotriene receptor antagonist, Theophylline, Monoclonal antibody

Environmental control

Current Recommendations
of Asthma Treatment

Figure I.d: Stepwise Approach for Management of Asthma in Individuals Ages 12 Years and Older

	Intermittent Asthma	Management of Persistent Asthma in Individuals Ages 12+ Years				
Treatment	**STEP 1**	**STEP 2**	**STEP 3**	**STEP 4**	**STEP 5**	**STEP 6** ■
Preferred	PRN SABA	Daily low-dose ICS and PRN SABA or PRN concomitant ICS and SABA ▲	Daily and PRN combination low-dose ICS-formoterol ▲	Daily and PRN combination medium-dose ICS-formoterol ▲	Daily medium-high dose ICS-LABA + LAMA and PRN SABA ▲	Daily high-dose ICS-LABA + oral systemic corticosteroids + PRN SABA
Alternative		Daily LTRA* and PRN SABA or Cromolyn,* or Nedocromil,* or Zileuton,* or Theophylline,* and PRN SABA	Daily medium-dose ICS and PRN SABA or Daily low-dose ICS-LABA, or daily low-dose ICS + LAMA, ▲ or daily low-dose ICS + LTRA,* and PRN SABA or Daily low-dose ICS + Theophylline* or Zileuton,* and PRN SABA	Daily medium-dose ICS-LABA or daily medium-dose ICS + LAMA, and PRN SABA ▲ or Daily medium-dose ICS + LTRA,* or daily medium-dose ICS + Theophylline,* or daily medium-dose ICS + Zileuton,* and PRN SABA	Daily medium-high dose ICS-LABA or daily high-dose ICS + LTRA,* and PRN SABA	
		Steps 2–4: Conditionally recommend the use of subcutaneous immunotherapy as an adjunct treatment to standard pharmacotherapy in individuals ≥ 5 years of age whose asthma is controlled at the initiation, build up, and maintenance phases of immunotherapy ▲			Consider adding Asthma Biologics (e.g., anti-IgE, anti-IL5, anti-IL5R, anti-IL4/IL13)**	

- Intermittent inhaled steroids
- Long-acting muscarinic antagonists
- Indoor allergy relief
- Immunotherapy in the treatment of allergic asthma
- Fractional exhaled nitrous oxide (FeNO) testing
- Bronchial thermoplasty

NHLBI EPR-4 Asthma Guidelines 2020

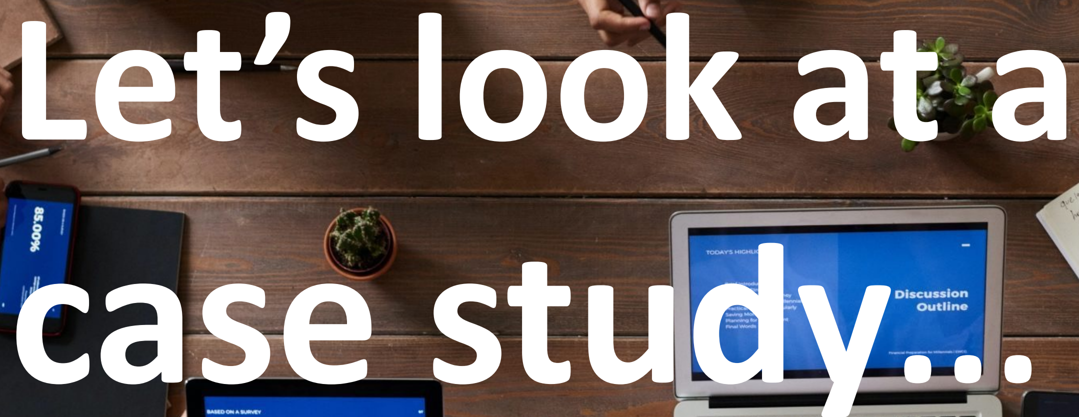
Current Recommendations of **Asthma** Treatment

- SABA
- Inhaled corticosteroids
  - Low, Med, High
- Oral systemic steroids prn
- Alternative Rx
  - Leukotriene receptor antagonist, Theophylline, Monoclonal antibody

*Environmental control

Why Do Patients with Asthma Still Die?

Let’s look at a case study…



18 Year Old, Black Female

- 5’5”, 80 kg (176 lbs)
- Brought in via EMS on stretcher
  - 1 Albuterol treatment given *en route*
- Upon arrival, Patient in remarkable distress
  - Unable to perform ROS; Patient unable to speak in complete sentences
- Pmed Hx: Schizoeffective disorder, asthma, eczema, depression

Physical Exam

- BP: 105/47
- HR: 120-140's
- Temp: 92.5 °F (33.6 °C, rectal)
- RR: 40's
- SpO_2: 70-90% (poor waveform)
- Bilateral breath sounds: Diminished with faint wheezes

