Anesthesiology, Perioperative & Emergency Medicine

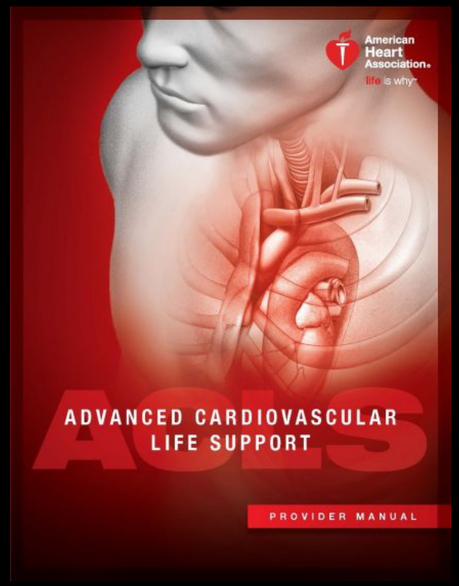
UNIVERSITY OF THE PACIFIC
Arthur A. Dugoni School of Dentistry

# Emergency Medicine for Every Dental Practice:
## Current Best Practices and Evidence-Based Management


**February 28th, 2025**

**Jesse West Manton, DDS, MS, CHSE, DADBA**
Assistant Professor - Dentist Anesthesiologist - Clinical Simulationist
Chief, Division of Anesthesiology & Perioperative Care
Department of Oral & Maxillofacial Surgery
Director, Medical Emergency Response Team & Teaching Internship Program
Director, Anesthesiology Internship Program

# Hi, i’m having a…


American Heart Association®

life is why™

## The Systematic Approach

**Initial Impression**
(Provider visually checks while approaching patient)

**Place Monitors:**
*Pulse Oximeter*
*Blood Pressure*
*Blood Glucometer*
*Electrocardiogram*

**Unconscious Patient**
(appearance)

**Conscious Patient**
(appearance)

**BLS Assessment**

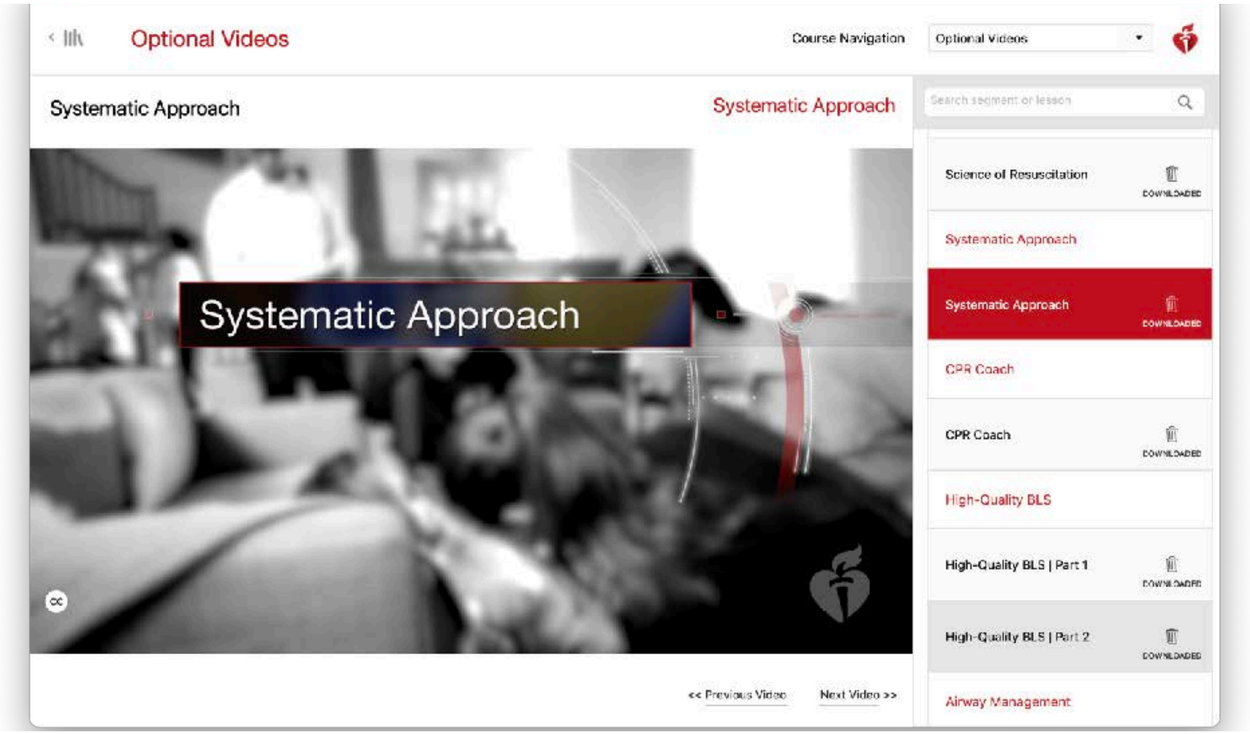
**Primary Assessment**

**Secondary Assessment**

**A***irway*
**B***reathing*
**C***irculation*
**D***isability* / **D***iabetes*
**E***xposure* / **E***scalate*

**S***igns and symptoms*
**A***llergies*
**M***edications*
**P***ast medical history*
**L***ast meal consumed*
**E***vents*

