Title:

Resuscitate Your Dying Lectures!

Applying Evidence-Based Principles to Improve Slide Design

Authors:

Carolyn Commissaris, MD

University of Michigan Medical School, Department of Emergency Medicine

cvcomm@med.umich.edu

Bella Nagappan, MD

University of Michigan Medical School, Department of Emergency Medicine

bellz@med.umich.edu

Daniel Cronin, MD

University of Michigan Medical School, Department of Internal Medicine

croninda@med.umich.edu

Sarah Michael, DO

Sarah.michael@cuanschutz.edu

University of Colorado Denver School of Medicine

Chris Merritt, MD

Alpert Medical School, Brown University

cmerritt@brown.edu

Michelle Daniel, MD

University of Michigan Medical School, Office of Medical Student Education

micdan@med.umich.edu

1

2 DR. CAROLYN V COMMISSARIS (Orcid ID : 0000-0002-7099-4851)

3 DR. CHRIS MERRITT (Orcid ID : 0000-0002-9897-1272)

4

5

7

8

9

10 **Corresponding author mail id:** cvcomm@umich.edu

11 **Resuscitate Your Dying Lectures!**

12 **Applying Evidence-Based Principles to Improve Slide Design**

13

14 Carolyn Commissaris[1], MD, Bella Nagappan[1], MD, Daniel Cronin[1], MD, Sarah H. Michael[2],

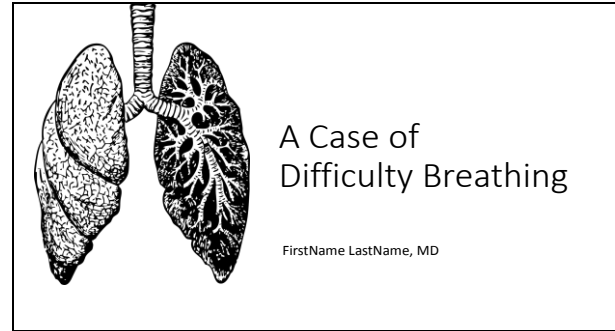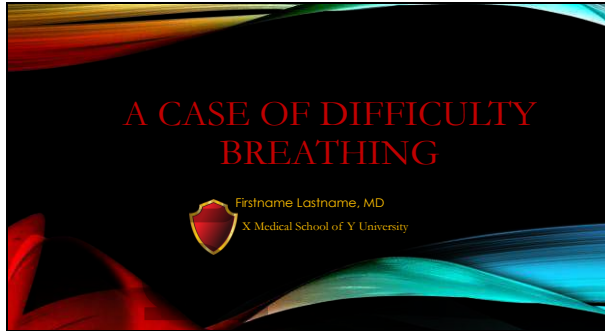15 DO, MS, Chris Merritt[3], MD, MPH, MHPE, Michelle Daniel[1], MD, MHPE

16 [1] University of Michigan Medical School, Ann Arbor, MI, [2] University of Colorado Denver School of Medicine,

17 Aurora, CO, [3] Warren Alpert Medical School of Brown University, Providence, RI

18

19 Lectures are a long-standing tradition in medical education, though in some settings they seem to

20 be drawing their last breath. But the lecture _need not die! When presentations are designed in

21 ways that are consistent with how the human mind works, they can be highly effective

22 instructional tools. Mayer's work on multimedia learning provides evidence-based guidance on

23 how to improve presentations, but most physicians are unfamiliar with these principles.[1-3] This

24 educational download uses graphic examples to familiarize educators with several of Mayer's

25 key concepts that relate to slide design and offers tips to improve the visual and educational

26 impact of future presentations.

27

28 **Applying Mayer's Multimedia Principles**

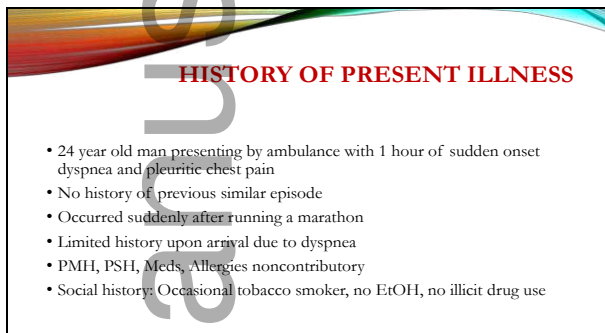BEFORE   AFTER
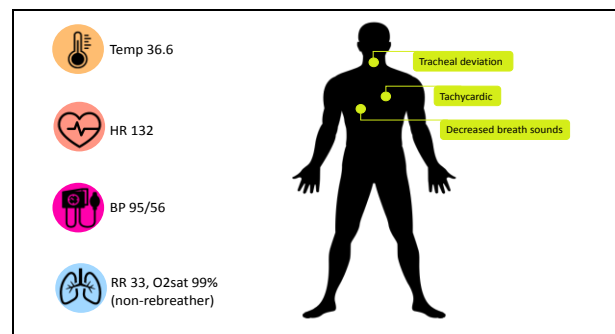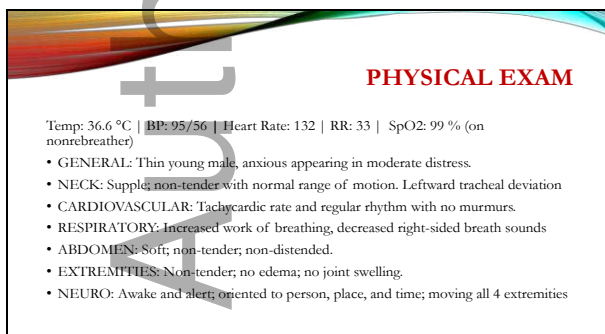
- Coherence principle – excluding interesting but irrelevant content reduces extraneous cognitive load and makes the slide as easy as possible to process.