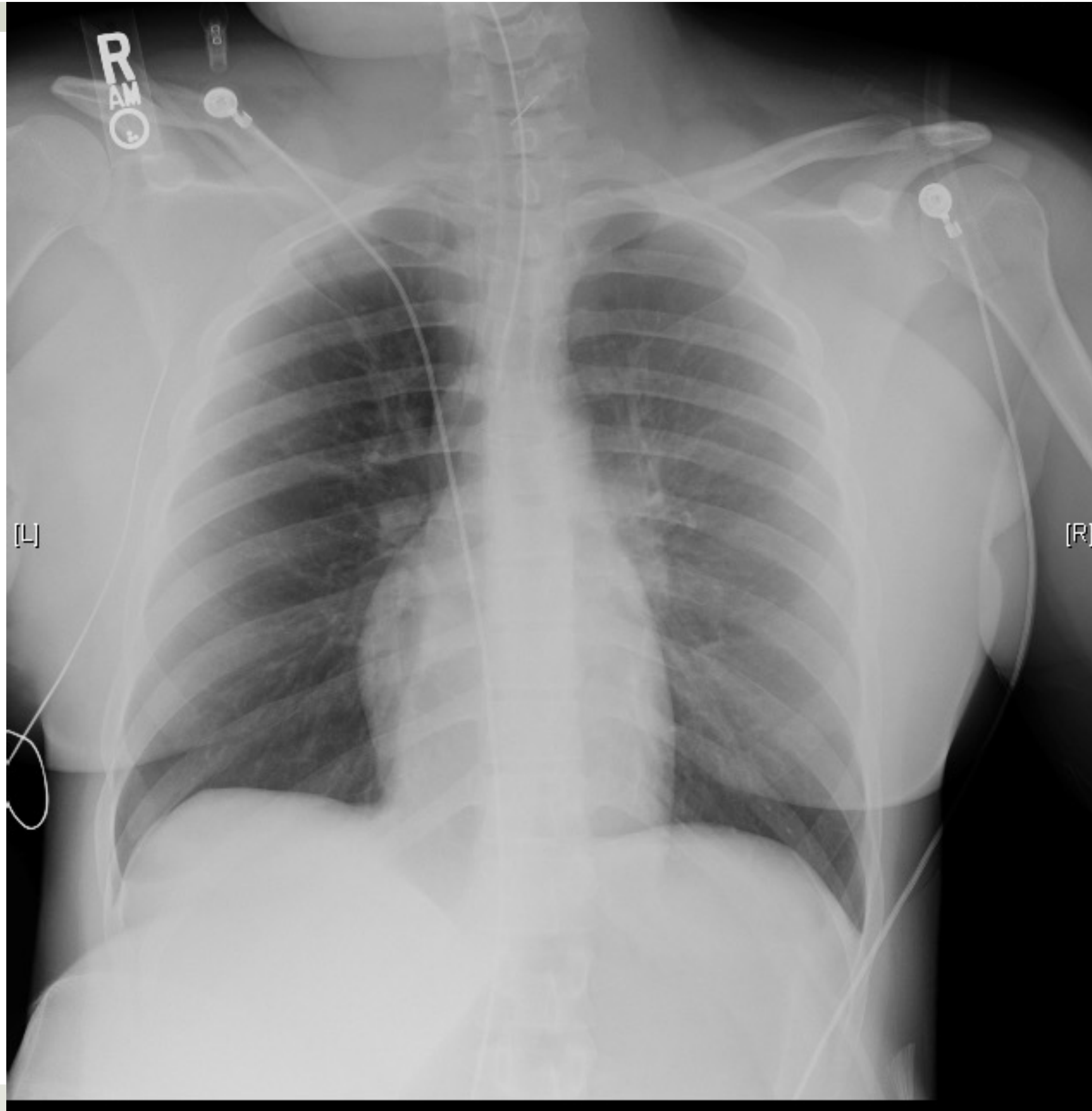
Initial Interventions

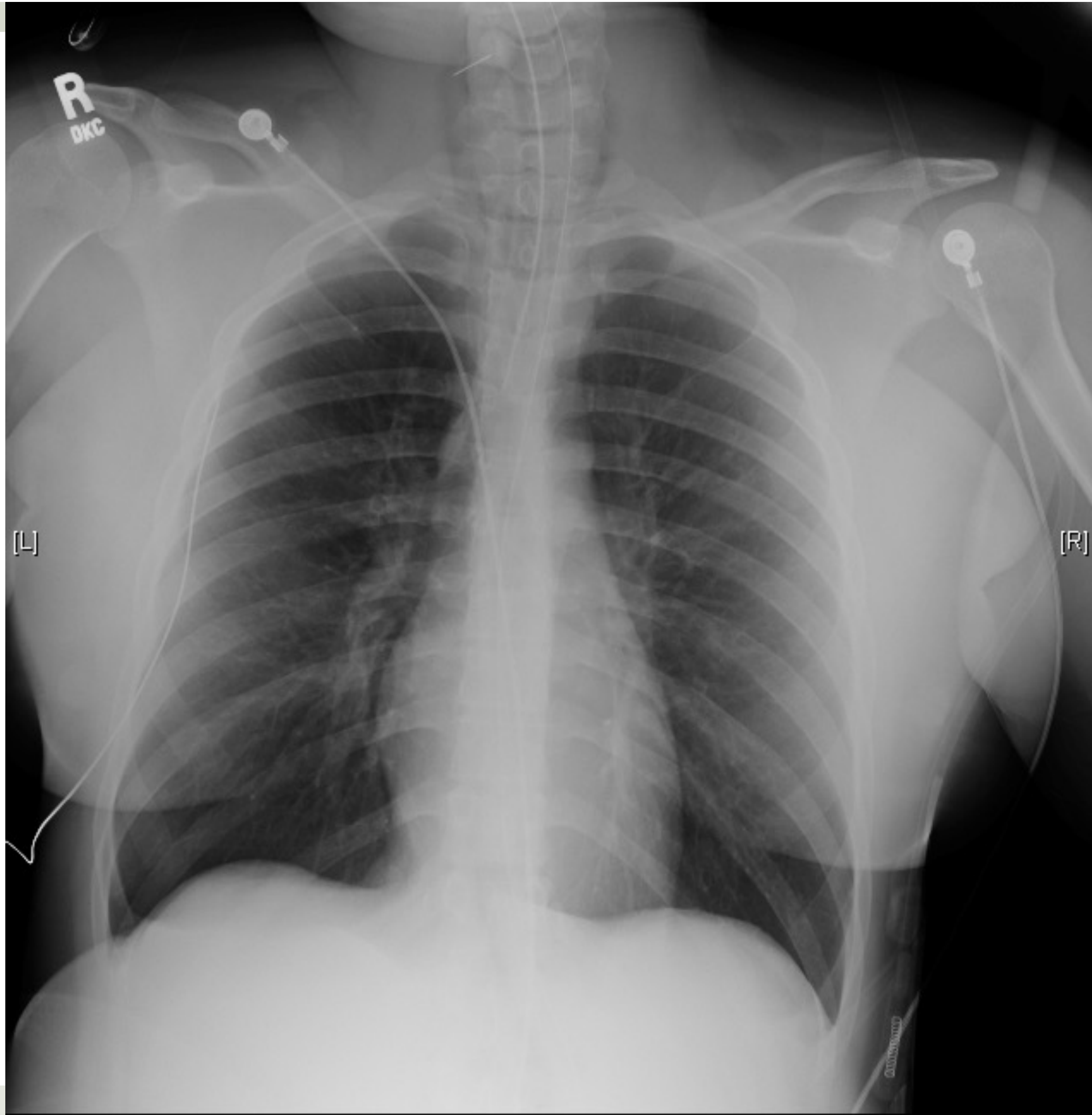
- 2 gm Magnesium Sulfate IV
- 125 mg Solumedrol IV
- Heliox started
- 10 mg Ketamine given

