The Vortex Approach to airway management

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INTRODUCTION

While technical competence and adequate planning are crucial to effective airway management, it is well recognised that even well-prepared airway clinicians can sometimes fail to perform basic interventions under stress[1].

The major airway guidelines are valuable resources that can be referred to *prior* to the occurrence of an airway crisis, to lay a foundation of knowledge on which subsequent airway management decisions can be based ("foundation tools"). They are not, however, usually presented in a format that makes their content readily accessible in real-time to teams of potentially highly stressed clinicians nor are they intended to be referred to *during* the process of managing a challenging airway[2]. In addition, difficult airway guidelines typically provide guidance predominantly directed at anaesthetists and largely restricted to the circumstance where the primary plan for airway management is endotracheal intubation[2-4].

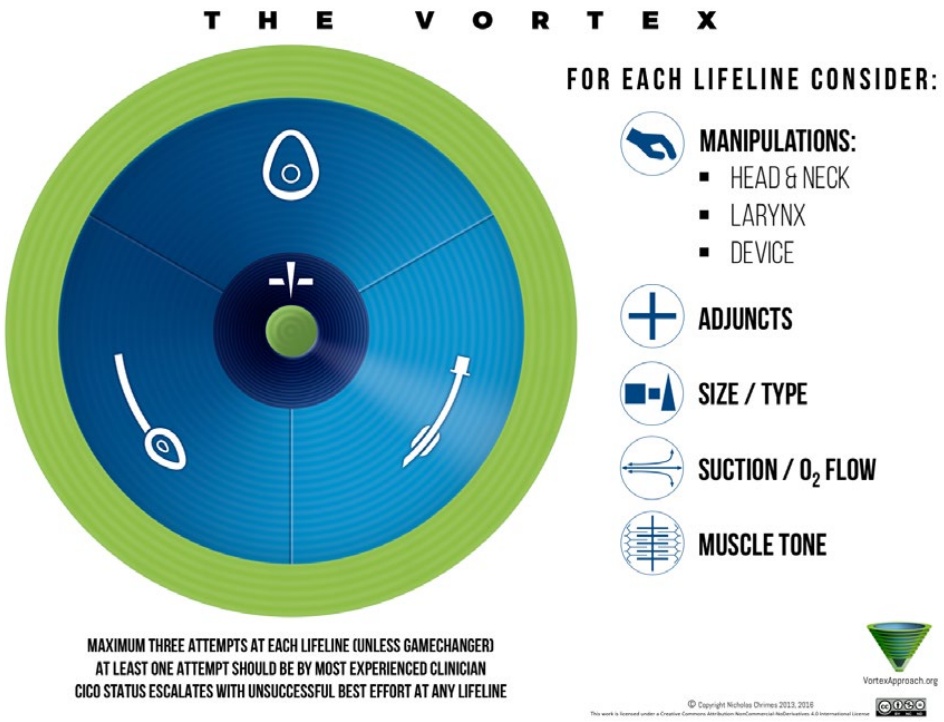
In contrast, the Vortex Approach[5] is based around a "high acuity implementation tool", designed to be used during the high-stakes, time-critical situation of an evolving airway emergency. It is intended to help clinical teams perform under pressure by providing a simple, consistent template that can be taught to all clinicians involved in advanced airway management, irrespective of critical care discipline and whether they are from a medical, nursing or paramedical background. It is also able to be used in any context in which an airway management takes place, regardless of whether the primary intended airway is an endotracheal tube (ETT), a supraglottic airway (SGA) or even a face mask (FM).

The Vortex Implementation Tool

The Vortex Implementation Tool (Figure 1) is based on the premise that there are only three upper airway "lifelines" ("non-surgical" techniques) by which alveolar oxygen delivery can be established and confirmed: FM, SGA and ETT. Completion of a best effort at any of the three upper airway lifelines without being able to confirm adequate alveolar oxygen delivery mandates abandoning further attempts at that lifeline and focusing instead on optimising one of the remaining alternatives. On the circular Vortex graphic this is represented by spiral inward movement. Completion of best efforts at all three lifelines without restoring alveolar oxygen delivery culminates in spiral movement to the central zone of the tool, representing the need to initiate CICO Rescue (emergency front-of-neck airway). Conversely, confirmation of adequate alveolar oxygen delivery using any of the three lifelines, results in outward movement into the circumferential "Green Zone" (see page 6), which provides time to consider and prepare for subsequent airway management options before further instrumenting the airway. The Green Zone is also depicted in the centre of the tool to remind clinicians that, when all three lifelines have been unsuccessful, CICO Rescue can also restore adequate alveolar oxygen delivery and provide these same opportunities.

