

# M.S.M.A.I.D.

## Applying the Pre-Anesthesia Checklist to SOF Medicine

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## MSMAID

Although the acronym “MSMAID” was designed as a pre-op checklist for the anesthesia provider, it is helpful for SOF Medics when (1) we need to decide what gear to bring with us and (2) as a checklist to prepare our non-medical help when they assist us. If you were working in the Operating Room, MSMAID simply walks you through an equipment check on your ventilator, wall suction, monitor, airway equipment, IV patency, and that you have the correct meds and enough of them for the case. The following is an explanation of how MSMAID can be applied to the pre-hospital sedation/pain-control realm with an emphasis on the Prolonged Field Care (PFC) provider. As usual, we’ve made some recommendations in the “minimum - better - best” format in order to give you options based on your mission. For example, if you are jumping in on a 5-day recce mission and only have so much room in your ruck, a finger pulse-ox is perfectly acceptable as a monitor (recognizing of course that it is not a great monitor). On the other hand, if you are deploying to a fixed facility and you can bring the kitchen sink, then you really should have the “best case” items outlined below.

### MSMAID as a planning and gear selection guideline

Simply put, if you are going to carry medications like Ketamine, Midazolam (Versed®), Fentanyl, and Hydromorphone (Dilaudid®), then you need to have MSMAID covered in some way no matter what the mission is. If you have these drugs in your aidbag, at a minimum you need to have a BVM, Suction Easy™, finger pulse-ox, NPA, OPA, King LT®, cric kit, IV starter kit, IO device, and your drug box to include reversal agents (Naloxone and Flumazenil). If you have the luxury of bringing a secondary bag with more space or if you are working out of a fixed facility, then check out the below examples for recommendations for how to increase your capability.

### MSMAID as a pre-sedation checklist

Before you sedate a patient in the PFC setting, we highly recommend that you brief your team using the MSMAID format to cover how you will handle contingencies if they arise. For example:

- **Machine:** “Guys, if the patient stops breathing, we will need to assist him with the BVM. I will hold the mask to the face like so, and Jim, you will squeeze the bag when I tell you. Use only 3 fingers to squeeze the bag, and ventilate the patient every time you take a breath.”
- **Suction:** “If he throws up from the medication, we are going to roll him into the recovery position immediately. I will attempt to clear his airway with the suction, but it is essential that we allow gravity to work in our favor.”

- **Monitor:** “Bob, you will be the monitoring guy. I need you to watch the screen and tell me his pulse rate every 5 minutes. If he starts breathing rapidly, let me know. I need you to also watch his oxygen saturation and tell me if the reading starts to drop below 97%.”
- **Airway:** “Guys, if he stops breathing at any time, we will attempt to ventilate him with the BVM, but if that isn’t working, we may need to put in the King LT to deliver better breaths. Let’s review how that works right now. Worst case, my cric kit is located on the table.”
- **IV:** “Jim, please open the IV up and make sure it is still patent. Let’s go ahead and start another line on his other arm. If we have issues, the IO device is by my cric kit.”
- **Drugs:** “Guys, if I need to give the patient more Ketamine, my syringe is sitting right here with the yellow label. It is all drawn up, so if I ask you to give one more CC, it means you will need to connect it to the IV port and push from the 10 mark to the 9 mark, then open the IV up for a second to let it circulate.”

## Machine

In the Anesthetist's world, the "M" in MSMAID usually refers to checking the gas anesthesia machine or ventilator to make sure it is working properly. In our world, this means having a BVM ready to assist ventilations. It has become common for SOF medics to abandon the mask portion of the BVM, thinking that they will simply connect to an ET tube if they need to use a BVM. However, if you are going to sedate a patient, you need to be prepared to assist ventilations with a Bag Valve MASK. We recommend the "two thumbs down technique" as briefed in the EMCrit Podcast that can be found here: <http://emcrit.org/podcasts/bvm-ventilation/>

**Minimum** – BVM with PEEP valve

**Better** – add oxygen (Saros™ O2 concentrator )

**Best** – Critical Care Transport approved ventilator (Hamilton T1™ or the Impact 731™)



\*Note, the SAVe™ and the SAVe II™ are not true ventilators. They were designed to provide a very short term, "hands free BVM" capability. If they were true ventilators, critical care transport teams would be using them and we have yet to find any reputable transport service that uses them. We are not saying the SAVe is a bad piece of gear, we just need to recognize that it will not provide adequate ventilation in the PFC setting and is therefore not included in the above recommendations. Even with the additional settings on the SAVe II, you are better off hand ventilating your patient with a BVM and PEEP attachment. See the article "Why we need PEEP" here:

[https://prolongedfieldcare.files.wordpress.com/2014/11/whyweneedpeepvalves\\_mason\\_24jan2014.docx](https://prolongedfieldcare.files.wordpress.com/2014/11/whyweneedpeepvalves_mason_24jan2014.docx)

## Suction

This is all about your plan to deal with a patient who starts to vomit once you begin the sedation. It is doubtful that you will have a powered suction unit, so it is essential that you have some form of manual suction to handle secretions in the ET tube, salivation from Ketamine, or an episode of vomiting while you are trying to get an airway established. Bottom line: if you are going to push meds that sometimes make people vomit, you need to be prepared to handle that. The Suction Easy system includes an adaptor and flexible tubing for ET tube suctioning – this is essential if you have patient with blood in the ET tube; there isn't much you can do to improvise that solution.