Figure. The AHA systematic approach
Modification for Office-Based Setting

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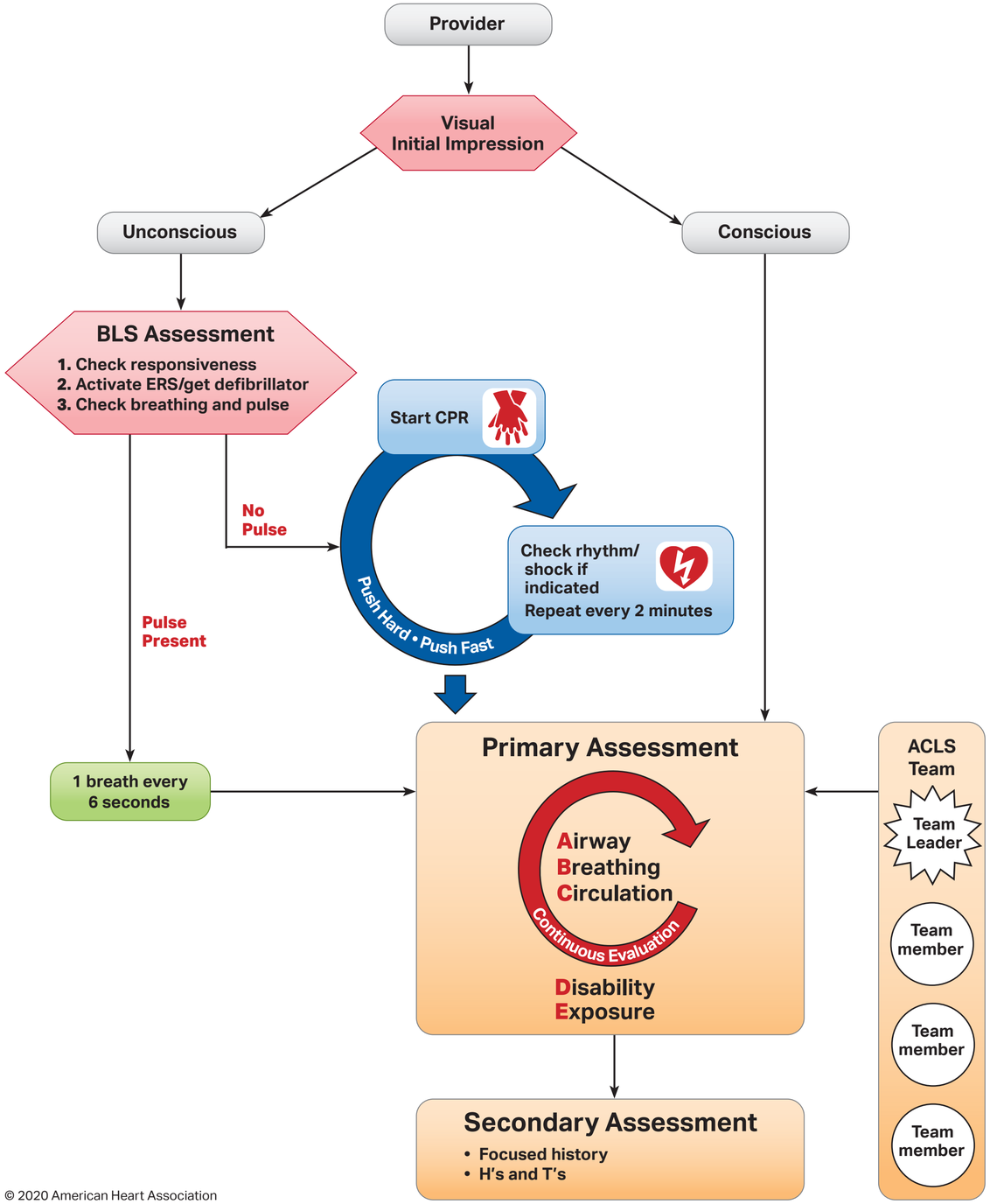
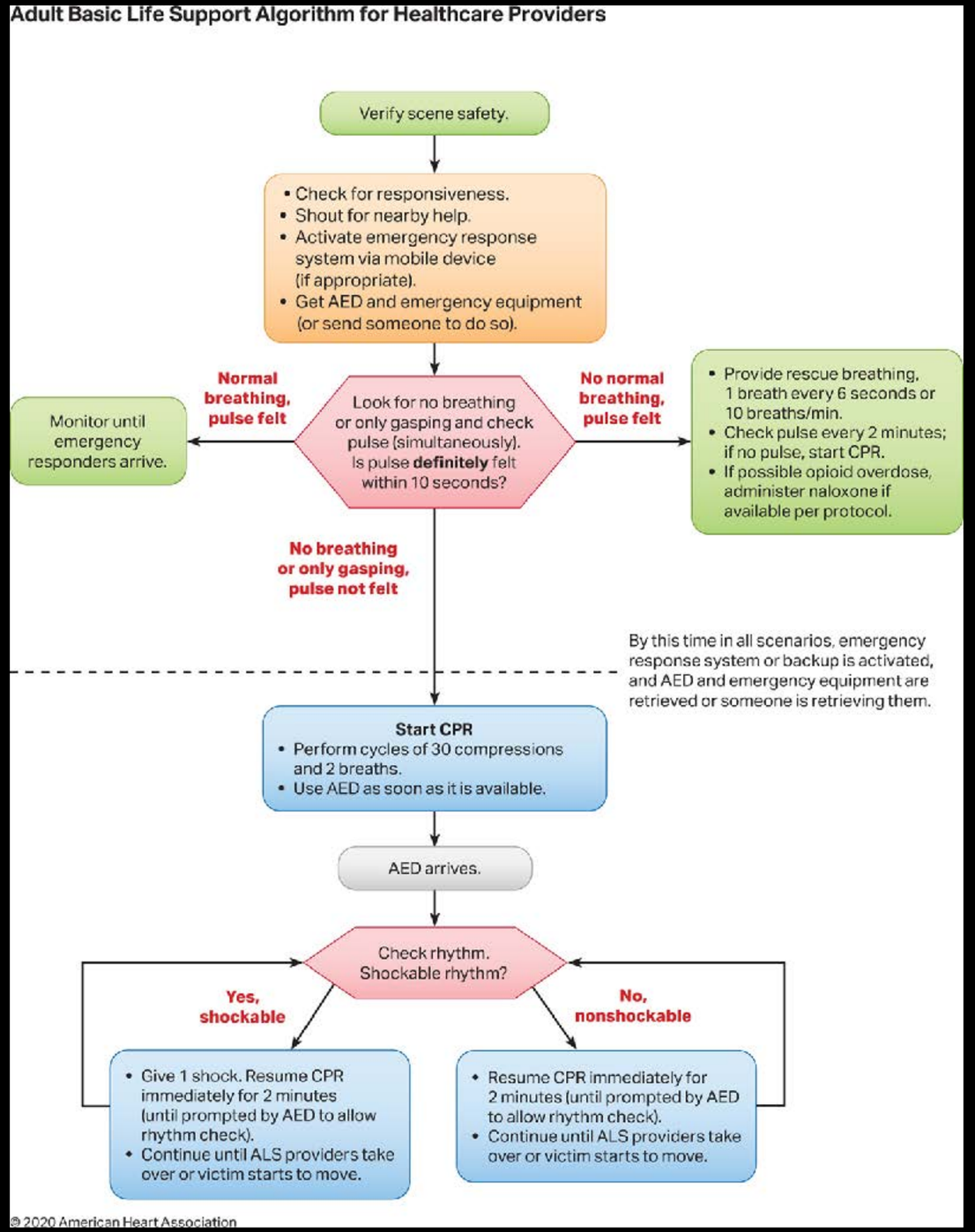
## Expanded Systematic Approach Algorithm



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# Efficacy of cardiopulmonary resuscitation performed in a dental chair

2003

MYTHBUSTERS

AJ Lepere,* J Finn,† I Jacobs‡

**Abstract**

*Background:* Within the dental setting, historically there has been some concern as to whether cardiopulmonary resuscitation (CPR) can be performed effectively in the dental chair. This study tested the hypothesis that there is no difference in the efficacy of CPR performed in the dental chair or on the floor.

