



HYPOXIA KILLS, HYPERCARBIA HAPPENS.

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OBJECTIVES

- HYPOXIC DRIVE AND THEORY
- MECHANISM FOR CO₂ RISE IN COPD PATIENT
- HOW TO SAFELY USE OXYGEN IN COPD
- HOW TO ELIMINATE CO₂

OXYGEN IS NOT ALL THAT

- TOXICITY IDENTIFIED 1775
- CELLULAR INJURY DUE TO FREE RADICALS AND REACTIVE OXYGEN SPECIES
- ACUTE LUNG INJURY
- BLINDNESS IN PREMATURE BABIES
- CAN CAUSE REDUCED OUTPUT IN CARDIAC FAILURE
- ELEVATES CO₂

“STAT 2 TO RESUS”

- 72 YEAR OLD COPD
- BREATHLESS AND BLUE
- NURSES DO EVERYTHING
- DOCTOR GETS THE CREDIT
- SATS IMPROVE TO 87% BUT NEEDING 35% O₂
- TURN O₂ DOWN “HAVE YOU NOT HEARD OF HYPOXIC DRIVE”

WHAT THE HECK IS HYPOXIC DRIVE?

- RECEPTORS RESPOND TO LOW O₂ LEVELS
- LOW OXYGEN CAUSES INCREASE IN RESPIRATORY RATE
- THIS IS HYPOXIC DRIVE
- 15% OF OUR DRIVE TO BREATHE

WHAT ABOUT CO₂?

- RECEPTORS PRIMED TO RESPOND TO HIGH CO₂
- HIGH CO₂ CAUSES AN INCREASE IN RESPIRATORY RATE
- THIS IS HYPERCARBIC DRIVE
- 85% OF OUR DRIVE TO BREATHE

WHAT HAPPENS IN COPD?

- CHRONICALLY RAISED CO_2 IN SOME COPD PATIENTS
- CO_2 RECEPTORS DESENSITISED
- DON'T INCREASE RESPIRATORY RATE IN RESPONSE TO HIGHER LEVEL OF CO_2
- RESPOND MORE TO LOW OXYGEN
- O_2 RECEPTORS REACT AND INCREASE RESPIRATORY RATE

WHAT IS HYPOXIC DRIVE THEORY?

- IF YOU GIVE A COPD PATIENT OXYGEN, THEY WILL STOP BREATHING DUE TO LOSS OF THE HYPOXIC DRIVE
- **MYTH**
- DISPROVED OVER 20 YEARS AGO

BUT CO₂ DOES RISE.....

- YES BUT NOT BECAUSE YOU STOP THE HYPOXIC DRIVE
- HALDANE EFFECT
- HYPOXIC PULMONARY VASOCONSTRICTION (HPV)

HALDANE EFFECT

- HAEMOGLOBIN HOLDS ONTO CARBON DIOXIDE
- IT PREFERS OXYGEN
- DUMPS CARBON DIOXIDE WHEN OXYGEN COMES ALONG

HYPOXIC PULMONARY VASOCONSTRICTION

- POORLY VENTILATED AREA OF LUNG LACKS OXYGEN
- LOW OXYGEN CAUSES CONSTRICTION OF BLOOD VESSELS RESTRICTING BLOOD FLOW
- BLOOD DIVERTED TO BETTER VENTILATED AREAS OF LUNG
- ADD OXYGEN AND CONSTRICTION DOESN'T HAPPEN
- BLOOD TRAVELS TO POORLY FUNCTIONING AREAS – CO₂ CAN'T BE REMOVED

HOW IS THIS RELEVANT?