NONE OF THE ABOVE HAD SIGNIFICANT CLINICAL EFFECT

…Patient becomes apneic

- Rapid sequence intubation performed
- Post-intubation difficulty bagging
- Patient becomes bradycardiac… then pulseless
- CPR started
  - return of pulse after 2 mins. CPR & 3rd dose Epi


R
AM
[L]
[R]


R
DKC
[L]
[R]

Post Intubation – Post Code

- Patient with sustained 'rebound' tachycardia & placed on PPV – **Propofol** for sedation
  - PRVC 350/12/.50/+5
- SpO2 begins dropping; PIPs increasing
  - Disconnected/bagged with improvement noted
- *New facial and neck edema noted*
- Asymmetrical excursion of R chest

20 mg Albuterol given down OETT

Initial Post-Intubation, Post-Code ABG

pH: 6.74

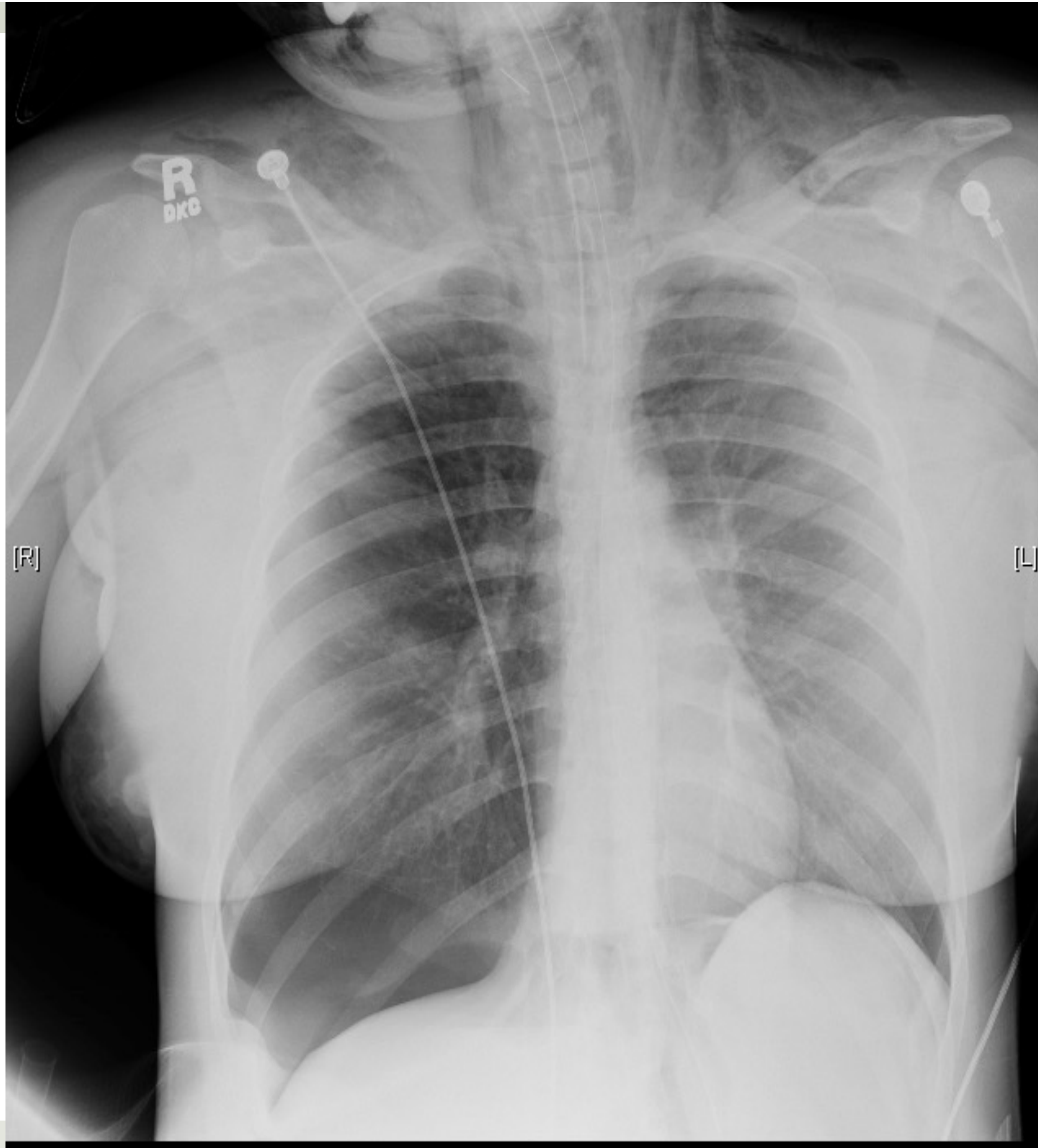
PaCO2: 213

PaO2: 50

HCO3: 11.4

BE/D: 8.7

Lactate: 11.7


R
DKC
[R]
[L]

