Emergency Medical Response Training (EMRT-VR™)

Emergency Medical Response Training - Virtual Reality Platform

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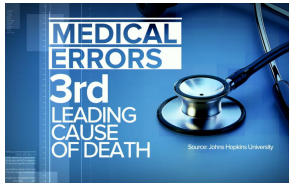
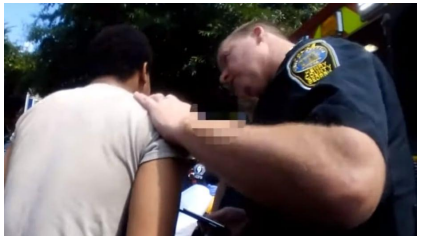
Public safety training is outdated.

CONFIDENT + EXPERIENCED + KNOWLEDGEABLE + SKILLED FIRST RESPONDERS

*A recent Johns Hopkins study claims more than 250,000 people in the U.S. die every year from **medical errors**. Other reports claim the numbers to be as high as 440,000. **Medical errors** are the third-leading cause of death after heart disease and cancer.* *Feb 22, 2018*





Some community panelists tasked with reviewing the training videos used by the Austin Police Department are calling the materials "outdated" and "concerning."
June 19, 2020 - https://www.kxan.com/investigations/panelists-say-austin-police-training-videos-are-outdated-and-concerning/

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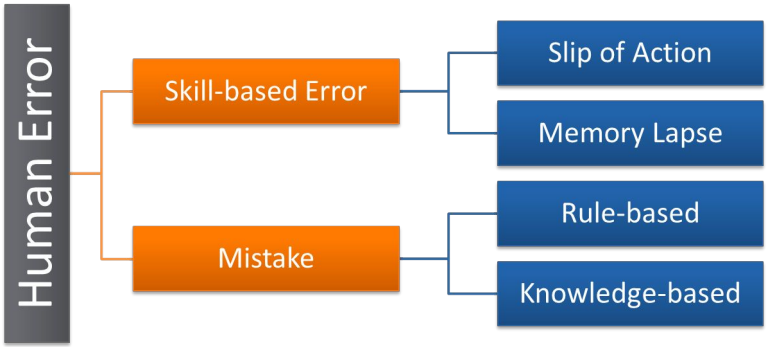

I earned my Emergency Medical Responder certification in May 2018 from text books that the instructor stated quite a number of times - "We don't do that anymore". "This book is outdated". The majority of the students' received C grades, and here we are certified Emergency Medical Responders. EMR certified First Responder.

In a CERT certification, a mass casualty scenario was played out with the certifying participants. I was given the role of 8 year boy with idiopathic anaphylaxis and acted out the symptoms as much as possible. I wasn't assessed with the procedural primary assessment nor asked if I was allergic to anything as I didn't have any obvious symptoms except for a hard-time breathing with a swollen throat. A first responder came to help and was told by the first responder to take me to the Green tarp as I was young and probably just shook up. In real-life I would have died without any epinephrine.

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Immersive Tech will enable our first responders to train better, faster, and more frequently.

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The problem we wanted to solve was how can we be trained to be better EMR, EMT or First Responders when disaster strikes. How can we have more practice, more knowledge, and more confidence in triaging a victim in a emergency incident? How can emergency medical training be less time consuming, less expensive, and more effective in preparing for the many, many types of medical incidents that emergency responders come across daily.

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Who uses the *EMT-VR*?

Professional Medical Trainees & First Responders

EMR -- EMT -- Paramedics -- Firefighters

First responders are often the primary line of defense for U.S. communities, responding to an evolving spectrum of natural and man-made threats.

Paramedics

Firefighters

EMTs

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What is *EMRT-XR*?

The ***EMRT-XR***™ is a category of Guardian Airwaves' ***MIRST*** (Mixed and Immersive Reality Simulation Training) products. ***EMRT-XR***™ presents new learning platforms of real-time simulation training for assessing medical conditions of patients or victims, specifically in emergency incidents. The delivery of its training interface can offer full-immersion or augmented platforms to its end-users.

The **purpose** of ***EMRT-XR***™ is to allow for first responders, EMR/EMT students, and re-certifying medical professionals, to practice the skills of patient assessment -- evaluating the patient's medical condition for triage or immediate medical treatment. Correct and on-going assessment by the first responder is critical for the patient's survivability. The ***EMRT-VR***™ prototype is the first of the ***EMRT-XR***™ category. It uses the virtual reality hardware, HTC VIVE HMD (head mounted display for fully immersive training versus mixed reality or augmented reality interface.

