AIRA AMERICAN IMMUNIZATION REGISTRY ASSOCIATION
Immunization Information Systems for a New Era

Guidance for HL7 ACK Messages to Support Interoperability

Background

In summer 2015, The American Immunization Registry Association's (AIRA) interoperability testing project reviewed HL7 Acknowledgement Messages (ACK) from 21 different Immunization Information Systems (IIS) as part of a standards alignment effort. The analyzed ACK messages had considerable variation and limited alignment with the National Implementation Guide (IG). These discoveries were significant enough to warrant further guidance in an effort to improve ACK message conformance and consistency across the nation. Release 1.5 of the National HL7 Implementation Guide (IG) allows for a few ways to provide an ACK which conforms to the IG. This, in-turn, results in varied understanding and implementation the ACK messages. This guidance document seeks to clarify those issues in an effort to drive all IIS towards common, standardized ACK messaging. This is important not only to ultimately improve data quality, but because EHR vendors, and increasingly healthcare entities themselves, cross IIS jurisdictional boundaries, and need a single standard with which to comply. Further conformance clarifications will be needed in a future release of the National IG.

Scope of Guidance

In Scope

As documented in the National HL7 IG, the ACK message requires the use of one and only one Message Acknowledgement (MSA) segment. The second segment is the Error (ERR) segment that can be repeated. The ERR segment is defined as a Required, But May Be Empty (RE) segment. Both the MSA and ERR have one critical field to help determine initial understanding of successful processing, MSA-1 (Acknowledgement Code) and ERR-4 (Severity) respectively. This document will provide guidance on consistent usage of MSA-1 and ERR-4 in response to a submitted VXU message.

Out of Scope

The ACK also contains other important fields. The other fields in the MSA and ERR have been populated according to the National IG with minor exceptions. Those fields will not be discussed in this guidance document. Please consult the National IG on other MSA and ERR fields.

Vocabulary

The use of the words "error" and "exception" are used extensively in the National HL7 IG. The word "error" is used in this document as well. Unfortunately, this can be problematic considering the different definitions readers may apply to the terms.

1) It could mean the general concept of an error as in something unexpected, unwanted, or wrong.

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2) It could refer to the Error (ERR) segment
3) It could refer to the Severity code of Error (E).
4) It could refer to the Acknowledgement Code of Application Error (AE)

This guidance document attempts to be as specific as possible when using the term 'error' to properly associate it to one of the possible meanings above. In the case that the term isn't clarified, the first meaning above (the general concept of an error as in something unexpected, unwanted, or wrong) should be assumed.

The term "Sender" is used extensively in this document. In all cases it refers to the submitter (e.g.: EHR, Pharmacy, etc..) of the VXU message and not the IIS responding to the VXU message with an ACK message.

ACK Guidance

As noted in the scope section, MSA-1 and ERR-4 are the main focus of this document. The combination of these two fields should be a reliable indicator to sending systems in an effort to understand the outcome of processing of the original message. In truth, MSA-1 (AA, AE, AR) can be derived from the ERR-4 (I, W, E). As such, ERR-4 will be discussed first, followed by a derivation table for consistent MSA-1 usage.

ERR-4 (Severity)

As suggested by the name of the field and the value set (I, W, E), this field documents how serious the error is and what the IIS expects of the sending system in regards to this error. In that light, it is very important to note that not all IIS will agree on the severity of a given error. For example, one IIS may consider an invalid value for Administration Route to be extremely serious and expect a sending system to correct and resubmit the data, while another IIS may simply want to alert the sending system about the situation, but not necessarily expect the sender to resubmit. This decision of the severity of a detected condition is left to the determination of each IIS. However, the distinction between a Severity of Error (E), Warning (W), and Information (I) along with the expectation of the sender must be consistent across IIS.

The following table was taken verbatim from the National HL7 IG. It provides the possible ERR-4 values.

Table 1: ERR-4 (Severity) Values defined by National HL7 IG

Value	Description	Comment
I	Information	Transaction successful, but includes returned information.
W	Warning	Transaction successful, but there may be issues. These may include non-fatal errors with potential for loss of data.
E	Error	Transaction was not successful. The application rejected data that it views as important. This could include required fields or the entire message. The sender should be alerted to review and correct the message.

One important note on the table are the phrases "Transaction successful" and "Transaction was not successful". These phrases may be misleading when looking at a collection of ERR segments across an

entire message. For example, just because there is an ERR segment with a severity of Warning (W), a sender cannot deduce that the transaction was successful without verifying all other ERR segments. It is entirely possible that a subsequent ERR segment may contain a severity of Error (E).

In looking at the description and comment columns above, and thus comparing it to the understood usage in the community, the following table was constructed to further define each value.

Table 2: ERR-4 (Severity) Value Assignment and Sender Expectation

ERR-4 Severity Value	Sender Must Correct?	Sender Must Resubmit?
I	N	N
W	Y	N
E	Y	Y

MSA-1 (Acknowledgement Code)

During the processing of a message, it is possible that more than one error might exist. Each error will be messaged as a distinct ERR segment. Each ERR segment will contain its own ERR-4 (Severity) value (I, W, E). It is at this point that MSA-1 must be derived in a consistent manner to be a quick and effective indicator for sending systems.

The following table was taken verbatim from the National IG. It provides the possible MSA-1 values.

Table 3: MSA-1 (Acknowledgement Code) Values defined by National HL7 IG

Value	Description	Comment
AA	Application Accept	Message was accepted without error.
AE	Application Error	Message was processed and errors are being reported. AE is sent whenever an error is detected. This may range from data that are ignored because they are not wanted to rejection of the entire message.
AR	Application Reject	Message was rejected because one of the following occurred: • Unsupported Message Type • Unsupported Event Code • Unsupported Processing ID • Unable to process for reasons unrelated to format or content.