*Methods:* Four cycles of two-person CPR were performed by three health professionals on a manikin positioned alternately on the floor and in a dental chair. Ventilation was performed using a Laerdal pocket mask, without oxygen supplementation. Compression and ventilation performance was recorded using a computerized manikin skill meter.

*Results:* Each of the participants was able to achieve a mean cardiac compression depth of between 41 and 50cm, irrespective of the CPR surface. The only statistically significant difference found in expired air resuscitation (EAR) and external cardiac compression performance was that 37 per cent of ventilations performed on the floor were deemed to be too shallow, compared to only 15 per cent in the dental chair.

*Conclusions:* It is possible for those trained in basic life support to perform CPR effectively in the dental chair. Each of the participants agreed that CPR, in particular EAR, was easier to perform when the manikin was in the dental chair compared with the floor. Dentists are encourage to regularly update their CPR knowledge and skills, including the practice of CPR in the dental chair.

*Key words:* Cardiopulmonary resuscitation, cardiac arrest, medical emergencies, dental emergencies.

*(Accepted for publication 28 May 2002.)*

## INTRODUCTION

In a cardiac arrest situation, the performance of cardiopulmonary resuscitation (CPR) forms part of the 'chain of survival' and 'buys time' until more definitive therapy, e.g., defibrillation is available.[1] However, even when performed by people knowledgeable and experienced in the technique, external cardiac compression (ECC) only achieves around 20 per cent of normal cardiac output.[2] Therefore, it is not surprising that efforts have been made to elucidate factors that maximize the output from CPR, including consideration of the effect of support surfaces such as mattresses on the efficacy of chest compressions.[3,4] Indeed, the International Guidelines for CPR and Emergency Cardiac Care state that 'the victim must be in the horizontal, supine position on a firm surface during chest compressions to optimize the effect of the compressions and blood flow to the brain'.[5]

It was probably this concern about the efficacy of ECC that led to early recommendations that in the event of a cardiac arrest the dental patient should be moved to the floor rather than performing CPR in the dental chair.[6] However, there have been case reports of successful resuscitative efforts being performed in the dental chair.[7,8]

The purpose of this study was to ascertain whether or not CPR could be performed effectively in a dental chair. The broad hypothesis under test was as follows: 'There is no difference in the efficacy of ECC or EAR (Expired Air Resuscitation) performed in the dental chair compared with the floor.'

## MATERIALS AND METHODS

## Efficacy of external cardiac compression in a dental chair

2008

*Sir,*

As anesthesiologists who take special interest in dental services, we will ask your attention how to perform cardiopulmonary resuscitation (CPR), when we have sudden cardiac arrest with a patient in a dental chair. Should we do it in the dental chair, or should we move the patient down to the floor or to some other place? There are several case reports of successful resuscitation.[1–3] However, few reports described about the efficacy of external cardiac compression (ECC) in a dental chair performed by staffs of dental office.

Usually, dental chairs are fixed firmly on the floor, thus we may perform ECC in the dental chair immediately if we know it to be effective. We, therefore, investigated the efficacy of ECC in the dental chair.

Ten dental hygienists participated in this study. They are all female, 26 ± 4 year-old, 159 ± 4 cm and 50 ± 3 kg. They performed ECC for 2 min on the resuscitation manikin, the Laerdal Resusci® Anne (Laerdal Medical AS, Norway), in two different situations; on the floor and in the dental chair (Spaceline Emcia, J. Morita Mfg. Corp., Japan). The efficacy of ECC was evaluated by the average depth and the percentage of correct ECC with adequate depth (38–51 mm), which were assessed using Laerdal PC SkillReporter® (Laerdal Medical AS, Norway). The average depth and the percentage of correct ECC were 34.8 ± 7.2 mm and 37.8 ± 39.8% in the dental chair, and 36.6 ± 5.9 mm and 49.7 ± 42.1% on the floor. Both values in the dental chair were higher than those on the floor, although it did not reach statistical significance.

From these data, we may safely argue that ECC done in the dental chair may be at least as effective as that done on the floor. Considering the difficulty of moving patients to the floor and the time required to this transfer, we are inclined to insist that we should perform CPR in the dental chair for dental emergency.

Awata et al. BMC Emergency Medicine (2019) 19:46
https://doi.org/10.1186/s12873-019-0258-x

BMC Emergency Medicine

RESEARCH ARTICLE Open Access

# Usefulness of a stool to stabilize dental chairs for cardiopulmonary resuscitation (CPR)

Norimasa Awata[1], Takashi Hitosugi[1*], Yoichiro Miki[2], Masanori Tsukamoto[3], Yoshifumi Kawakubo[1] and Takeshi Yokoyama[1]

**Abstract**

**Background:** Cardiopulmonary resuscitation (CPR) requires immediate start of manual chest compression (MCC) and defibrillation as soon as possible. During dental surgery, CPR could be started in the dental chair considering difficulty to move the patient from the dental chair to the floor. However, all types of dental chairs are not stable for MCC. We previously developed a procedure to stabilize a dental chair by using a stool. EUROPEAN RESUSCITATION COUNCIL (ERC) guideline 2015 adopted our procedure when cardiac arrest during dental surgery. The objective of this study was to verify the efficacy of a stool as a stabilizer in different types of dental chairs.

**Methods:** Three health care providers participated in this study, and 8 kinds of dental chairs were examined. MCC were performed on a manikin that was laid on the backrest of a dental chair. A stool was placed under the backrest to stabilize the dental chair. The vertical displacement of the backrest by MCC was recorded by a camcorder and measured by millimeter. Next, the vertical displacement of the backrest by MCC were compared between with and without a stool.

**Results:** In all 8 dental chairs, the method by using a stool significantly reduced the vertical displacements of the backrest by during MCC. The reduction ratio (mean [interquartile range]) varied between nearly 27 [20] and 87 [5] %. In the largest stabilization, vertical displacement was 3.5 [0.5] mm with a stool versus 26 [5.5] mm without a stool ([illegible]).

**Conclusions:** Our procedure to stabilize dental chairs by using a stool reduced the displacement of a backrest against MCC in all chairs.

**Clinical relevance:** Effective MCC could be performed in dental chairs by using a stool when sudden cardiac arrest occurs during dental surgery.