The **functions** of the ***EMRT-VR***™ prototype are to:

1. Respond to a 911 call involving a 72 year old virtual man -- Albert.
2. Perform primary assessment by using SAMPLE & OPQRST protocol questions (form questions using keyword protocols).
3. Visually assess what symptoms Albert has - pale & diaphoretic.
4. Decide whether to transport Albert to the nearest medical treatment center.

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The Possibilities of *EMRT-XR*

The most unique and disruptive component of the EMRT-XR is the use of machine learning. Guardian Airwaves LLC intends to develop proprietary machine learning algorithms based on medical emergency classifications.

Together with embedded ML algorithms which prompt a virtual reality patient to respond to a trainee in real-time is the new disruptive way to medically prepare and train any candidate for emergency disaster response.

Development of digital twins (virtual humans) brought forth with collaborative efforts of companies like Unreal Engine, 3 Lateral, Cubic Motion, Tencent, and USC Institute for Creative Technologies, have closely replicated humans in digital detail with natural human expressions and physical characteristics. Guardian Airwaves, LLC's EMRT-VR training modules are a disruptor in medical emergency skills training.

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Learning goals & features of *EMRT-VR*?

The first responder must perform a patient assessment. Their protocol is to evaluate the patient's medical condition using the **SAMPLE** and **OPQRST** questioning protocols. This is critical for the survivability of the patient.

SAMPLE:

1. **S**igns & Symptoms
2. **A**llergies
3. **M**edications
4. **P**rovoking Events
5. **L**ast Oral Intake
6. **E**vents leading up to the Call

OPQRTS:

1. **O**nset
2. **P**rovocation/**P**alliation
3. **Q**uality of Pain
4. **R**egion/**R**adiation
5. **S**everity
6. **T**ime

The first responder provides two categories of information unavailable from any other source at the time of the encounter with the patient:

- What the patient says about emergency condition and how it is said.
- What the patient tells the medical responder provides the factual content of the medical condition.

The observation of process, both verbal and nonverbal, provides important information about the patient's condition. The patient's behavior (e.g., facial expressions, posture, gestures) and what he/she communicates, emotional concerns, reactions to illness, and physical symptoms are all observation skills the trainee must exercise.

Clinical Methods: The History, Physical, and Laboratory Examinations. 3rd edition. (https://www.ncbi.nlm.nih.gov)

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Meet Albert

Question
Listen
Observe

Use Case: The most common 911 callers are elderly men with angina and hypertension. Angina is a type of chest pain caused by reduced blood flow to the heart. Angina is a symptom of coronary artery disease. Hypertension is another name for high blood pressure. It can lead to severe health complications and increase the risk of heart disease, stroke, and sometimes death. Diaphoresis is excessive sweating due to an unrelated medical condition or medication side effect.

The Interaction: Patient assessment is frequently done throughout the course of patient care. We chose **primary assessment** as the basis for our UX. Primary assessment is a necessary rapid, initial examination of a patient to recognize and manage all immediate life-threatening conditions.

The Task: The medically trained first responder must use the assessment protocol questions when first approaching Albert. These protocol questions are asked in a certain order to obtain important information about Albert that could determine if he needs immediate treatment and whether he should be transported to a hospital. At the end of the interaction with Albert, the medical responder should be able to determine that Albert is suffering from angina and hypertension.

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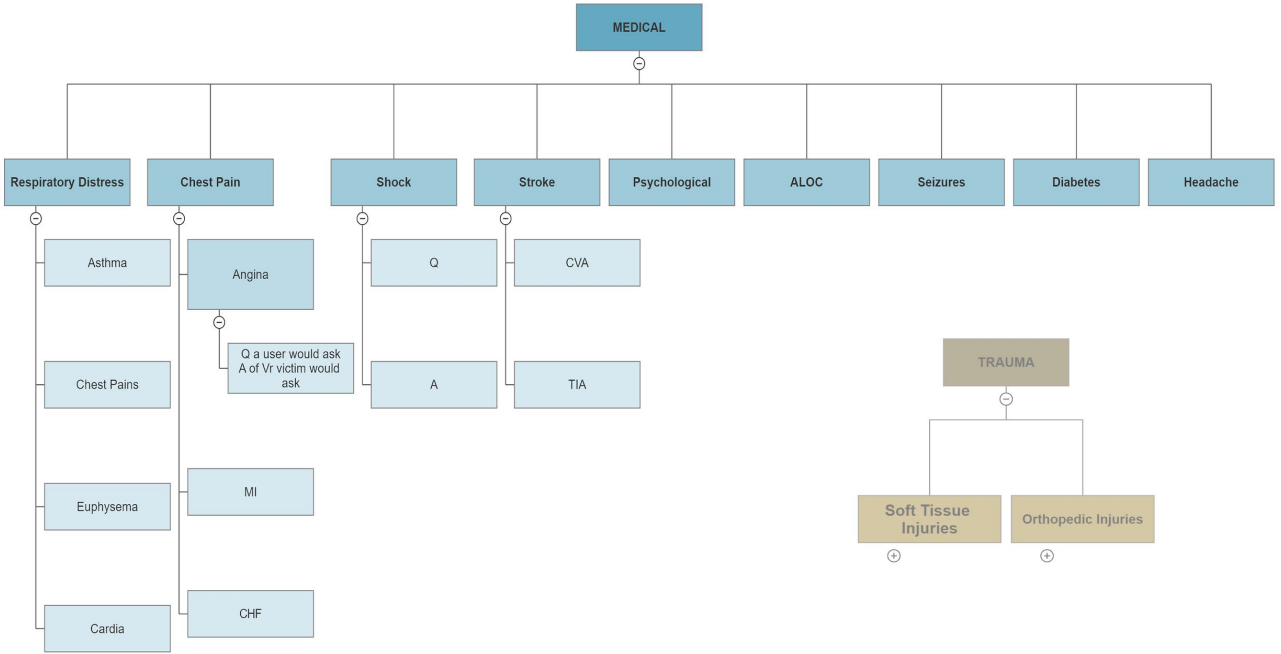
Medical History Classification