In contrast to a linear algorithm, the concentric arrangement of the three lifelines on the circular Vortex graphic reflects that airway management can be initiated using any lifeline and, if this is unsuccessful, attempts at the same or alternate lifelines can be implemented in whatever sequence is judged most appropriate in the clinical circumstances. This flexibility in the sequence in which attempts at different lifelines are undertaken, better represents real-world airway management practice than the more rigid sequential progression through upper airway techniques depicted by an algorithm and allows the Vortex to be applied to any context in which airway management occurs.

Figure 1. Vortex.



The Vortex Approach

The Vortex Implementation Tool is the core of the broader "Vortex Approach" which provides an extended array of resources[6] to facilitate all phases of advanced airway care including airway assessment, development of an airway strategy and efficient performance of airway interventions in both the routine and emergency setting. The focus of the Vortex Approach is on providing "implementation tools" designed to be simple enough for real-time use during the process of airway management. This includes a suite of resources designed to facilitate both the preparation and intervention phases of advanced airway care. These adjunctive tools work in an integrated fashion with the primary Vortex tool using the same concepts and language to maximise opportunities to establish alveolar oxygen delivery by:

- Facilitating effective planning for airway management.
- Facilitating efficient best efforts at each of the three upper airway lifelines.
- Encouraging appropriate decision making when adequate alveolar oxygen delivery is achieved via any lifeline.
- Promoting early priming for CICO Rescue as an airway crisis evolves.
- Facilitating rapid recognition of the need for CICO Rescue.
- Facilitating ready access to appropriate airway equipment.

BEST EFFORT AT UPPER AIRWAY LIFELINES

The term "best effort" refers to the circumstance in which all reasonable interventions to facilitate success at entering the Green Zone via a given lifeline have been implemented. Whether or not a given intervention constitutes a "reasonable" contribution towards achieving a best effort represents a balance between its likelihood for success and its potential for harm in a given clinical situation.

The likelihood of success of an intervention is influenced by:

- The intervention: its intrinsic efficacy for addressing a particular problem.
- The problem: the specific challenges impeding entry to the Green Zone in a given patient.
- The clinician: experience and skill set in implementing the intervention.

Repeated interventions to optimise success at a lifeline may contribute to harm by two mechanisms:

- Trauma: repeated airway instrumentation may produce trauma that potentially compromises the ability to enter the Green Zone by alternative means. Airway instrumentation may also produce trauma resulting in patient morbidity beyond airway compromise.

- Time: repeated airway instrumentation consumes time and if unsuccessful may prolong the time to enter the Green Zone relative to exploring alternative options. This potentially increases the duration and severity of hypoxaemia to which a patient is exposed. Even in patients with adequate SpO2, delays to entering the Green Zone consume safe apnoea time and potentially increase the risk of a patient subsequently being exposed to critical hypoxaemia.

Except in the unusual circumstance where an attempt at a given lifeline is considered futile, at least one attempt at each lifeline is usually indicated prior to initiating CICO Rescue. Although desirable, it is not usually feasible to implement all optimisations required to maximise success at a given lifeline and achieve a best effort on this first attempt. Additional factors which might improve the chances of entering the Green Zone may only be identified after initial airway manipulations have taken place. In addition, while some optimisations can be superimposed in an incremental fashion during a given attempt (for example, application of external laryngeal manipulation) others represent alternatives (for example, use of a hyperangulated rather than a Macintosh blade videolaryngoscope) that necessitate an additional attempt. As a consequence, achieving a best effort at a given lifeline typically occurs in a cumulative fashion over a number of attempts, each incorporating additional optimisations that have not previously been implemented. To address the potential for trauma and delays with repeated instrumentation, the Vortex limits the maximum number of attempts to achieve a best effort at each lifeline to *three* but emphasises using the *minimum* number of attempts possible.

To assist with the process of efficiently achieving a best effort over the minimum number of attempts, the Vortex implementation tool (Figure 1) includes a list of five categories of optimisation that apply equally to each of the three lifelines and provide a prompt to consider specific interventions relevant to achieving a best effort at a particular lifeline. Categorising optimisations in this manner is intended to help the entire team to track which interventions have been implemented by the airway operator and to offer suggestions in a structured way.