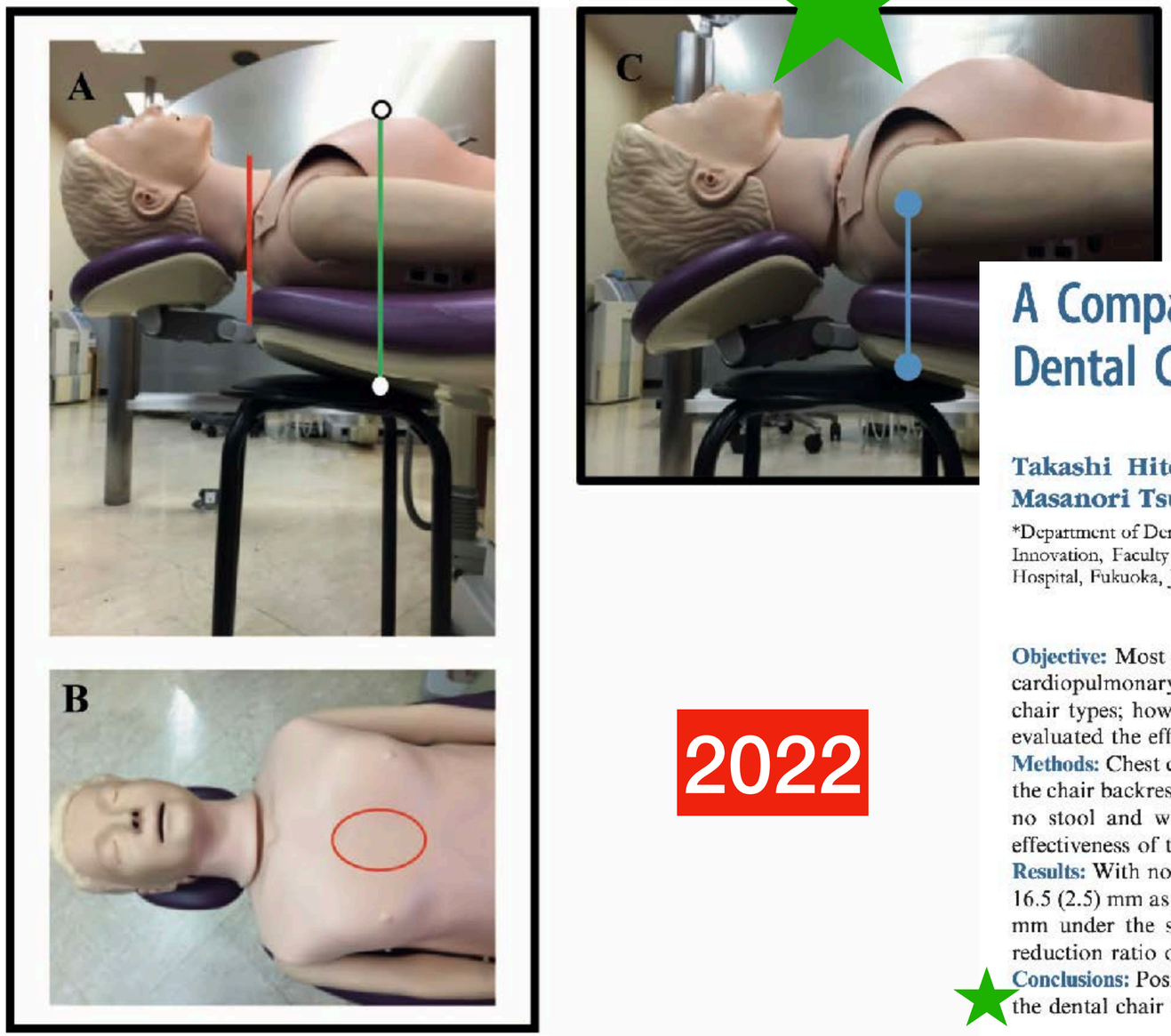
[illegible]
surgery

2019

## Background

The dental office poses special circumstance where life-threatening emergencies of aspiration of dental materials and asphyxia can lead sudden cardiac arrest. We have already proposed supine abdominal thrust as a relief for asphyxia in the dental chair [1]. When the thrust relief is ineffective, immediate cardiac arrest can occur. Or cardiac arrest might occur alone, as dental surgery is often stressful for patients and dental surgery sometimes worsens basic illness. CPR requires immediate start of manual cardiac compression (MCC). The patient must be placed on a hard surface to ensure the effectiveness of MCC. However, given the limited space around a dental chair for effective interventions on the floor and the difficulty in moving a patient to the floor safely requiring multiple staff which may be limited in some clinics, CPR should be started in the dental chair itself. But, all types of dental chair are not always stable for

* Correspondence: hitosug.takashi.24@m.kyushu-u.ac.jp
[1]Department of Dental Anesthesiology, Faculty of Dental Science, Kyushu University, 3-1-1 Maidashi, Higashi-ku, Fukuoka 812-8582, Japan
Full list of author information is available at the end of the article




2022

# A Comparison of Two Stool Positions for Stabilizing a Dental Chair During CPR

**Takashi Hitosugi, DMD, PhD,* Norimasa Awata, DDS, PhD,* Yoichiro Miki, PhD,† Masanori Tsukamoto, DDS, PhD,‡ and Takeshi Yokoyama, DDS, PhD***

*Department of Dental Anesthesiology, Faculty of Dental Science, Kyushu University, Fukuoka, Japan, †School of Interdisciplinary Science and Innovation, Faculty of Arts and Science, Kyushu University, Fukuoka, Japan, ‡Department of Dental Anesthesiology, Kyushu University Hospital, Fukuoka, Japan

**Objective:** Most dental chairs lack sufficient stability to perform effective manual chest compression (MCC) during cardiopulmonary resuscitation (CPR). A stabilizing stool can significantly reduce backrest vertical displacement in all chair types; however, a severely curved exterior backrest may negatively impact the stool's effectiveness. This study evaluated the efficacy of 2 stool positions for stabilizing a dental chair during MCC.

**Methods:** Chest compressions were performed on a manikin positioned in a dental chair while vertical displacement of the chair backrest during MCC was recorded using video and measured. Vertical displacement data were captured with no stool and with a stabilizing stool in 2 different positions. Reduction ratios were calculated to evaluate the effectiveness of the 2 stool positions.

**Results:** With no stool, the backrest median (interquartile range) vertical displacement during chest compressions was 16.5 (2.5) mm as compared with 12.0 (1.5) mm for the stabilizing stool positioned under the area of MCC and 8.5 (1.0) mm under the shoulders. The stool positioned under the shoulders produced a significantly increased calculated reduction ratio of 48% (14%) compared with 27% (20%) under the area of MCC ($P < .001$).