Complications continue…

- Patient with altered mental status
- Still unable to be ventilated via PPV

2nd ABG drawn

2nd ABG

pH: 7.18

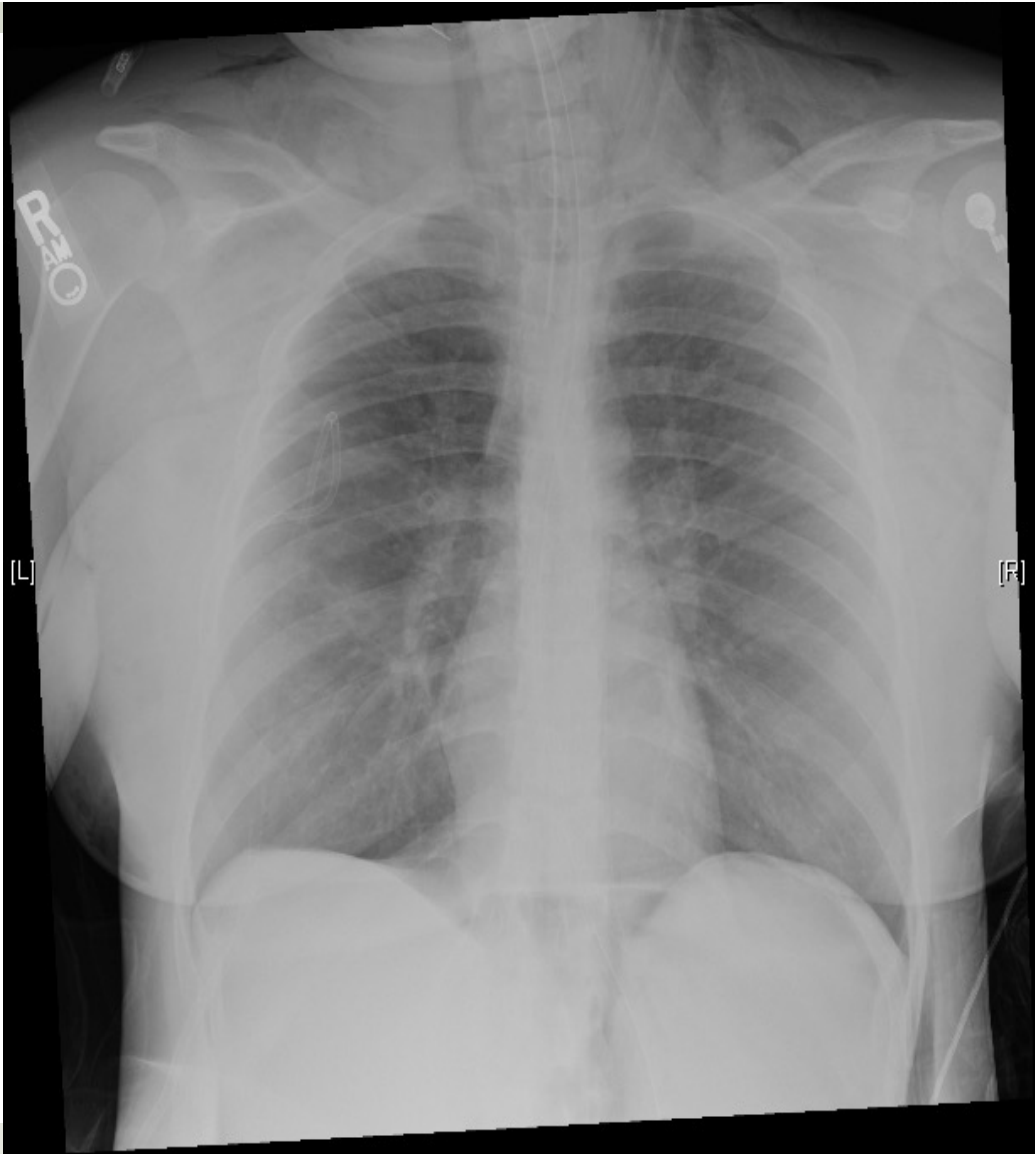
$PaCO_2$: 80

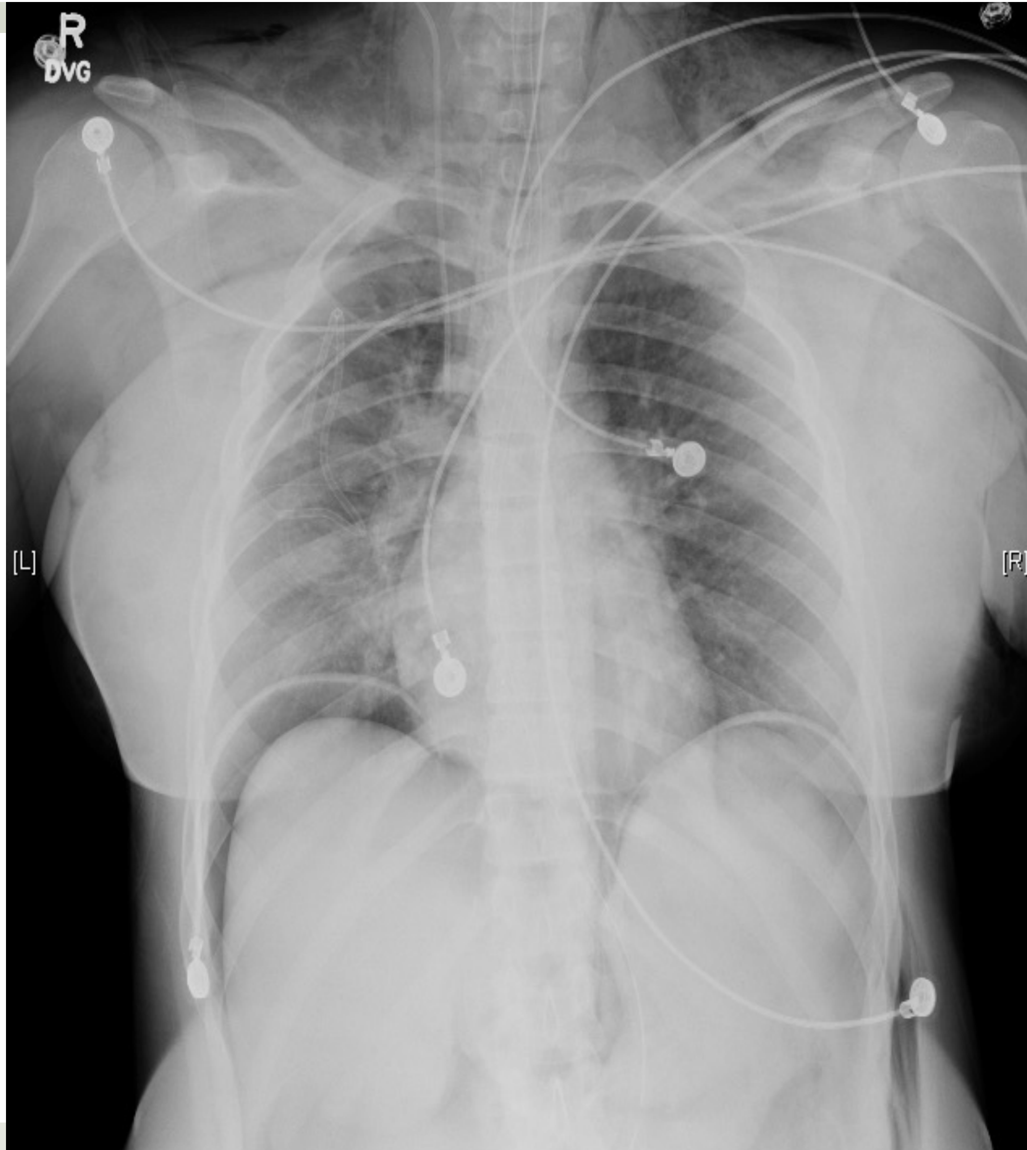
PaO_2: 389

HCO_3: 20.3

BE/D: 20.3

Lactate: 2.9


R
[L]
[R]


R
DVG
[L]
[R]