It is not expected that all the optimisation interventions in a given category are exhaustively implemented for a particular lifeline, as this would be both time consuming and inappropriate in most circumstances. Instead the optimisation headings serve to encourage the clinical team to *consider* all of the options, with the airway operator only *implementing* those thought to be beneficial in a particular context. This structured approach to considering optimisation strategies maximises the opportunities for achieving timely entry to the Green Zone by ensuring that the process of achieving a best effort is:

1. Efficient: by minimising both the time and number of attempts needed to implement all strategies considered to be useful.
2. Rigorous: by minimising the likelihood that potentially helpful interventions are overlooked.
3. Finite: by outlining a set of optimisations that define an endpoint to optimisation of a given lifeline. This promotes team recognition that a best effort at a given lifeline has been completed and, if adequate alveolar oxygen delivery has not been achieved, provides them with permission to move on to an alternate technique.

The goal is to maximise opportunities to enter into the Green Zone in the shortest possible time and with minimum instrumentation of the airway. This makes optimal use of the safe apnoea time and minimises the risk that the patient will be exposed to critical hypoxaemia.

The specific interventions required to achieve a best effort and the number of attempts over which these are employed is thus a context dependent decision, to be made by the airway operator within the confines of the principles set out by the Vortex Approach. In a given set of circumstances this decision will be influenced by the clinical situation and the difficulties being encountered as well as the skill set of, and resources available to, the team managing the airway.

Attempts

In order to meaningfully limit the number of attempts at a lifeline it is necessary to precisely define what is meant by an “attempt”. The definition used by the Vortex Approach for an attempt at each lifeline is as follows:

- ETT: the insertion and removal of a laryngoscope from the airway.
- SGA: the insertion and removal of a supraglottic airway from the airway.
- FMV the application and removal of a face mask to the patient’s face.

It is not necessary that all attempts in pursuit of a best effort at one lifeline must be completed before initiating the first attempt at an alternate lifeline. Best efforts at multiple different lifelines may be proceeding in parallel, with sequential attempts alternating between optimising different lifelines. This reflects normal clinical practice as well as being the most efficient way to achieve entry into the Green Zone[7].

Declaration

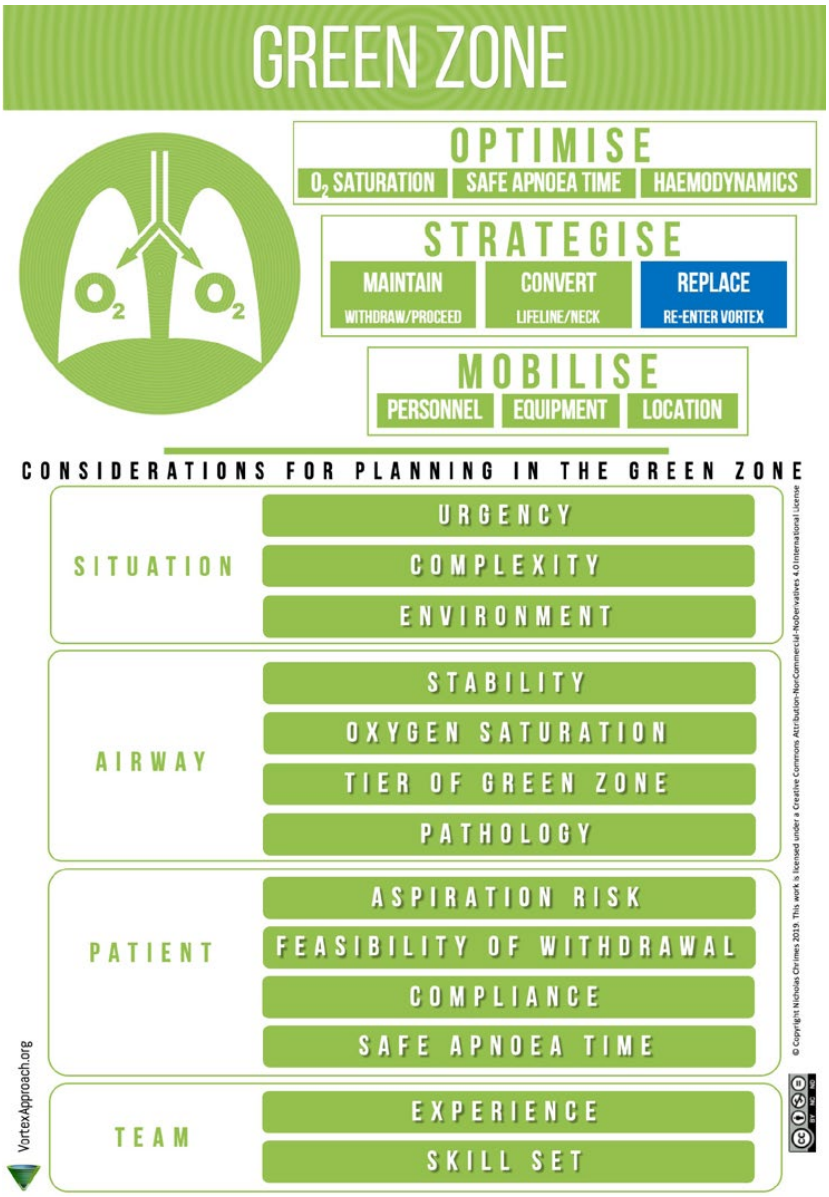
Declaration that alveolar oxygen delivery cannot be achieved by a given technique is a key step in encouraging the team to commit to alternate strategies. Most of the major difficult airway algorithms emphasise the need to make declarations of "failure" at each of ETT, SGA and FM[2-4] in order to facilitate team situation awareness of the need to progress to other techniques. Linking such a declaration to the notion of "failure", however, with the implications this may carry for the competence of the airway operator, may have the potential to become a psychological barrier to such a declaration being made. Use of the term "best effort" rather than "failure" serves to convey the futility of further attempts at the relevant lifeline while emphasising that the clinician has maximised the opportunities available to them according to anatomical, situational and clinician factors at the time. The expectation is that there are less barriers to a clinician to declaring a best effort at intubation than to declaring failure.