**Conclusions:** Positioning a stabilizing stool under the shoulders was more effective at reducing vertical displacement of the dental chair backrest during chest compressions than positioning the stool under the area of MCC.

**Figure 1.** Manikin setup and positioning of the stabilizing stool. Upper end of the manikin torso was aligned with the top edge of the backrest (A; red line). The superior surface of the backrest under the lower half of the manikin sternum was positioned horizontally using a levelling instrument. The edge of the stool's seating surface was set to touch the backrest vertically under the area for manual chest compressions (A; green line). The center of the manikin's chest (B; red ellipse) was the hand position during chest compressions. The stool was set to touch the backrest vertically under the shoulders (C; blue line).

## Emergency duties of a four-member dental team.*

### TEAM MEMBER 1: LEADER

- Directs team members
- Positions the patient and stays with him or her
- Performs "ABCs"† of cardiopulmonary resuscitation (CPR)
- Takes command and appears calm
- States instructions directly and clearly
- Requests acknowledgment from team members that instructions are understood
- Fosters open exchange among team members
- Concentrates on what is right for the patient, not who is right‡

### TEAM MEMBER 2

- Brings emergency kit
- Brings oxygen tank and attaches appropriate delivery system
- Brings automated external defibrillator
- Assists with ABCs of CPR, including monitoring vital signs
- Checks oxygen tank regularly
- Checks emergency kit regularly
- Prepares drugs for administration

Narrative Review

# Emergency protocol in the dental clinic

Assessing medical emergency training requirements and guidelines for dentists

Lindsay Pius, BS; Noah Brady, BS; Madison Overby, BS; Jenna Zhu, BS; Nalton Ferraro, DMD, MD

2023

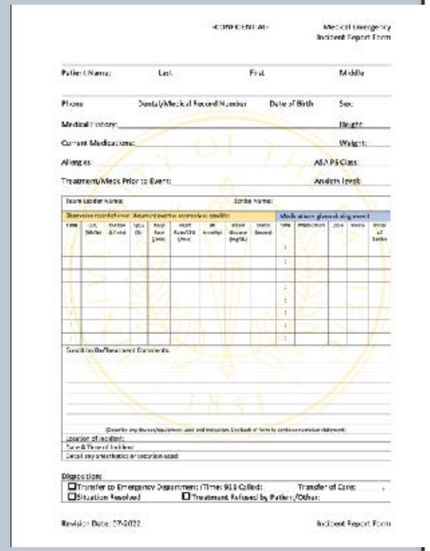
- Prepares drugs for administration

**TEAM MEMBER 3**

- Telephones emergency medical services (9-1-1)
- Meets paramedics at building entrance
- Keeps chronological log of events
- Assists with ABCs of CPR

**TEAM MEMBER 4**

- Assists with ABCs of CPR
- Assists with other duties as needed



* Source: Malamed.[1]

† ABC: Airway, breathing, circulation. Source: American Heart Association.[4]

‡ Source: Gaba and colleagues.[3]

ermission of Elsevier from Haas.[7] * Malamed SF. Preparation. In: *Medical Emergencies in the Dental Office*. 6th ed. 5. † American Heart Association. Part 2: the systematic approach—the BLS primary survey and ACLS secondary *d Cardiovascular Life Support Provider Manual*. Professional; 2006:7-10. ‡ Gaba DM, Fish KJ, Howard SK. Principles of ource management. In: *Crisis Management in Anesthesiology*. Churchill Livingstone; 1993:31-52.

Narrative Review

**Emergency protocol in the dental clinic**

Assessing medical emergency training requirements and guidelines for dentists

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2023

-CONFIDENTIAL-

Medical Emergency
Incident Report Form

Patient Name: Last First Middle

Phone Dental/Medical Record Number Date of Birth Sex:

Medical History: Height:

Current Medications: Weight:

Allergies: ASA PS Class:

Treatment/Meds Prior to Event: Anxiety level:

Team Leader Name: Scribe Name:

| Observation record of event (document event as accurately as possible) | | | | | | | | | Medications given during event | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Time | LOC (A&Ox) | O2 flow (L/min) | SpO2 (%) | Resp Rate (/min) | Heart Rate/CPR (/min) | BP (mmHg) | Blood Glucose (mg/dL) | Defib (joules) | Time | Medication | Dose | Route | Initial of Scribe |
| : | | | | | | | | | : | | | | |
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| : | | | | | | | | | : | | | | |

Condition Dx/Treatment Comments:

(Describe any devices/equipment used and indication. Use back of form to continue narrative statement)

Location of Incident:

Date & Time of Incident:

Detail any anesthetics or sedation used:

Disposition:

☐ Transfer to Emergency Department (Time: 911 Called:_____ Transfer of Care:_____.

☐ Situation Resolved ☐ Treatment Refused by Patient/Other:

Revision Date: 07-2022



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# Taking It Home - Your Office

## Regular Training and Rehearsal

- Create a culture of safety and preparedness
- Written emergency action plan (EAP)
- Written incident report form
- All staff are trained initially
  - Regular team-based review and rehearsal ***at least*** annually
- Ensure adequate equipment and supplies on hand with monthly checks/restocking
- Various CE types (beyond lecture), stay current with evidence based guidelines
- High Fidelity Simulation training at least every 5 years

2024

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Taylor & Francis
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OPEN ACCESS

## Best Practices in Training and Preparedness for Medical Emergencies: From Dental School to Private Practice

Alini Agnes, DDS[a] and Jesse W. Manton, DDS, MS[b,c]

[a]Predoctoral DDS Program, University of the Pacific Arthur A. Dugoni School of Dentistry, San Francisco, California, USA; [b]Department of Oral & Maxillofacial Surgery, University of the Pacific Arthur A. Dugoni School of Dentistry, San Francisco, California, USA; [c]Division of Anesthesiology & Perioperative Care, Un... Arthur A. Dugoni School of Dentistry, San Francisco, California, USA

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**ABSTRACT**

**Background:** Medical urgencies and emergencies require immediate attention and competent management by dentists and their teams. Having a proper emergency medical kit to support management of these situations is essential.

**Types of Studies Reviewed:** A review of the available literature was performed, including peer-reviewed articles, American Dental Association (ADA) Commission on Dental Accreditation standards, ADA website articles, and publications from professional societies.

**Results:** An emergency medical kit is a key component of a well-designed medical emergency response system in a dental practice. Initial and regular training sessions to optimize dentist and team member knowledge, skills, and experiences are essential to maintaining emergency preparedness. A description of modern predoctoral emergency medical training is provided.