3rd ABG

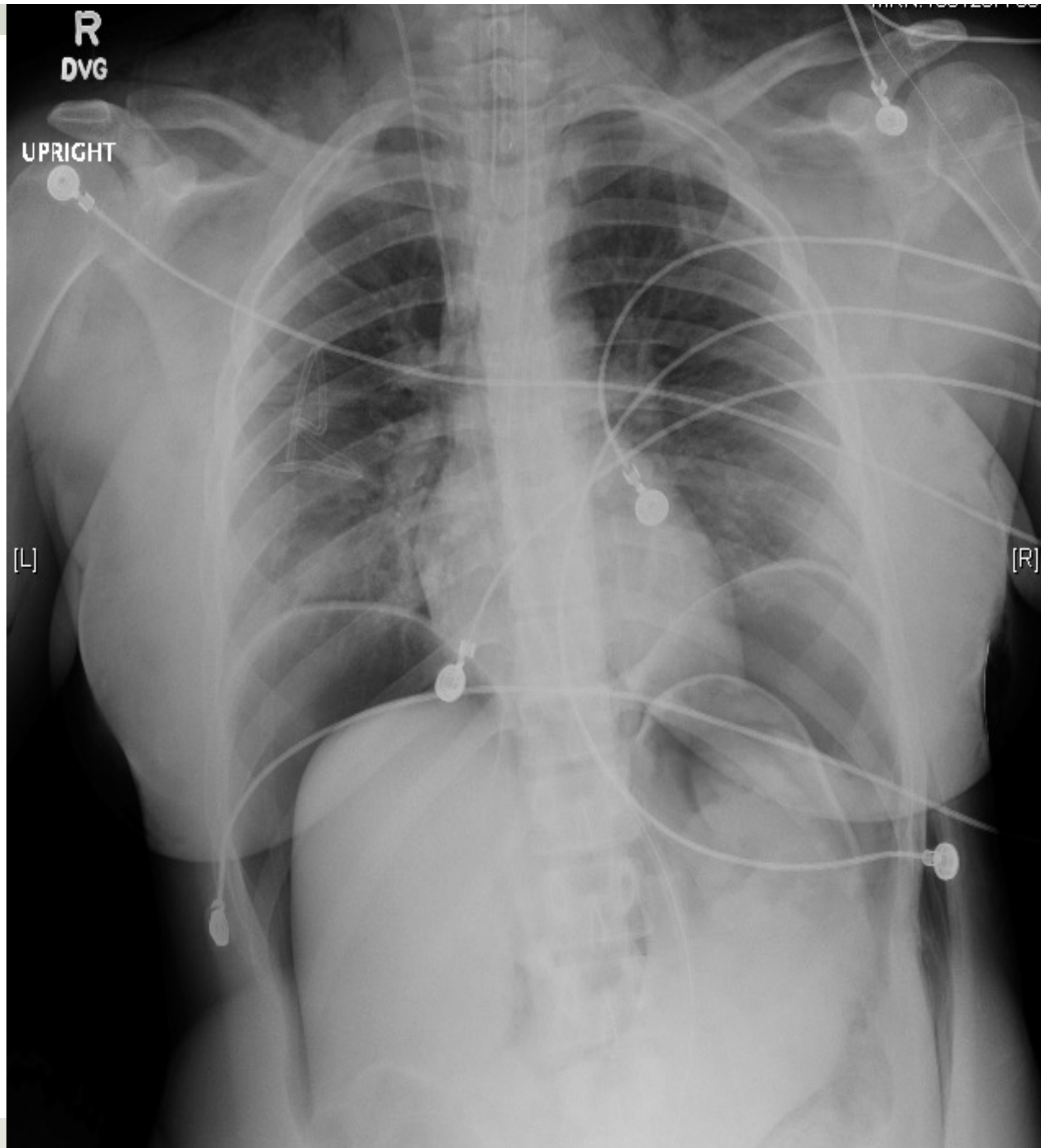
pH: 7.00

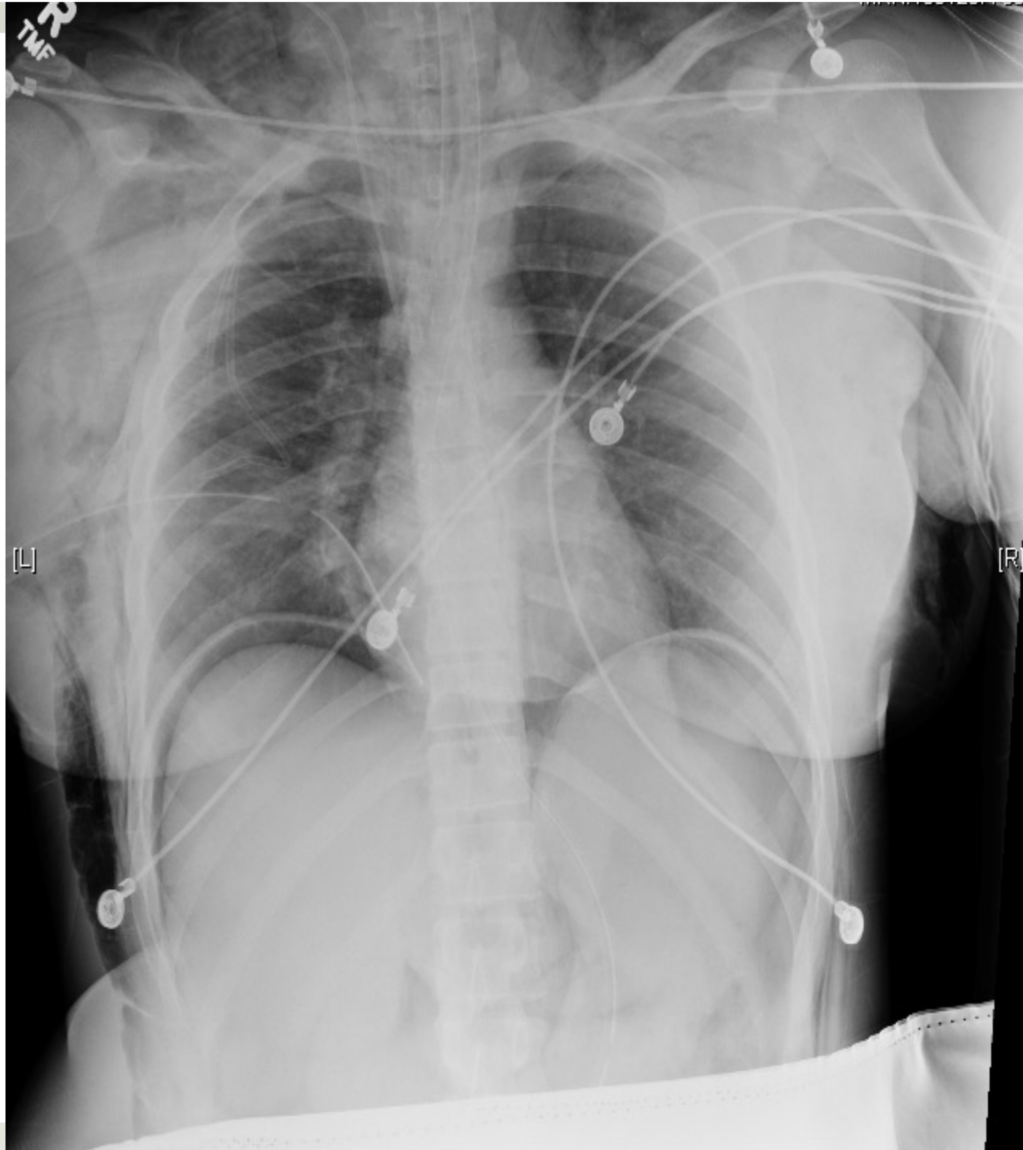
$PaCO_2$: 130

PaO_2: 102

HCO_3: 19.5

BE/D: 0.3


R
DVG
UPRIGHT
[L]
[R]