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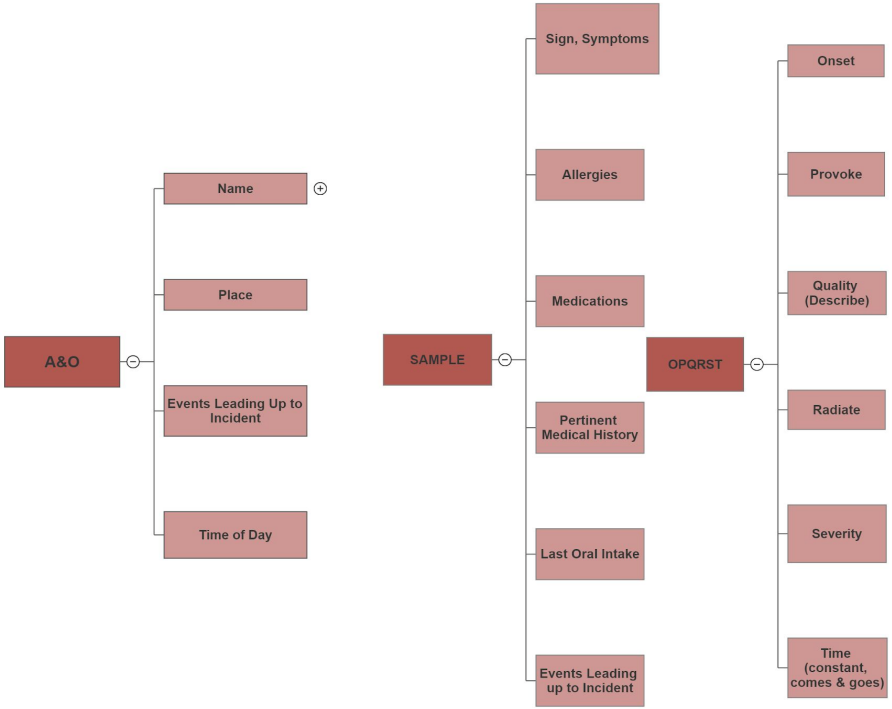
Medical Assessment Protocol



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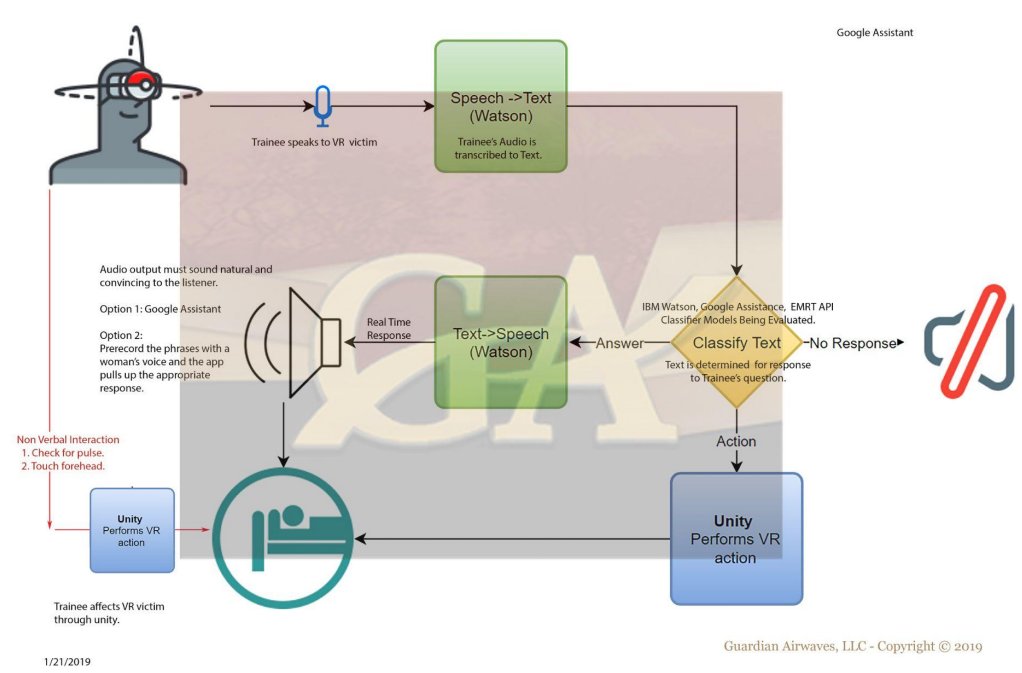
Assessment Questioning Protocols