Similar to ERR-4, the values in MSA-1 should have consistent meaning and usage. The following table was developed based on the description and comment columns above as well as understood usage in the community.

Table 4: MSA-1 (Acknowledgement Code) Value Assignment and Expectation

Scenario	MSA-1 Value	Sender Expectation
No ERR segments	AA	Document the message was accepted by the IIS.

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All ERR segments have ERR-4 (Severity) of Information (I)	AA	Document the message was accepted by the IIS. Only informational data is being returned.
At least one ERR segment has an ERR-4 (Severity) of Warning (W) or Error (E).	AE	Investigate ERR segment(s) and take expected actions per Table 2 above.
At least one ERR segment has an ERR-4 (Severity) of Error (E) and is related to one of the following: • Unsupported Message Type • Unsupported Event Code • Unsupported Processing ID • Unable to process for reasons unrelated to format or content.	AR	Investigate ERR segment(s) and take expected actions per Table 2 above.

Correction and Resubmission

A few places in this document expect the sender to correct and resubmit, however, it has not been stated what (or how much of the message) the sender is expected to resubmit. A single message may contain multiple parts or concepts (e.g.: multiple immunizations, addresses, responsible persons, observations, etc…). This guidance defines a consistent way to highlight errors in response to a submitted message, but the ACK is not well suited to indicate what data was consumed. As such, it is expected that a sender first investigate any error (E) conditions, correct any issues in the sending system, and then resubmit the corrected version of the data. It is important to note that correcting errors may include conversation with an IIS as the error may be on the IIS side (e.g.: new CVX code not yet accepted by an IIS).

Summary

The following table was built as a summary of the information defined above. This can be used as a quick resource for trading partners to have a common agreement on the use and expectation of MSA-1 and ERR-4.

Table 5: MSA-1 and ERR-4 Summary

ERR-4 Content	Expected MSA-1	Understanding
• No ERR Segment	AA	Message was accepted. - No action expected by sender
• All ERR Segments have a Severity of Information (I)	AA	Message was accepted. - No action expected by sender
• At least one ERR Segment has a Severity of Warning (W) • No ERR Segments have a Severity of Error (E)	AE	Message was accepted. - Sender expected to take action to correct - Sender not expected to resubmit
• At least one ERR Segment has a Severity of Error (E)	AE	The IIS has identified issues with the message. - Sender expected to take action to correct - Sender expected to resubmit
• At least one ERR Segment has a Severity of Error (E) with a condition defined in Table 4 above	AR	The IIS has detected 1 of 4 specific problems. - See table 4 above for specific problems - Sender expected to take action to correct - Sender expected to resubmit

Examples

The following examples are provided based on the guidance provided in this document.

Scenario	ACK Example
IIS Accepted Message.	MSH|^~\&|DCS|MYIIS|MYIIS||20150924161633-0500||ACK^V04^ACK|1234567|P|2.5.1|||NE|NE|||||Z23^CDCPHINVS MSA|AA|9299381
IIS Accepted Message with additional Information (I)	MSH|^~\&|DCS|MYIIS|MYIIS||20150924161633-0500||ACK^V04^ACK|5315315|P|2.5.1|||NE|NE|||||Z23^CDCPHINVS MSA|AA|4513185 ERR|||0^Message Accepted^HL70357|I||||3 of 3 immunizations have been added to IIS
IIS wants to warn (W) a Sender of an issue. No Error (E) level problems with Message.	MSH|^~\&|DCS|MYIIS|MYIIS||20150924162038-0500||ACK^V04^ACK|465798|P|2.5.1|||NE|NE|||||Z23^CDCPHINVS MSA|AE|313217 ERR||PID^1^11^5|999^Application error^HL70357|W|1^illogical date error^HL70533|||12345 is not a valid zip code in MYIIS
IIS has Error (E) level problem with the message.	MSH|^~\&|DCS|MYIIS|MYIIS||20150924162038-0500||ACK^V04^ACK|987648|P|2.5.1|||NE|NE|||||Z23^CDCPHINVS MSA|AE|1531573 ERR||PID^1^7|101^required field missing^HL70357|E||||Birth Date is required.

IIS has Warnings (W) and Information (I).	MSH|^~\&|DCS|MYIIS|MYIIS||20150924162038-0500||ACK^V04^ACK|6516848|P|2.5.1|||NE|NE||||Z23^CDCPHINVS MSA|AE|165138 ERR|||0^Message Accepted^HL70357|I||||3 of 3 immunizations have been added to IIS ERR||PID^1^11^5|999^Application error^HL70357|W|1^illogical date error^HL70533|||12345 is not a valid zip code in MYIIS
IIS has Warnings (W) and Errors (E)	MSH|^~\&|DCS|MYIIS|MYIIS||20150924162338-0500||ACK^V04^ACK|6157|P|2.5.1|||NE|NE||||Z23^CDCPHINVS MSA|AE|783843 ERR||PID^1^11^5|999^Application error^HL70357|W|1^illogical date error^HL70533|||12345 is not a valid zip code in MYIIS ERR||PID^1^7|101^required field missing^HL70357|E|||Birth Date is required.
IIS unable to process message due to 1 of 4 specific HL7 defined problems	MSH|^~\&|DCS|MYIIS|MYIIS||20150924162338-0500||ACK^V04^ACK|13549|P|2.5.1|||NE|NE||||Z23^CDCPHINVS MSA|AR|9299381 ERR||MSH^1^12|203^unsupported version id^HL70357|E|||Unsupported HL7 Version ID