R
TMF
[L]
[R]

Outcome

- Difficult to manage on PPV
- Prolonged "reversal" time
- Patient survived
  - Mild anoxic brain injury

- Recovered at outlying rehab facility

25.2 Million Americans Have Asthma

Group with highest proportional prevalence:
20-24 year olds

Females > Males
Highest risk = Below poverty level

CDC, 2022

Number of visits to ED with asthma as primary diagnosis: 1.6 million

Number of asthma-related deaths in 2020 = 4,145

CDC, 2022

“If you think about how healthcare is delivered, it’s on an ad hoc basis. Someone comes into a hospital, someone comes into a pharmacy, someone comes into a doctor. But beyond those touchpoints, the patients are on their own.

Viehbacher – CEO, Sanofi [Harvard's First Forum on Healthcare Innovation Report]

THE BEST ‘TREATMENT’ FOR ASTHMA?

PREVENTION OF EXACERBATION

THE NEW ENGLAND JOURNAL OF MEDICINE Feb. 13, 1986

FATAL ASTHMA

SOLOMON R. BENATAR, M.B., CH.B., F.F.A. (S.A.), F.R.C.P. (LOND.)

ASTHMA has been recognized for more than 30 centuries,[1] but only in the past 50 years has death from the disease attracted much atte[illegible] Floyer re-

ic" of deaths among young persons with asthma was observed in the United Kingdom,[10-12] New Zealand,[13] Australia,[14,15] and to a much lesser extent, in the

- **Delay** in seeking medical assistance
- **No** history of **specialist care**
- History of **previous hospitalizations**
- High incidence of death **after recent hospitalization** for asthma
- At least 1 **ED visit** for asthma **in last 1 year**

Why asthma still kills
The National Review
of Asthma Deaths (NRAD)

Identifying patients at risk for fatal asthma

Authors: J Mark Madison, MD, Richard S Irwin, MD
Section Editor: Monica Kraft, MD
Deputy Editor: Paul Dieffenbach, MD

Contributor Disclosures

All topics are updated as new evidence b[...]es available and our peer review process is complete.

Literature review current through: **Sep 2022.** | This topic last updated: **Aug 10, 2022.**

Most asthma-related deaths are preventable if risk factors are recognized and addressed early

Specific characteristics that would help the clinician predict which patients are predisposed to rapid-onset asthma attacks have not been identified

UpToDate®

Identifying patients at risk for fatal asthma

Authors: J Mark Madison, MD, Richard S Irwin, MD
Section Editor: Monica Kraft, MD
Deputy Editor: Paul Dieffenbach, MD

Contributor Disclosures

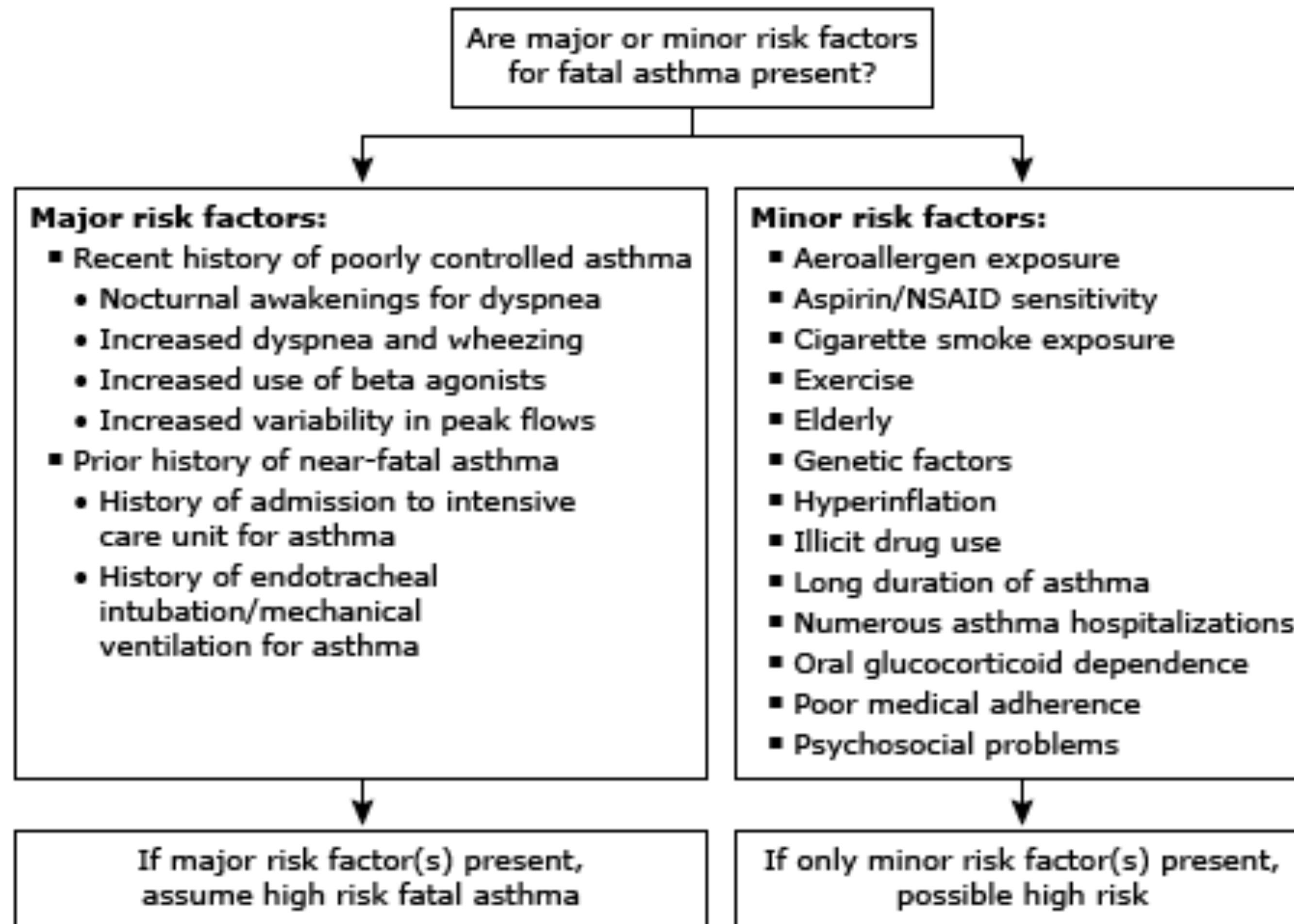
All topics are updated as new evidence [illegible]es available and our peer review process is complete.