If following a best effort at any lifeline alveolar oxygen delivery has not been restored, then alternate strategies must be exclusively pursued, including CICO Rescue when best efforts at all upper airway lifelines have been exhausted.

THE GREEN ZONE

Entry into the Green Zone via any lifeline removes the imminent threat of critical hypoxia and places the patient in a position of relative safety. The declaration "we're in the Green Zone" prompts recognition of the opportunity this presents to optimise physiology, strategise further airway management and mobilise resources (Figure 2).

Figure 2. Green Zone.



Identifying the Green Zone

The essential question to be answered to identify whether the Green Zone has been entered is: Can *adequate* alveolar oxygen delivery be *confirmed*?

- Confirmation: real-time confirmation of alveolar oxygen delivery should typically be achieved by ensuring the presence of $ETCO_2$ (when the patient is being ventilated with oxygen) though a rising pulse oximetry (SpO_2) reading also establishes this.
- Adequacy: the adequacy of alveolar oxygen delivery is not defined numerically but is instead assessed by asking "Is the patient likely to suffer harm from hypoxaemia if exposed to this level of SpO_2 for the next 15 minutes?". The absolute SpO_2 value satisfying this criterion will vary according to the context.

Entry into the Green Zone is therefore not synonymous with obtaining a normal SpO_2 measurement. Normal SpO_2 may be maintained by preoxygenation stores despite an obstructed airway and absent alveolar oxygen delivery. As such there is an ongoing urgency to address the situation before the safe apnoea time is exhausted. Conversely following severe desaturation, obtaining an $ETCO_2$ trace accompanied by recovery of the SpO_2 from 40% back to only 85% would clearly confirm the occurrence of alveolar oxygen delivery. Irrespective of the exact value of the SpO_2 reading, provided it is considered “adequate” in context, confirmed alveolar oxygen delivery always represents entry into the Green Zone.

Any time adequate alveolar oxygen delivery cannot be confirmed, the patient is instead described as being “in the Vortex”. This provides a clear conceptual dichotomy by which all patients must either be “in the Green Zone” or “in the Vortex” at any time. After each attempt to establish or optimise one of the airway lifelines, clinicians are encouraged to verbally declare whether they are in the Vortex or the Green Zone. Such a declaration clearly conveys to the team the answer to a critical question in relation to decision making during airway management: If something is not changed, will the patient inevitably become critically hypoxaemic? By highlighting whether the patient remains at risk of imminent critical hypoxaemia, the declaration of whether or not the patient is in the Green Zone facilitates team situation awareness of the urgency and priorities of airway management at any given point in time in a way that may be obscured when focusing solely on the adequacy of saturations or “oxygenation”.

Opportunities of the Green Zone

1. *Optimise:*

Optimisation of patient physiology consists of maximising the oxygen saturation of the blood, extending the safe apnoea time and stabilising haemodynamics:

- Optimising the blood oxygen saturation minimises the *immediate* threat of harm from tissue hypoxia.
- Optimising the safe apnoea time minimises the *future* threat of harm from tissue hypoxia in the event that alveolar oxygen delivery is subsequently interrupted.
- Optimisation of haemodynamics may previously have been overlooked while trying to restore the airway, leading to compromise of oxygen delivery to the tissues.