- Start with a plain background (avoid templates, logos).
- Use colors with high contrast (i.e. black on white).
- Use sans serif fonts.

HISTORY OF PRESENT ILLNESS

- 24 year old man presenting by ambulance with 1 hour of sudden onset dyspnea and pleuritic chest pain
- No history of previous similar episode
- Occurred suddenly after running a marathon
- Limited history upon arrival due to dyspnea
- PMH, PSH, Meds, Allergies noncontributory
- Social history: Occasional tobacco smoker, no EtOH, no illicit drug use

- Multimedia principle – words and pictures are more memorable than words alone.
- Modality principle – since people cannot process written and spoken words simultaneously (dual channel hypothesis),[1] use narration with graphics instead of text.

- Use pictures that reinforce narration and evoke emotion.
- Fill the entire slide with one high-quality image.
- Limit text. Some of the best slides have no text at all.

PHYSICAL EXAM

Temp: 36.6 °C | BP: 95/56 | Heart Rate: 132 | RR: 33 | SpO2: 99 % (on nonrebreather)
- GENERAL: Thin young male, anxious appearing in moderate distress.
- NECK: Supple; non-tender with normal range of motion. Leftward tracheal deviation
- CARDIOVASCULAR: Tachycardic rate and regular rhythm with no murmurs.
- RESPIRATORY: Increased work of breathing, decreased right-sided breath sounds
- ABDOMEN: Soft; non-tender; non-distended.
- EXTREMITIES: Non-tender; no edema; no joint swelling.
- NEURO: Awake and alert; oriented to person, place, and time; moving all 4 extremities
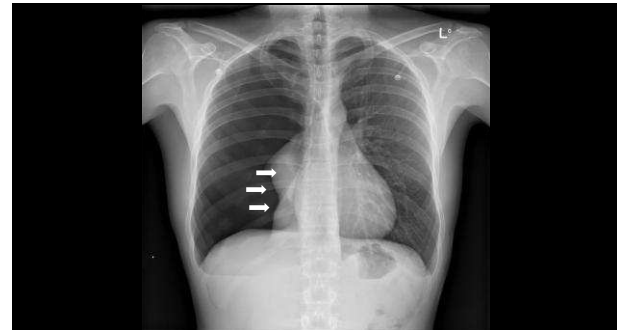

- Spatial contiguity principle – print words adjacent to corresponding graphics.

- Place words next to the related graphic.
- Tailor animations and slide timing to your message.

- Temporal contiguity principle – narration should coincide with related graphics.

This limits the audience's ability to anticipate what you'll say next and helps hold their attention. This slide has 7 simple animations. Avoid distracting effects.

- Signaling principle – design slides to visually highlight essential material.

- Fill the slide with the radiograph or other relevant image, then use arrows to draw the eye to important details.
- Attribution: A. Murphy, Radiopaedia.org, rID: 46492

29 **Great presentation images…**

4:3 :: 1024 x 768 16:9 :: 1920 x 1080 Are High Resolution	Augment The Narration	Tell A Story	DO NOT COPY Are Watermark-Free
Highlight Key Ideas	Are Not Distracting	Fit A Color Scheme	Are Legal

30

31 **Where to look for legal images?**

Pexels	Unsplash	Pixabay	Wikimedia	Google images (tools > filter by, usage rights)	OR… - Create your own images! - Consider an individual or departmental subscription to an image stock service.

32 **References**

33 1) Mayer RE. Applying the science of learning to medical education. Med Educ 2010;44(6):543-549.

34 2) Mayer RE. Applying the science of learning: evidence-based principles for the design of multimedia instruction.
35 Amer Psych 2008;19:177-213.

36 3) Mayer RE, Moreno R. Nine ways to reduce cognitive load in multimedia learning. Educ Psych 2003;38(1):43-52.