Literature review current through: **Sep 2022.** | This topic last updated: **Aug 10, 2022.**

Highest risk patients = Recent history of poorly controlled asthma

Highest risk patients = history of near-fatal asthma

Assessing fatal asthma risk



UpToDate®

EMERGING **RESEARCH**

Comparing the Effect of Acute Moderate and Vigorous Exercise on Inflammation in Adults with Asthma: A Randomized Controlled Trial

Hayley A Scott, Lisa G Wood, Evan J Williams, Natasha Weaver, and John W. Upham

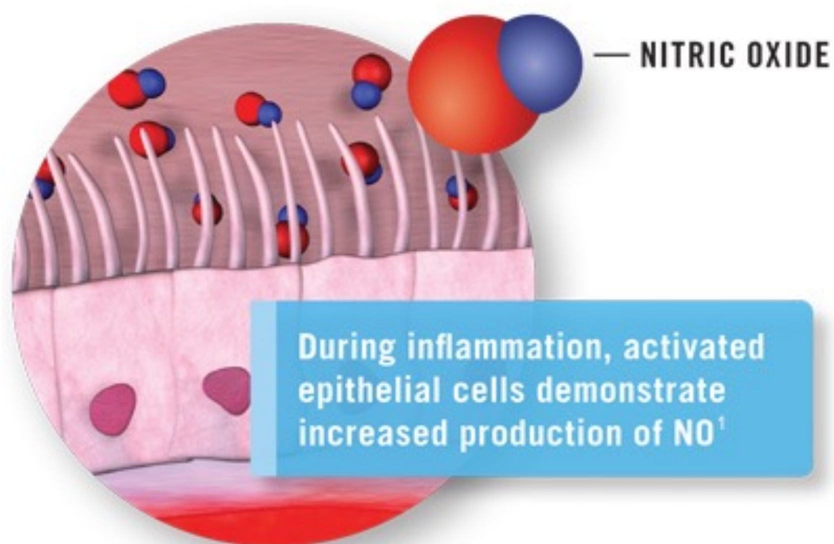
Conclusions: Exercise intensity modifies the acute inflammatory response to exercise in adults with asthma. While a bout of moderate exercise is associated with a reduction in eosinophilic airway inflammation, vigorous exercise has no effect on airway inflammation. Interestingly, the effects of moderate exercise vary by asthma phenotype, with greater anti-inflammatory effects in participants with eosinophilic asthma. Future studies should examine the impact of exercise training at different intensities on inflammation and clinical asthma outcomes.

ANNALS OF THE
AMERICAN THORACIC SOCIETY®
A journal dedicated to advancing care in respiratory diseases, sleep disorders, and critical illness

Breathing Exercises for Patients with Asthma in Specialist Care: A Multicenter Randomized Clinical Trial

Karen H. Andreasson, Søren T. Skou, Charlotte S. Ulrik, Hanne Madsen, Kirsten Sidenius, Karin D. Assing, Celeste Porsbjerg, Jannie Bloch-Nielsen, Mike Thomas, and Uffe Bodtger

ATSJournals
American Journal of Respiratory and Critical Care Medicine



Use of Fractional Exhaled Nitric Oxide to Guide the Treatment of Asthma: An Official American Thoracic Society Clinical Practice Guideline

Sumita B Khatri, Jonathan M Iaccarino, Amisha Barochia, Israa Soghier, Praveen Akuthota, Anna Brady, Ronina A Covar, Jason S Debley, Zuzana Diamant, Anne M Fitzpatrick, David A Kaminsky, Nicholas J Kenyon, Sandhya Khurana, Brian J Lipworth, Kevin McCarthy, Michael Peters, Loretta G Que, Kristie R Ross, Elena K Schneider-Futschik, Christine A Sorkness, Teal S Hallstrand, American Thoracic Society Assembly on Allergy, Immunology, and Inflammation

ANNOUNCEMENT

SPACER USE DECREASES PATIENT COORDINATION NEED AND **WILL ENHANCE** OVERALL **AEROSOL** MEDICATION **DELIVERY**

THANKS FOR LISTENING!

Tim.Gilmore@lsuhs.edu