2. *Strategise:*

Initial strategic options in the Green Zone can be discussed under three broad headings:

- Maintain: maintain the lifeline by which the Green Zone was achieved and use it to either proceed with the indication for which airway management was initiated or withdrawn (“wake” the patient), using the current lifeline as a bridge to provide time for the patient to regain the ability to maintain their own airway.
- Convert: an attempt can be made to convert the current lifeline, without leaving the Green Zone, to a more appropriate alternative that satisfies other secondary goals of airway management. This can either occur via one of the upper airway lifelines (for example, converting a supraglottic airway to an endotracheal tube using an Aintree catheter) or via some form of front-of-neck airway under more controlled circumstances.
- Replace: this option involves a deliberate decision to abandon the lifeline that provided entry to the Green Zone, interrupting alveolar oxygen delivery, with the expectation that it can be restored using an alternate lifeline.

Categorising strategic options in this manner provides a simple format that decreases the likelihood that key alternatives are overlooked.

NAP 4 emphasised that clinicians should develop a strategy rather than a plan for airway management[1]. A strategy can be defined as an integrated series of plans, each a contingency for failure of the preceding one,

concluding with the trigger for initiation of CICO Rescue. Thus, even when the plan is to remain in the Green Zone ("maintain" or "convert" options), consideration should always be given to the possibility that the ability to achieve alveolar oxygen delivery is inadvertently lost. This should include developing plans to complete best efforts at any remaining lifelines and an appropriate level of priming (see below) to perform CICO Rescue. Thus, it is not sufficient to simply plan the next step in airway management while in the Green Zone. In developing a strategy the question that must repeatedly be asked is: What is the plan if that plan fails?

3. Mobilise:

Having developed a strategy, the time provided by restoration of alveolar oxygen delivery can be used to assemble the resources necessary to facilitate the safe management of the patient. Resources include personnel, equipment and the potential to change the location in which airway management is taking place.

- Personnel: this may include seeking the assistance of an experienced anaesthetist, an ENT surgeon, additional medical/nursing staff or even consulting with a remote colleague via phone.
- Equipment: any specialised equipment for both primary and contingency plans should be made immediately available.
- Location: there may be circumstances in which it is desirable to transfer the patient to a more suitable environment such as the operating suite before proceeding with further airway management.

Entry into the Green Zone consistently provides the same opportunities. The scope of the options available to exploit these opportunities and what constitutes an appropriate strategy, however, depends on the context. The context dependent considerations that might influence this are outlined in the lower half of the Green Zone tool. The Green Zone Tool thus prompts the team to consider the key considerations for planning in the Green Zone. The implications of each of these considerations on the decision making process should be apparent to airway clinicians from their training and is beyond the scope of the content addressed by the Vortex Approach.

CICO RESCUE

CICO Rescue is the term used by the Vortex Approach to describe emergency cannula or scalpel cricothyroidotomy/tracheostomy procedures required during can't intubate, can't oxygenate (CICO) events. Unlike many other terms applied to this procedure (emergency surgical airway, emergency front-of-neck access, invasive airway access, infraglottic rescue, and so on) CICO Rescue satisfies the criteria required of such a term[8] in being simple, intuitive, precise, unintimidating (even reassuring) and inclusive of both cannula/scalpel techniques performed on either the cricothyroid membrane or trachea. This enables it to be readily distinguished from non-emergency techniques to access the airway via the anterior neck (for example, surgical tracheostomy, percutaneous tracheostomy) which are inappropriate for the time critical situation of a CICO event.

There is considerable variation in the way the CICO acronym is verbalised by clinicians. In addition to spelling out C-I-C-O, phonetics range across *Kick-Koh*, *See-Koh*, *Chee-Koh*, *Sic-Koh* and *Psy-Koh*. To facilitate clear, efficient communication during an airway crisis, the Vortex Approach encourages consistent pronunciation of the CICO acronym as *Ky-Koh*.

Trigger for Initiating CICO Rescue

According to the Vortex Approach the trigger for initiating CICO Rescue is the inability to confirm adequate alveolar oxygen delivery following best efforts at all three upper airway lifelines. Note that this trigger is independent of the oxygen saturations since, even in the unusual situation where the oxygen saturations remain high following best efforts at all three lifelines, the inability to confirm alveolar oxygen delivery means that eventual desaturation is inevitable. Rather than being a deterrent to its performance, recognition of the need for CICO Rescue while the oxygen saturations remain high should be viewed as advantageous – providing increased time to perform this confronting procedure in a more controlled manner, thereby increasing the chance of success. Conversely, a critically low oxygen saturation is not in itself a trigger to initiate CICO Rescue if best efforts at all three lifelines have not yet been completed. While legitimate opportunities to enter the Green Zone in a timely fashion via the familiar upper airway lifelines remain, these should be given priority, as they are more likely to be successful than resorting to an unfamiliar and more traumatic technique.