EMRT-VR Framework

Speech to Text/Text To Speech



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Rule-Based Dialogue

Key words used	GCP Recognizable Keywords	Naming Conventions	VR User performing Primary Assessment/OPQRST/Sample
			Doug has added more questions to accomodate more variation of questions from user. These newly added questions are in blue and the recognizable keywords are bolded. If the bolded words are in the same sentence, please use those words together.
Help&you	(help, you)	help	Hi, my name is Doug, can I help you today? Can I be of **assistance**?
what& call or contact seems going on	(what,call),(contact),(seems, going on)	call911	What seems to be going on? **What** is **happening**?
when start	(when,start)	starttime	**When** did this **start**? **When** did this **begin**? ~~What time did this start?~~
better worse	(better,worse)	better or worse	Is there **anything** that makes it **better or worse**? Is there **anything you do** that makes it **hurt less or hurt more**?
pain can is	(pain,can),(pain,is)	describe pain	Can you describe the pain? **What** does it **feel like**? Can you describe it?
radiate	(radiate),(chest, doing)	radiate	Is it just in your chest, or does it radiate anywhere else? Does the **pain go** anywhere else? Does the **pain stay** put **or** does it **travel elsewhere**?
pain-rate	(pain,rate)	pain rate	On a scale of zero (one) to ten, with ten being the worst pain you have ever felt, **how** would you **rate this pain**? How would you **rate it**?
constant	(constant)	constant	Is it constant or does it come and go? **Is** it **always** there?
allergies	(allergies)	allergies	Do you have any allergies? Are you **allergic** to anything?
medications&medications	((do),(or)) + (medications, medication)	medications	Do you take any medications? Do you **take** any meds? Do you **use** any **meds**? Are you **prescribed** any **meds**?
medical&conditions	(medical)	conditions	Do you have any other medical conditions beside hypertension and angina? Do you have **anything else wrong** with you? Is there **anything else going** on with you that I **should know** about? Do you have **any other conditions** you haven't told me about? No.
eat,drink,when start	(eat),(drink), (eat and drink) + (when)	When (Change this to "last food time" because when keywords should be unique. "when" is common question word. Or maybe "last eat drink time"?	When did you last **eat** or **drink**? When did you last have something by **mouth**?
eat, drink, what	(eat),(drink) + (what)	food. add "drink"	**What** did you eat? **What** did you **have**? **What** was **it**?
what&doing	(what,doing)	doing	And what were you doing before the chest pain started? What was **going** on before this started?
taken, pain	(pain,taken)	taken	Have you taken any nitro since this pain started? Have you **taken anything** for this? Have you taken anything since this started? Have you **taken something**?
hospital&take&you	(hospital)	hospital	**I think** that it would be best to get you to the hospital. Would you be willing to have us take you? we take? **I think** that you should be seen by a doctor. **I think** that you need to go to the ER. You might want **us to take you** to the emergency room. Can **we take you** to get looked at?
loaded&ambulance	(ambulance)	ambulance, rig, bus	Okay, we are going to get you onto the gurney and loaded into the ambulance,**rig, bus**. Let's get **you loaded** and on the way.
			6/11/2019 - Tuesday

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Tactical Experience of the *EMT-VR*

Question
Listen
Observe

Further of development of the EMT-VR training simulation involves development of haptic hardware and UI/UX design to simulate ‘vitals taking’. force feedback haptics allow for reading pulses, respiratory rates, **blood pressure**, **heart rate**, body **temperature** and **respiration rates** (BT, BP, HR, and RR).

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