**Minimum** – improvised suction with syringe and NPA

**Better** – disposable device such as the Suction Easy with flexible tubing for ET tube secretions

**Best** – powered suction



*Minimum*



*Better*



*Best*



## Monitor

Ideally, you should be using a monitor that will automatically cycle BP and provide continuous pulse oximetry and ETCO<sub>2</sub>, however if you are operating with a reduced amount of gear, you may just have a finger pulse-ox. Bottom line: you need to have some sort of plan in place to continuously monitor the patient. In the first column, we have a stethoscope and radial pulse check. This is to remind you not to forget the basics, and that in a pinch, you can do some pretty good monitoring without much gear. Add a finger pulse-ox and you save a lot of work, just keep in mind that the lag time from a finger-tip reading to what is actually happening in the body is around 3 minutes, so don't ever rely on pulse-oximetry to monitor ET tube placement. If you want to be prepared to intubate your patient, a Capnograph<sup>®</sup> is a much better option, and it's tiny. It's not waveform capnography, but it at least gives you ETCO<sub>2</sub> readings. For more on the pitfalls of pulse-oximetry, check out this EM-Crit podcast: <http://emcrit.org/podcasts/oxygen-physiology/>

**Minimum** – manually monitor pulse, BP, and respirations

**Better** – finger pulse-ox, ETCO<sub>2</sub>

**Best** – monitor with ETCO<sub>2</sub>, BP, Pulse oximetry, EKG, etc.



## Airway

In the Operating room, this is where the Anesthetist checks to make sure he has the right ET-tube, laryngoscope blades are present and bulbs are good, and that he has a plan if the first attempt is not successful. The bottom line for us in the pre-hospital environment is that if you plan on sedating someone, you need to be prepared to secure their airway if things do not go as planned. A surgical airway cannot be your only option especially when we are talking about procedural sedation. Imagine having to cric someone when all you were trying to do was sedate in order to set a fracture. If the bare minimum for your TCCC gear is a cric kit and NPA, then for PFC you need to add some options that are less invasive especially if you suddenly need to establish an airway during procedural sedation. \*Note – The King LT® is not a definitive airway. The addition of the King LT to one's kit is only to add a less invasive option for a temporary airway. If the airway needs to be secured for a long period of time, the only option is a cuffed tube in the trachea.

**Minimum** – NPA, OPA and a cric kit

**Better** – the above + King LT or LMA

**Best** –all the above + a full airway kit with laryngoscope and full range of ET tubes and Bougie stylette



## IV

For the Anesthesia provider, this is the part of the checklist where they would check the patency of their IV before they administer medications to the patient and possibly start a second line. It goes without saying that you need IV access if you are going to sedate someone. Not much we can say here, other than the fact that a plan to do purely IM sedation is a BAD plan. One helpful suggestion is to include some 20ga angio-caths in your kit, as your chances for successful cannulation are much better with a smaller needle. We have often been told that 18ga is the minimum angio-cath size, but in this case it makes sense to increase chances of success especially when your non-medical help may be the ones doing the IV. It's a good idea to have an IO kit as well.

We don't have a "minimum-better-best" here; you simply need to have the ability to get IV access if you are going to carry advanced medications, and you need to check patency of the line before pushing your meds.

## Drugs

This is your prompt to make sure you have enough medications as well as the needles, syringes, and saline to administer them. If you carry an opiate, you need to have Naloxone. If you have a Benzodiazepine, you need to have Flumazenil. At a minimum, you need to be able to control pain with an opiate analgesic, but if you truly seek to be prepared for the PFC setting, you need to have Ketamine and Versed as well. Best case, have enough medication to create a 5-hour sedation drip kit with Ketamine and Midazolam (Versed®) in a 250ccs of NS, and a STAT2® drip set (<http://www.conmed.com/products/iv-gravity-stat-2-pumpette.php>). It would be wise to backwards plan the time to evacuation in your PFC setting and make sure you have enough opiate analgesics to control pain for that duration, and enough Ketamine and Midazolam to keep an intubated patient comfortable for that duration as well. The 250cc Saline bag will get you about 4-5 hours of sedation when you add 750mg of Ketamine and 25mg of Midazolam run at approximately 50mL/hr for a 100kg patient (for this sedation mix, take weight in kg divided by 2 = mL/hour). This is not meant to be a "cookbook" formula, just a starting point to work from as well as a very useful planning tool when estimating how much Ketamine you need to bring. Here is an example:

- Each 250mL Saline bag needs 1.5 vials of Ketamine (500mg/5mL) in order to create a "5 hour sedation drip kit" (750mg total)
- Timeline is as follows: 8 hour patient hold time + 4 hour drive to airfield + 8 hour flight to Ramstein AFB = 20 hour sedation requirement. Add 10 more hours to be safe.
- How many "5 Hour Sedation Kits" will you need to keep someone sedated for 30 hours? Answer: 6
- If each sedation kit requires 1.5 vials of Ketamine, and you want to create 6 kits, then you will need at least 9 vials



Now you can take this math to whoever it is that approves your medication request for a mission and have a realistic idea of just how much Ketamine you will need to draw for the trip.

*Minimum*

*Better*

*Best*



Morphine or  
Dilaudid and  
Naloxone

Drug Box with  
Dilaudid®, Fentanyl,  
Ketamine, Versed®,  
Zofran®, Phenergan®,  
Naloxone, Flumazenil,  
Epi and Benadryl

In addition to the  
drug box, add  
multiple “5-hour  
Sedation Kits”.

250mL bag NS +  
750mg Ketamine +  
25mg Versed® +  
STAT2 micro drip  
set



We highly recommend that you pre-label your syringes with the appropriate tape noting the dosage pre-written on the side. For example, when pre-labeling a 10cc NS flush for Ketamine, I write: “waste 1mL NS, draw 1cc Ketamine. 100mg/10mL, 10mg/mL”. Doing the math ahead of time will ensure that you can act quickly and safely under stress.