Oxygen saturations are therefore not a relevant consideration in deciding the trigger for CICO Rescue – this is always "the inability to confirm adequate alveolar oxygen delivery following best efforts at all three upper airway lifelines". They are, however, a relevant consideration in making the context dependent decision of what constitutes a best effort at each lifeline in a particular situation. This is because the oxygen saturations impact on how much time it is reasonable to invest in optimising each of the upper airway lifelines before declaring

a best effort. When the oxygen saturations are critically low it might be reasonable to have only one attempt at each lifeline before declaring a best effort, even though this means leaving some potential optimisation interventions untried. This is because the incremental benefit of repeated attempts to optimise a lifeline that has already failed is typically low relative to untried alternative lifelines. Thus the time expended on such low yield interventions cannot be justified when the patient is already critically hypoxaemic and alternatives (including CICO Rescue) with a substantially higher likelihood of success remain.

Priming for CICO Rescue

The term "priming" was introduced by the Vortex Approach to refer to an escalation in readiness to perform CICO Rescue that occurs prior to recognition of a CICO situation. This includes activities that occur during an evolving airway crisis in parallel with attempts to enter the Green Zone via one of the upper airway lifelines, not just preparatory activities that take place in the more static setting before the initiation of airway management. Priming is crucial to ensure that airway management teams are poised to perform CICO Rescue, ideally with zero latency, when CICO is declared and minimise the exposure of patients to hypoxaemia.

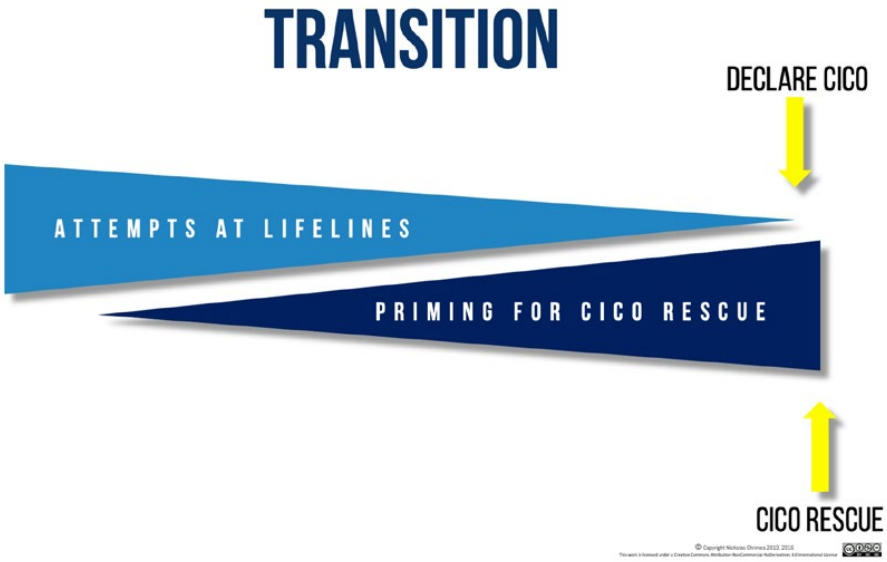
Priming represents a departure from the way in which clinical teams have typically approached readiness for CICO Rescue – which has been to wait until a CICO event is imminent or has already occurred before making any efforts towards getting ready to perform CICO Rescue.

Transition to CICO Rescue

Priming is a key component in the process of "transition" to CICO Rescue encouraged by the Australian and New Zealand College of Anaesthetists (ANZCA)[9]. ANZCA's transition concept emphasies that the shift in focus from attempts to enter the Green Zone via the upper airway lifelines, to achieving this via CICO Rescue, should be a *process* (occurring over a period of time) rather than a *pivot* (occurring at an instant in time).

The Vortex Approach describes transition as *"the phase of care leading up to and including the potential initiation of CICO Rescue"*. Transition is therefore comprised of simultaneous priming for CICO Rescue in parallel with ongoing attempts to enter the Green Zone via the upper airway lifelines (Figure 3). Transition thus commences with the onset of priming and concludes either with entry into the Green Zone via an appropriate upper airway lifeline (typically) or the initiation of CICO Rescue (rarely).

Figure 3. Transition.



