The Medication Administration Cross-Check© (MACC)

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User's Manual

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Greetings,

Since the publication of the Institute of Medicine's landmark text *To Err is Human*, combined with the influences of physicians, engineers, cognitive ergonomists, human factors psychologists, and others, the need to improve patient safety has never been more apparent. Although we recognize the need, many have failed to make sustainable improvements in quality and patient safety.

Underlying much of the limited or transient success of token efforts is an unwillingness to move away from a punitive organizational culture. True quality and safety improvement is about learning and creating a culture in which learning can occur; it is not about punishment. The tenets described by the Just Culture management philosophy and the approach described by those seeking to develop a Culture Of Safety (i.e non-punitive error, near-miss, and safety reporting) are critical components of improving the care we deliver, and keeping our providers safe.

As managers we must trade indignation for understanding, recognize that we are fallible, and that our systems are not perfect - failure is not an aberrancy. As providers we must appreciate that the measures developed to create barriers, redundancy, and recovery are not attempts to 'dumb down' the care we provide, but to address the ubiquitous vulnerabilities of human cognition so that our patients are more than one human error away from harm. The Medication Administration Cross-Check© is an attempt to do just that; to insert one more layer of protection for the patient from predictable patterns and frequency of human error.

Clinical error information is sensitive information and as such, opportunities for comparison are limited. It takes tremendous organizational courage to adopt a systems approach to improvement, to refuse to simplify the nature of failure and error, and identify how the decisions made at the blunt end of the organization seed latent error into the systems we design.

> *"The occasional human contribution to failure occurs because complex systems need an overwhelming human contribution for their safety." – Sidney Dekker*

It is our hope that by sharing this information and procedure with you, that you will be able to take a significant step toward improving the health of your communities by decreasing potential and actual harm that occurs as a natural part of healthcare delivery.

This procedure does not replace the need for your organization to thoroughly investigate errors. It has only been through intense and laborious study that we have come to understand the nature of our medication errors. A systems approach is paramount.

Prior to development of this procedure, an internal survey conducted revealed that of 107 respondents, 100% indicated that they "do" some kind of verification prior to medication administration, yet 40% indicated that they had made a medication error (those who were aware they had). 76% indicated they used the "five-rights" method; 64% stated that their verification was out-loud (verbal) and 36% indicated that their verification was "in their head." Our conclusion is that the 'five-rights method" for ensuring medication administration accuracy is insufficient, regardless of how it is performed.

The MACC was beta tested by two paramedic crews for over one month prior to roll out and it has been revised several times. In its first three months of use, it successfully stopped three medication errors that would have occurred otherwise. We have also investigated errors that occurred following implementation of the MACC and have found that the procedure was not actually utilized, or only half-heartedly completed.

So we ask that you evaluate this procedure and implement as you see fit. We are happy to provide the tools to facilitate its dissemination. If you see need to modify or make improvements, please let us know so that we can improve together. We only ask that appropriate credit be given when and where it is due. By embracing the development of non-punitive, learning organizations that value true, forward-looking accountability, we can improve patient safety in the future.

Thank you for your consideration,

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Medication Administration Cross-Check© (MACC) v3.7

Provider 1 (Giving the medication)	Provider 2 (Remember: *"R.C.V." or "R.C.Q."*)
"Med-Check" or "Safety-Check" or "Cross-Check"	**"Ready"**
"I am going to give:" Dose Drug name Route Rate Reason	Concurrence → **"Contraindications?"**
If none state **"No Contraindications"** Otherwise verbally verify	Concurrence → **"Volume?"** (or "Quantity?" for PO)
• State the drug concentration • State volume to be administered in milliliters *[Do not say "amp" or "vial"]* or state # of tablets • Show the vial/ bottle to provider 2 (if safe to do so)	Concurrence & Positive Visual Verification → **Sounds good, give it, go ahead, etc.**

- "**Contraindications**" include: 1) verification of appropriate VS, 2) known patient allergies, and 3) expiration date.
- If a discrepancy, disagreement, or need for clarification is encountered at any step in the process, it must be resolved prior to continuing the cross-check.
- Essentially only Provider 2 can authorize the administration of the medication.
- The MACC must be completed prior to the administration of any medication.
- If there is an interruption or change in patient condition of any kind, the process must be re-initiated by Provider 1.
- Avoid ambiguous statements or confirmations like "okay."

RED RULE of Medication Administration
(A Duty to Avoid Causing UNJUSTIFIABLE Harm)
NEVER give the contents of a syringe that is not labeled or without visualizing the vial or ampule from which it was immediately drawn.

RED FLAGS of Lost Situational Awareness And Errors in Production

Situational Awareness is the ability to identify, process, and comprehend the critical elements of your team's actions with regard to achieving your team's goals.

Red flags are signs that you or someone on your team has lost situational awareness and a verification is needed.