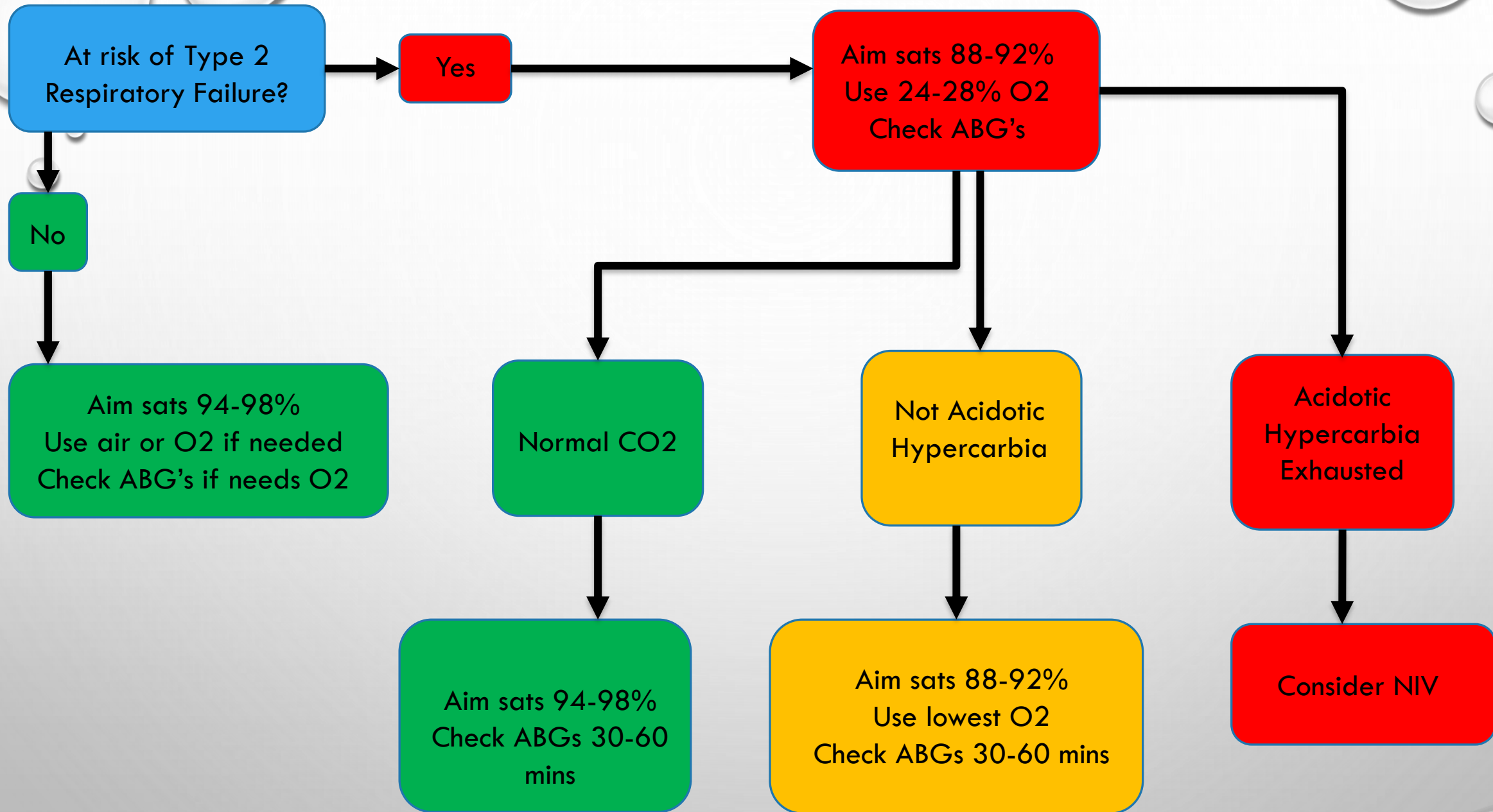
- HYPOXIC COPD PATIENT
- LOADS OF CO₂ IN THEIR BLOODSTREAM
- HAEMOGLOBIN HOLDING ONTO THE CO₂
- BLOOD DIVERTED AWAY FROM POORLY VENTILATED AREAS
- WE ADD O₂
- HAEMOGLOBIN DUMPS CO₂ IN FAVOUR OF O₂ AND CO₂ LEVELS RISE
- CONSTRICTION DOESN'T HAPPEN – CO₂ NOT REMOVED IN POORLY VENTILATED AREAS
- CO₂ LEVELS RISE

SO WE SHOULD WITHHOLD O₂.....

- ABSOLUTELY NOT
- HYPERCARBIA SLOWER TO DEVELOP
- HYPOXIA KILLS QUICKLY
- WHY WOULD YOU DEPRIVE A HYPOXIC PATIENT OF O₂?

SO WE GIVE O₂?

- YES!
- HOW MUCH TO GIVE?
- RETURN LEVELS TO WHAT IS NORMAL FOR THAT PATIENT
- SIMPLE – FOLLOW THE BTS GUIDELINES



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SHIFT YOUR FOCUS

Its not about O₂

ITS ABOUT CO₂

ENTER NIV

- PREVENTS ALVEOLAR COLLAPSE
- REDUCES WORK OF BREATHING
- IMPROVES VENTILATION
- REVERSES HYPOXIA
- REDUCES HYPERCARBIA
- OFFLOADS RESPIRATORY MUSCLES
- REDUCES WORKLOAD ON THE HEART

KEEP IT SIMPLE....

- EPAP AT 7
- IPAP AT 12
- MONITORED
- NOT LEFT ALONE
- WEAN ON
- CHECK ABGS
- FAILURE TO OXYGENATE –
INCREASE EPAP
- FAILURE TO REDUCE CO₂ –
INCREASE IPAP



THE BOTTOM LINE

- OXYGEN IS MISUSED IN CLINICAL PRACTICE
- TOO MUCH CAN BE HARMFUL
- TOO LITTLE IS LIFE THREATENING
- HYPOXIC DRIVE THEORY TUNNEL VISION
- OXYGEN TITRATION CURRENT BEST PRACTICE



IN SUMMARY

- DO NOT GIVEN OXYGEN WITHOUT THINKING
- FOLLOW THE GUIDELINES
- RESTORE OXYGEN LEVELS TO WHAT IS NORMAL FOR THAT PATIENT
- MONITOR, CHECK ABG'S
- CONSIDER NIV EARLY
- CHALLENGE THE DOGMA

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Thank You