CICO Status

While the concept of transition is appealing, effective priming presents two main challenges:

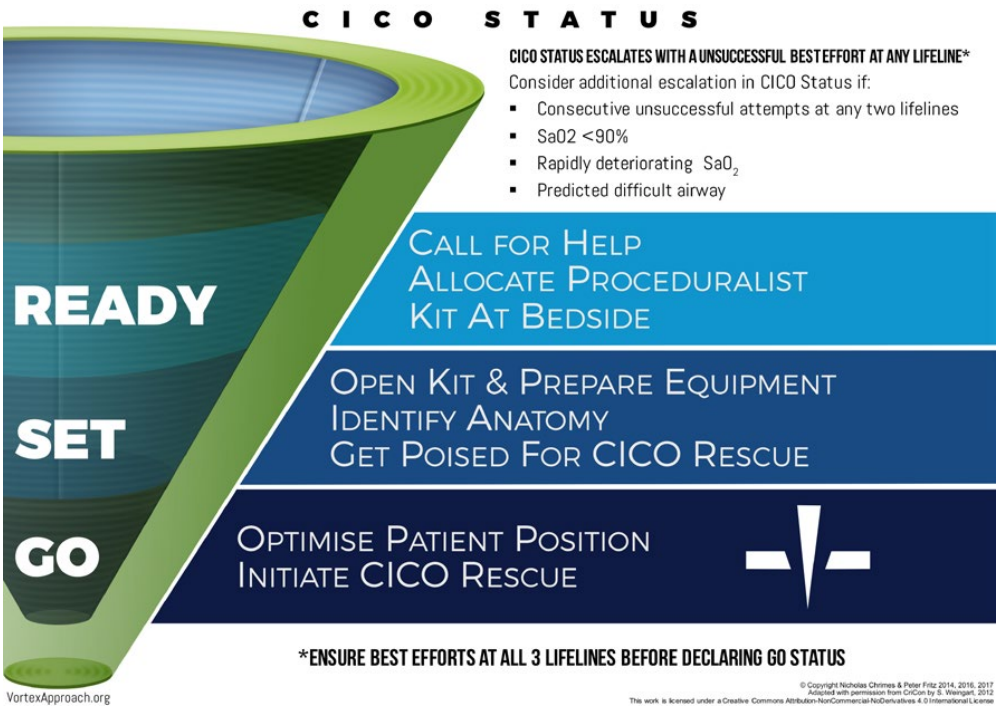
1. Trigger: The onset of an airway crisis is frequently insidious. Even during routine airway management, it is not uncommon for optimisations to be required before entering the Green Zone. The gradual evolution of these routine issues into an airway emergency makes it difficult for clinical teams to identify and declare a clear point of onset for a crisis and thus a trigger to initiate priming.

2. Outcome: To be effective, priming must be initiated early in the management of the challenging airway. Given that CICO events are so uncommon, it would be expected that in most cases the airway will subsequently be successfully managed by one of the upper airway lifelines. Thus initiation of priming will not usually culminate in a declaration of CICO or the need for CICO Rescue.

The above two issues have the potential to create a barrier to effective priming. While the absence of occurrence of a CICO event represents an expected outcome of most episodes of priming rather than a "false alarm", clinicians may be reluctant to initiate priming early, due to concerns about being seen to have panicked or overreacted. As such, a tool is required to facilitate implementation of the process of transition.

While the Vortex tool defines when performance of CICO Rescue is indicated, it does not in itself provide a clear trigger to initiate priming for CICO Rescue. To facilitate effective priming for CICO Rescue, the Vortex Approach uses the CICO Status tool (Figure 4) as an adjunct. This tool helps to address the above issues by linking specific pre-defined priming actions to objectively defined events in the management of the challenging airway in a manner that is integrated with the Vortex model. Using a three-tiered ready-set-go system, the CICO Status escalates with the declaration that a best effort at any lifeline has been completed without providing entry to the Green Zone. Adopting a structured and standardised approach to priming shares the responsibility for escalation with the team, removes the focus on the "anxiety" of an individual clinician and reduces the barriers to timely escalation towards CICO Rescue.

Figure 4. CICO Status.