- Intuition or a "bad gut feeling"
- Rushing
- Poor Communication
- Disagreement
- Task Saturation
- Trying Something New Under Pressure
- Interruptions
- Ambiguity
- Preoccupation
- Confusion

Establish a collective awareness by:

- **Review the situation out loud (SBAR)**
  - **S**ituation
  - **B**ackground
  - **A**ssessment
  - **R**ecommendation
- Defer to expertise
- Look it up (i.e. protocols, SOP)
- Contact the Medical Director

Be the voice of the patient!

Slow is smooth, smooth is fast!

Executing the Procedure

Scenario: Provider one would like to give 75 micrograms of Fentanyl for pain control.

1 Provider 1 initiates the procedure by stating one of the following phrases: "***cross-check,***" "***safety-check,***" or "***med check.***"

2 Provider 2 responds that he or she is "**ready**." It is important to avoid using ambiguous responses such as "okay" since they may be interpreted many different ways and they do not effectively reflect the provider's condition.

> It is essential that provider two participate in an engaged manner and not passively participate. [This is a known weakness of the procedure, and human factors/ patient safety literature and research has demonstrated that when an effective attentional capture does not occur by those participating in such a procedure, errors may penetrate the barrier and ultimately reach the patient.]

3 Provider 1 states the phrase "I am going to give" and provides the following information: the dose, drug name, route, rate, and the reason. For example "I am going to give 75 micrograms of Fentanyl IV slow push for pain."

If and only if there is concurrence on provider two's behalf, does the cross-check procedure continue. (If provider two does not agree that the drug, dose, route, rate, or reason are appropriate, then he or she will need to resolve the conflict and make corrections as necessary and provider 1 will need to begin again. Other reasons why provider two may not agree include perhaps contraindications that he is aware of, but provider 1 has not been made aware of yet.)

4 If provider two agrees, he or she responds with the question "are there contraindications?" or simply "**contraindications**?" [This can be colloquial – it does not have to be robotic or verbatim, but the specific questions must be asked.]

5 Provider 1 must check the expiration date if he or she has not done so already, verify that the patient's VS are appropriate, and any drug allergies. Provider one should respond either by saying "no contraindications" or by stating any *relative* contraindications present.

6 If provider 2 concurs, he or she response with the question "what's your volume?" or simply "**volume**?"

7 Provider one should state the drug concentration, the volume he or she intends to deliver, and should show the vial to provider two (if it is safe to do so, such as the other provider is not driving, etc.)
So following our example, provider one would state: 50 micrograms per mL, I'm going to give 1.5 mL.

8 If provider two agrees and makes a positive visual verification, he or she should response with the phrase "sounds good" or "I agree" and the order to "give it" in some form or another, again, avoiding ambiguous words like "okay."

Bottom/ Back of the Card

The bottom portion of the card describes some of the other characteristics and expectations of the procedure and its execution.

- The first point clarifies that the term contraindications include: 1) the verification of appropriate vital signs, 2) known patient allergies, 3) expiration date
- If a discrepancy, disagreement, or need for clarification is encountered at any step in the process, it must be resolved prior to continuing the cross-check.
- It also states that: Essentially, only Provider 2 can authorize the administration of the medication by design of the procedure
- It describes that the MACC must be completed in its entirety prior to the administration of any medication.
- If there is an interruption or change in patient condition of any kind, the process must be re-initiated by Provider 1.
- If a dilutent is used, the vial for the dilutent should be visualized as well.
- It also reiterates the need to avoid ambiguous statements or confirmations like “okay.”

Avoiding ambiguity in communication is an important Crew Resource Management concept. The great majority of failures in any system and any domain are due to the lack of adequate communication. CRM compels us to avoid ambiguity and used closed loop, effective communication between providers. Our own internal investigations into medication errors and near-misses have revealed that good communication can stop an error in production, and the lack thereof, can allow an error to occur.

The Back of the Card

- Human Factors/ CRM concept of situational awareness (SA)
- Red flags as cues for lost SA
- Suggestions for verification

While the purpose of the MACC is not to be a teaching tool, it does contain some helpful hints about when confirmation is necessary and how to go about doing so. The reason is that some crews described that while we have offered insight into identifying the need to perform a verification, some are not sure how to go about doing so in an effective manner.

The MACC was presented to field personnel in conjunction with an introduction to Crew Resource Management (CRM). The literature pertaining to CRM indicates that the first step is to create an awareness of CRM and it precepts, then to offer practice and practical application and continuous reinforcement.