**Practical Implications:** Dental schools and practices should carefully assess their emergency medical kits, training, and protocols to ensure a system is in place to initiate evaluation and management of acutely unwell patients.

**ARTICLE HISTORY**
Received 28 June 2024
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**KEYWORDS**
Emergency medical kit; emergency drugs; dental education; emergency manuals; simulation training


**Figure 2.** The highly mobile wheeled BLS MED kit. Left: showing front of kit with incident report form on clipboard in front of the printed TMSAL booklet, pulse oximeter and red emergency drug box with TMSAL QR code label added. Right: size E cylinder of oxygen with regulator and tank key and airway management equipment and supplies. Not visible are the stethoscope, blood glucometer, and semi-automatic blood pressure monitor.

# A Culture of Safety

## You set the tone

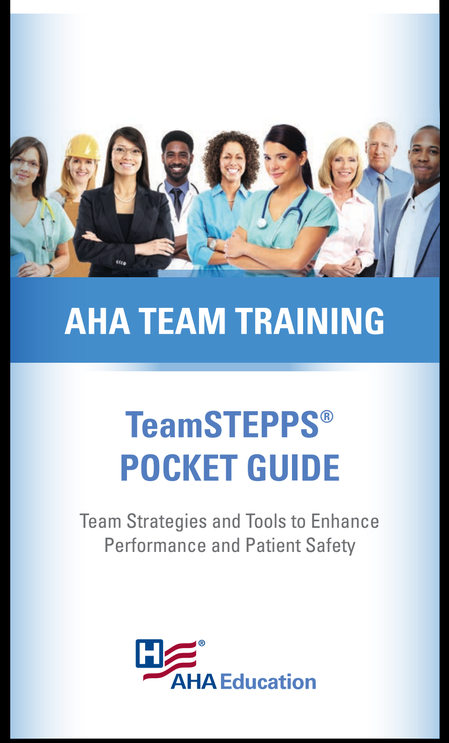
- ***Systems engineering*** for patient safety
  - Team STEPPS 2.0

    Pre-procedure team huddles/time outs

    Communication tools

    Team leadership and followership skills

    Situational awareness and situation monitoring



Office Medical Emergencies

# Ten Minutes Saves A Life!

Anesthesia Research Foundation of the American Dental Society of Anesthesiology

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https://www.adsa-arf.org/tenminutes


ANESTHESIA RESEARCH FOUNDATION
AMERICAN DENTAL SOCIETY OF ANESTHESIOLOGY

HOME | TEN MINUTES | GRANTS | DONATE

## Ten Minutes Saves A Life!®

The goal of the Ten Minutes Saves A Life® ADSA Anesthesia Research Foundation initiative is to optimize patient safety and outcomes in office medical emergencies.

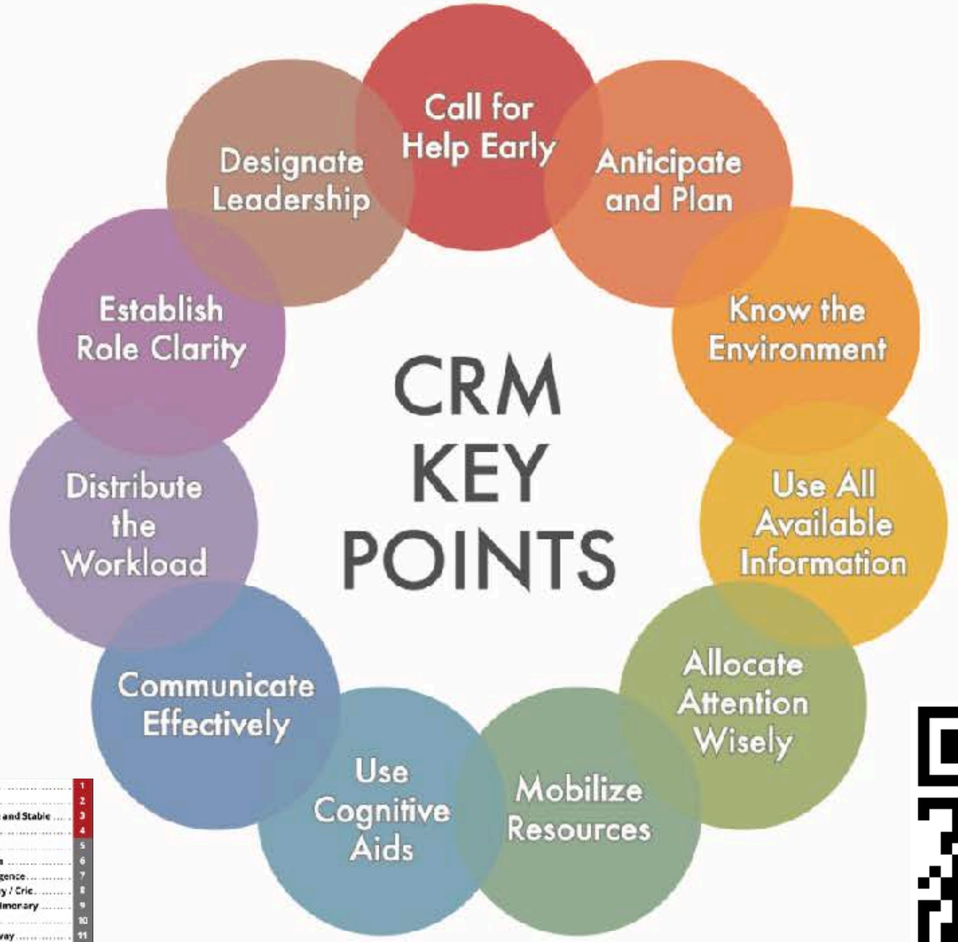
This program supports crisis resource management team training in the use of emergency drugs and equipment during the critical ten minute interval between recognition of a patient's medical emergency and arrival of EMS (emergency medical service) personnel.

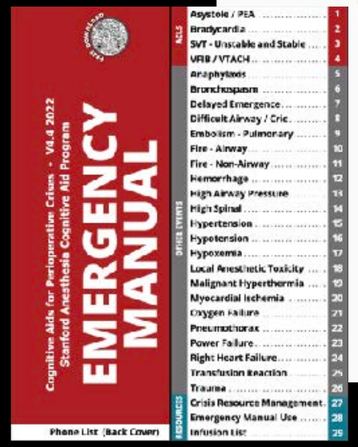
Practitioners should be familiar with the suggested emergency drugs/equipment and have them immediately available.