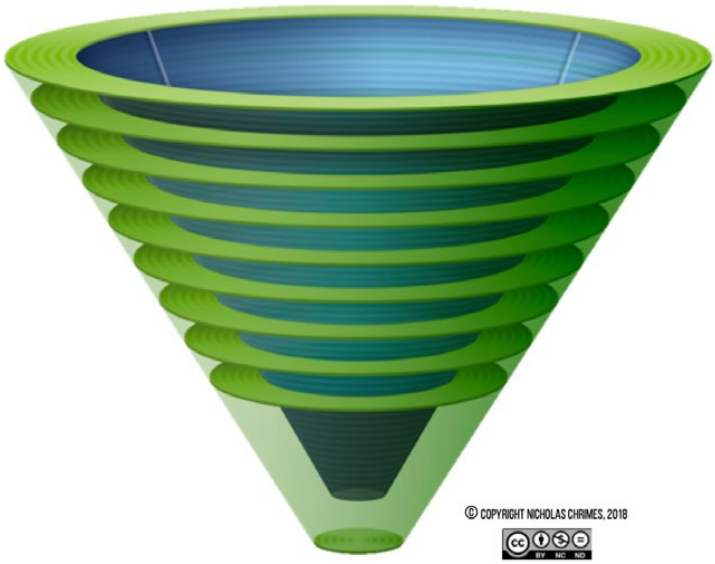
As well as the mandatory escalations with completed best efforts at any lifeline, additional discretionary escalations of the CICO Status may be suggested by members of the team according to other recommended criteria on the tool or their own clinical judgement. In an anticipated difficult airway, where there is perceived to be a high risk of needing to proceed rapidly to CICO Rescue, airway management may even begin with the CICO Status already at SET (the "double setup"). It is also appropriate to consider the need to escalate the CICO Status in any circumstance where previously secured access to the Green Zone has the potential to become compromised, such as during extubation of a high-risk airway.

The declaration of a completed best effort at any lifeline should therefore be accompanied by a request to escalate the CICO Status. If this is not made by the airway operator, other members of the team should feel empowered to insist on this. It is important to note, however, that the CICO Status should not reach GO unless best efforts at all three lifelines have failed to provide entry into the Green Zone. Once the CICO Status reaches SET it should plateau here until a declaration is made that best efforts at all three upper airway lifelines has been unsuccessful.

CONCEPTUAL IMPRINTING

The circular graphic on the Vortex Implementation Tool is intended to represent looking down into a funnel, as illustrated in the lateral three-dimensional image of the Vortex (Figure 5). This three-dimensional depiction of the Vortex is not intended to be referred to during an airway crisis but is used during training to convey and promote retention of additional concepts relating to airway management – a process described as "conceptual imprinting". The Vortex implementation tool is then able to evoke recall of these imprinted concepts without making specific reference to them, which allows it to maintain a simple, low content interface.

Figure 5. Vortex Lateral.



The narrowing of the funnel represents the decreased time and options available with spiral descent deeper into the Vortex. The darker blue at the centre of the funnel evokes recognition of the potential for worsening hypoxaemia and cyanosis if alveolar oxygen delivery is not restored. The sloping surface of the interior of the funnel emphasises that this is an unstable situation and reinforces the need to keep moving forward with attempts to efficiently establish alveolar oxygen delivery via one of the lifelines to avoid a deterioration in tissue oxygenation. In contrast the horizontal surfaces which make up the surrounding Green Zone serve as a reminder that whenever alveolar oxygen delivery is achieved the risk of imminent hypoxaemia has been arrested. The patient is then in a situation of relative safety which provides time to pause and exploit the opportunity to optimise physiology, strategise management and mobilise resources.

CRITICAL LANGUAGE

Critical language refers to standardised communication using specific terms or phrases that are clearly defined, mutually understood and consistently used[8]. The Vortex Approach emphasises the use of critical language to facilitate team situation awareness during airway management. Such terminology is commonplace during cardiac arrest where standardised phrases such as no output, shockable rhythm, stand clear, and so on are routinely used. In contrast, emergency airway management has not evolved an analogous lexicon, leading to duplication and ambiguity of many terms[8], which has the potential to negatively impact on team performance. This has necessitated the Vortex Approach coining idiosyncratic language such as best effort, Green Zone, CICO Status and CICO Rescue to address these deficits.

CLINICAL INTEGRATION

The structured approach to considering optimisation strategies using the five categories of the Vortex for each lifeline can be integrated into the clinical environment[10]. Labelling the emergency airway cart drawers to correspond to the different domains of the Vortex and arranging equipment inside them according to the optimisation categories allows clinicians to use the equipment itself as a prompt to ensure efficient optimisation of the lifelines. In addition, graphics in the drawers can provide visual cues for non-equipment interventions. In this way the airway cart itself becomes an extension of the cognitive tool.

SUMMARY

The Vortex Cognitive Tool is the core element of a broader array of integrated airway resources that include critical language, equipment layout and adjunctive cognitive tools that comprise the Vortex Approach. The Vortex Approach provides a simple, consistent template to prompt team recall and application of technical background material in real-time. Underpinning the effective use of the Vortex Approach is the need for team training to ensure familiarity with the elements required for its successful application. It should not be viewed as an alternative to the major airway algorithms but as a complementary resource, designed to facilitate implementation of the management recommendations outlined by these training tools and improve the performance of clinical teams.

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