Design Considerations & Specific Error Traps

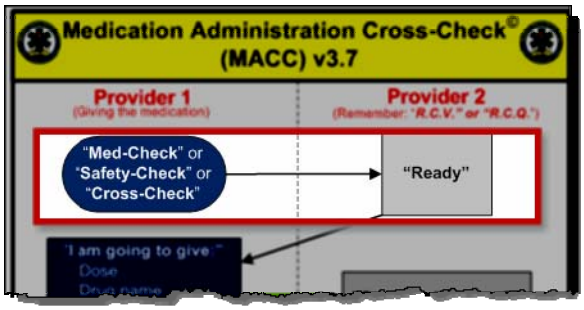
BLS Providers

This procedure was designed in a manner that would allow verification to occur even if "provider two" is a BLS level provider. It is less likely that a BLS provider will know or be able to verify dosages, but positive visual verification of information printed on the drug label can take place regardless of provider two's knowledge of pharmacology. The drug name, concentration, and expiration date can still be verified.

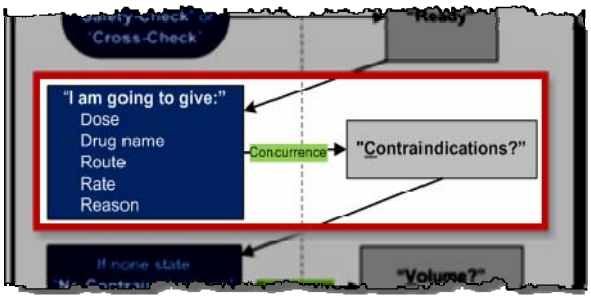
This procedure is weaker when provider two is unable to verify correct dosage and volume to be administered, the procedure still requires an out-loud verbal and visual verification. Further, it is likely that some BLS providers are familiar with appropriate dosages, but even in the event of a discrepancy, the person giving the drug will need to be able to support their dose decision.

Strategic Error Traps

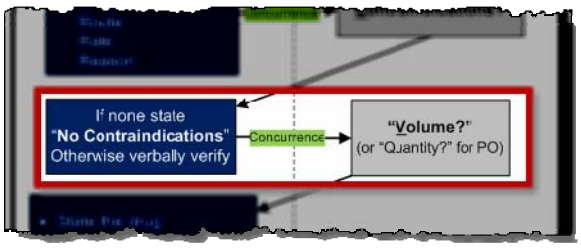
The first step in the procedure is for provider one to initiate an attentional check with provider two – either by saying the phrase "med check," "safety check," or "cross check." Words found in bold in the procedure should be used such that there is a consistent understanding between providers and that there is no confusion about what is being requested.



Provider two should respond that they are "ready" and provider one should affirm that he or she has the full attention of provider two. The purpose is to avoid ineffective verification.

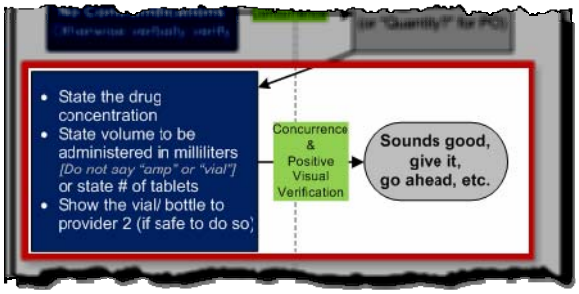


Provider one responds by stating the dose, drug name, route, rate of administration, and the reason for administration. The purpose is so that providers become accustomed to learning and knowing the mechanism of action and pathophysiologic basis of pharmacologic intervention, rather than rote protocol memorization. This also enables verification of administration speed, as well as ensure that both providers agree that the drug is necessary for administration.



A verification of contraindications is meant to stop any errors that may occur due to expired medication, require that both providers share any information regarding known patient drug allergies, as well as relative contraindications such as medical history or prescribed drug interactions, creating a shared awareness. It is not required to verbalize contraindications unless they are present, but some providers have chosen to verify appropriate vital signs, patient drug allergy status, and expiration date out loud anyway.

The last and final steps in the process were designed to catch errors of action. Slips or lapses in behavior that may not have otherwise been corrected such that both providers can verify the volume that provider one intends to deliver and avoid the false notion that the contents of a vial are a "dose." It serves to direct the provider's attention to exactly how much liquid they intend to deliver, rather than assuming they have the appropriate dose.



It also directs the avoidance of terms like "amp" or "vial," which could lead to an incorrect dose administration. Visual verification is designed to prevent wrong drug errors. Research has clearly demonstrated that people will see what they are prepared to see.

Our organization has chosen not to *mandate* visual verification if there is only one provider in the back of the ambulance with the patient during transport, which could create an unsafe distraction for the driver. However the exclusion of visual verification has permitted errors to occur in spite of the process since the implementation of the MACC.

In summary, this procedure was designed to catch:

1) wrong drug, (visual slip or mistake– skill based error)
2) wrong dose (mistake – skill, rule, or knowledge base error)
3) wrong concentration, (slip – skill or rule based error)
4) wrong volume to be administered, (calculation - knowledge base error)
5) wrong duration of administration (rule based error)
6) wrong situation or reason for administration (contextual, rule based error)
7) absolute and relative contraindications including known patient drug allergies, potential interactions, expired medication (contextual error – rule based error)