Available on the App Store

GET IT ON Google Play

# CRISIS RESOURCE MANAGEMENT






https://emergencymanual.stanford.edu/downloads/

# CRISIS RESOURCE MANAGEMENT

## Call for Help Early
- Call for help early enough to make a difference
- Err on the side of getting more help
- Mobilize early personnel with special skills if they may be needed

## Designate Leadership
- Establish clear leadership
- Inform team members who is in charge
- 'Followers' should be active in asking who is leading

## Anticipate and Plan
- Plan & prepare for high work-load periods during low work-load periods
- Know where you are likely headed during the crisis and make backup plans early

## Know the Environment
- Maintain situational awareness
- Know how things work and where things are
- Be aware of strengths and vulnerabilities of environment

## Establish Role Clarity
- Determine who will do what
- Assign areas of responsibility appropriate to knowledge, skills, and training
- Active followers may offer specific roles

## Use All Available Information
- Monitor multiple streams of data and information
- Check and cross check information

## Distribute the Workload
- Assign specific tasks to team members according to their abilities
- Revise the distribution if there is task overload or failure

## Allocate Attention Wisely
- Eliminate or reduce distractions
- Monitor for task saturation & data overload
- Avoid getting fixated
- Recruit others to help w/ monitoring

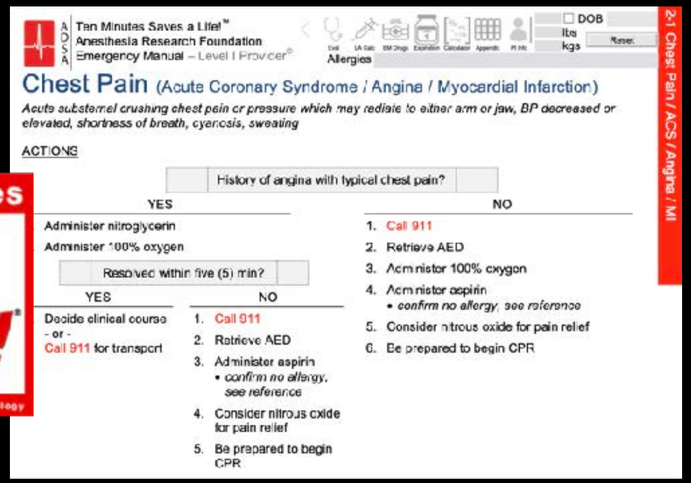
## Communicate Effectively
- Command and request clearly
- Seek confirmation of request (close the loop)
- Avoid "thin air" statements
- Foster input and atmosphere of open information exchange among all personnel

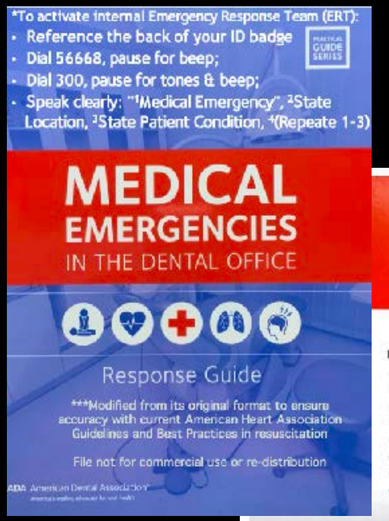
## Mobilize Resources
- Activate all helpful resources including equipment and additional personnel

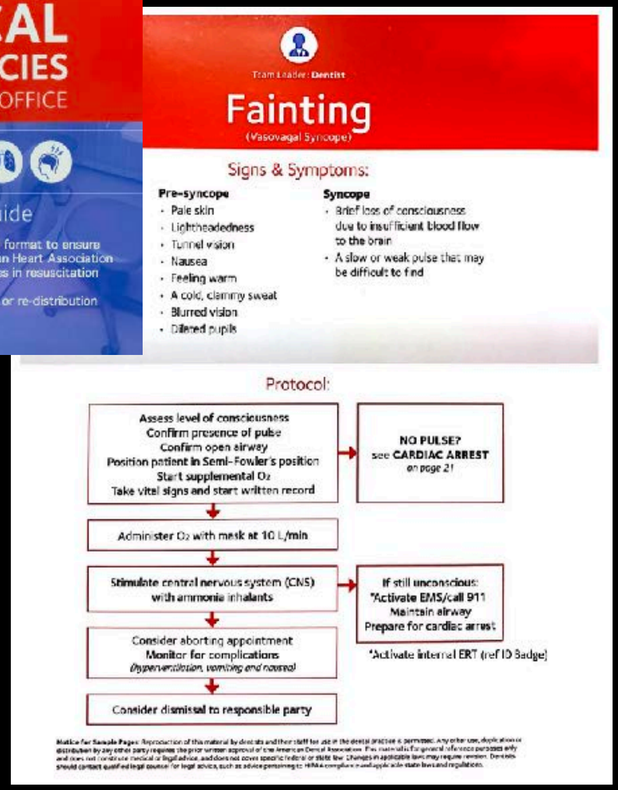
## Use Cognitive Aids
- Be familiar with content, format, and location
- Support the effective use of cognitive aids

# How should you use an Emergency Response Guide?

- For study and review
- For practice scenarios and team training
- For real-time patient care

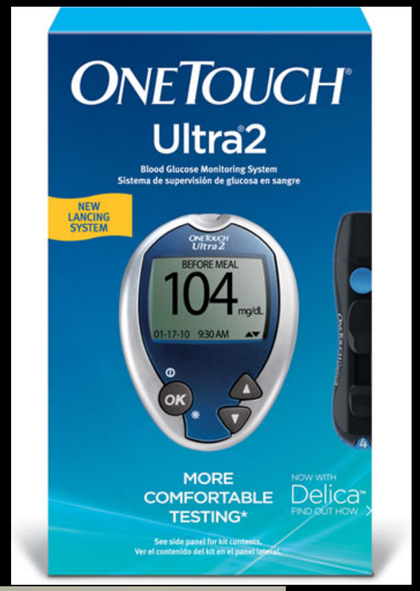
When a patient is acutely unwell:

# A Question You Must Consider, Every Time:

# Home VS. Hospital

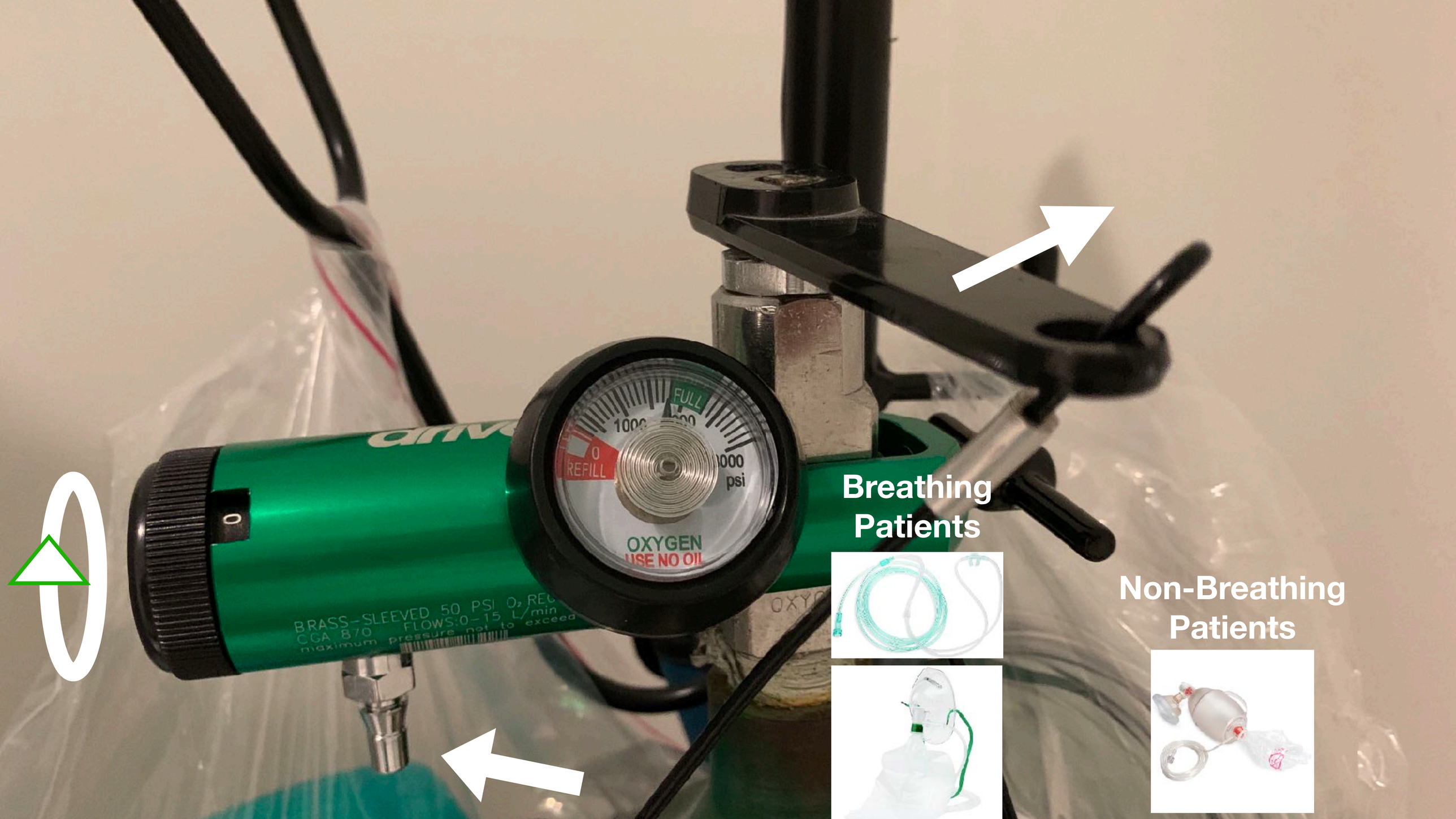
# Basic Patient Assessment & Monitoring Equipment



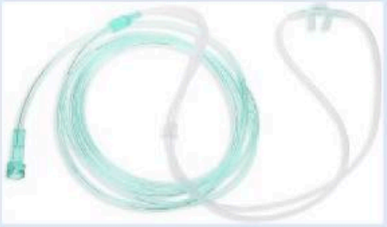







FULL
0
REFILL
psi
OXYGEN
USE NO OIL
BRASS-SLEEVED 50 PSI O2 REG
CGA 870
FLOWS:0-15 L/min
maximum pressure not to exceed
Breathing Patients
Non-Breathing Patients

# Supplemental Oxygen Therapy Grid: Delivery Device, Flow Rates and Fraction of 100% Delivered

| Device Image | Device | Patient Breathing? | Flow Rates (L/min) | Delivered Oxygen (%) | Fraction inspored oxygem (FiO2) |
|---|---|---|---|---|---|
|  | Nasal Cannula | Spontaneous | 0 (Room Air) | 21 | 0.21 |
| | Nasal Cannula | Spontaneous | 1 | 21-24 | 0.21-0.24 |
| | Nasal Cannula | Spontaneous | 2 | 25-28 | 0.25-0.28 |
| | Nasal Cannula | Spontaneous | 3 | 29-32 | 0.29-0.32 |
| | Nasal Cannula | Spontaneous | 4 | 33-36 | 0.33-0.36 |
| | Nasal Cannula | Spontaneous | 5 | 37-40 | 0.37-0.40 |
| | Nasal Cannula | Spontaneous | 6 | 41-44 | 0.41-0.44 |
|  | Simple Face Mask | Spontaneous/ Respiratory Distress | 6-10 | 35-60 | 0.35-0.60 |
|  | Non-Rebreather Face Mask | Spontaneous/ Respiratory Distress | 10-15 | 95-100 | 0.95-1.0 |
|  | Bag-Valve-Mask | Apneic/ Respiratory Failure | 0 (Room Air) | 21 | 0.21 |
| | Bag-Valve-Mask | Apneic/ Respiratory Failure | 15+ | 95-100 | 0.95-1.0 |

https://www.youtube.com/watch?v=9GPPLR_3aBE

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## Proper Position

Place the patient in a proper sniffing posture to ensure an excellent nasal breathing pattern.

## Tight Seal

**Perform a C & E hold:** Little, ring, and middle fingers form an "E" and the index finger and the thumb form a "C" around the mask to provide a tight seal

## Ventilate

Squeeze the bag over 1 second. (Do not over-ventilate)


# NARCAN Nasal Spray Training Video:

Anesthesiology, Perioperative & Emergency Medicine

UNIVERSITY OF THE PACIFIC
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# Emergency Medicine for Every Dental Practice:
## Current Best Practices and Evidence-Based Management


jmanton@pacific.edu
O: 415-929-67690

Jesse West Manton, DDS, MS, CHSE, DADBA
Assistant Professor - Dentist Anesthesiologist - Clinical Simulationist
Chief, Division of Anesthesiology & Perioperative Care
Department of Oral & Maxillofacial Surgery
Director, Medical Emergency Response Team & Teaching Internship Program
Director, Anesthesiology Internship Program