Acknowledgement (ACK) Messaging: Updated Specifications and Guidance

Table of Contents

Executive Summary

This Technical Advisory Bulletin (TAB) clarifies and expands specifications for HL7 v2.5.1 immunization Acknowledgement (ACK) messaging in response to a submitted Unsolicited Vaccination Record Update (VXU) message. Specifically, this TAB addresses key concepts and provides definition for terms related to VXU message acceptance and processing by an immunization information system (IIS), as relayed in ACK messages, including:

- **Core Intent:** At their most fundamental level, IIS provide consolidated patient immunization records, i.e., what shots were received and when for a given patient. A submitted VXU serves to electronically update a patient's immunization record within an IIS. This TAB provides a baseline definition of core intent to mean whether the submitted patient and their shot history could be associated/recorded in the IIS, which serves as a framing to inform acknowledgement messaging:
    - Core intent fulfilled: patient and their shot record(s) updated
    - Core intent not fulfilled: patient and/or their shot record(s) not updated
- Whether the core intent was fulfilled informs **acceptance** and **rejection** of a submitted VXU.
    - **Accept:** The IIS received the message; the submitted patient was associated/recorded and their shot(s), if submitted, were associated/recorded (core intent fulfilled). The submitted patient and their shot(s) are in the IIS.
    - **Reject:** The IIS received the message; however, the patient was not associated/recorded and/or one or more submitted shot(s) were not associated/recorded (core intent not fulfilled), warranting resubmission of a corrected message.
- An accepted VXU may be further characterized as successful or qualified successful:
    - **Successful:** Core intent fulfilled. No further action is required.
    - **Qualified Successful:** Core intent fulfilled; however, issue(s) requiring correction.
- A rejected VXU may also be referred to as an 'unsuccessful' submission:
    - **Unsuccessful:** Core intent not fulfilled; correction and resubmission are required.

Additionally, the TAB clarifies specifications and guidance for ACKs, with key specifications as follows:

- IIS SHALL return MSA-1 Acknowledgement Code value 'AE' to convey VXU message acceptance as a qualified successful transmission, (i.e., the ACK contains one or more severity level 'W' error(s) but no severity 'E' error(s)).
- IIS SHALL return 'AR' to convey VXU rejection, i.e., unsuccessful processing of a submitted VXU due to one or more severity 'E' error(s).

- IIS SHALL NOT use ACKs to convey transport or connectivity issues; therefore, IIS SHALL NOT use 'AR' for the reason 'Unable to process for reasons unrelated to format or content'.

Background

Over a decade ago, AIRA released *Guidance for HL7 Acknowledgement Messages to Support Interoperability*. Prior to this guidance, ACKs were often ignored by receiving systems due to inconsistent usage and limited actionable content. It was difficult to determine whether submitted data had been accepted by an Immunization Information System (IIS), leading to confusion and poor visibility into interface performance. Since the publication of that guidance and its widespread adoption, most IIS now produce more structured and useful ACK messages. This has significantly increased the value of ACKs for both submitters and IIS, making it easier to determine whether messages were processed successfully and what follow-up actions may be required.

However, there is still room for improvement. Submitters and implementers have asked for clearer, more detailed feedback in ACKs to support troubleshooting and data quality monitoring. Some work has already been done in this area, such as expanding the use of ERR-5 values to describe specific issues in more detail.

This TAB incorporates that work into a broader effort to improve the expressiveness and interpretability of ACK messages. The guidance is intended to help submitters and receivers understand broad questions about the state of an interface (i.e., what percentage of submitted messages are being accepted by the IIS?) and provide clear, actionable information about each transaction to facilitate follow-up and troubleshooting if necessary. Optimizing ACK messages to directly support this kind of tracking benefits all parties: submitters gain better visibility and accountability, and IIS benefit from improved data quality and system monitoring.

For additional information about Technical Advisory Bulletins and conformance verbs (i.e., SHALL, SHOULD) and their definitions, see the TAB Overview.

Scope

This guidance defines how to clearly communicate message processing outcomes in VXU/ACK transactions by further clarifying and standardizing the use of five key elements: MSA-1 Acknowledgement Code, ERR-2 Error Location, ERR-4 Severity Code, ERR-5 Application Error Code, and ERR-8 User Message.

In scope

This guidance applies specifically to production **VXU/ACK** transactions and includes requirements for:

- Use of **MSA-1** Acknowledgement Code to summarize message processing outcome.
- Use of **ERR-2** Error Location to identify the specific location of issues in the message.
- Use of **ERR-4** Severity Code to assign severity levels that guide submitter follow-up.
- Use of **ERR-5** Application Error Code to specify the nature of the issue using standardized codes.
- Use of **ERR-8** User Message to provide clear, non-technical user-facing messages.

Out of scope

This guidance does not define:

- QBP/RSP message processing or responses.
- Jurisdiction-specific policies that determine what messages an IIS will accept or reject. This TAB focuses solely on how to report processing outcomes within the ACK message, not on the policy decisions that drive those outcomes.
- Transport-level behaviors, such as SOAP fault handling, endpoint availability, or security exceptions, which are governed by other specifications (e.g., CDC WSDL).
- Jurisdictional onboarding practices and policies associated with VXUs (which may place additional requirements on conformance and quality of submitted VXUs).
- Advanced ACK proposals under discussion, including: new MSA-1 values, new ERR-4 values, MSH-21 profile identifier changes, and the ability to distinguish between 'full rejection' and 'partial rejection' (i.e., the ability to indicate, within an ACK conveying rejection, specific elements that may have been processed/stored and those that may have been rejected).

Transport-Level Failures

The guidance in this TAB applies to application-level acknowledgments (ACKs)—responses to HL7 message processing—not to transport or broader connectivity issues. Transport and connectivity issues prevent a VXU from being submitted to the IIS and/or prevent the IIS from returning an ACK message in response to a VXU. Therefore:

IIS SHALL NOT use ACKs to convey transport or connectivity issues, i.e., IIS SHALL NOT use an ACK to convey the following types of issues:

- **Connectivity issue:** DNS lookup fault, timeout (network outage)
- **SOAP-related issue:** unknown operation, invalid SOAP message, SOAP message too large
- **Security issue:** e.g., certificate failure, TLS authentication failure, or invalid credentials/tokens
- **Other routing/connectivity issue**

When encountered, these prevent message delivery and must be investigated and resolved before retrying HL7 messaging. Using HL7 ACKs to indicate these problems is unreliable and misleading to submitters.

Note, there are cases when an intermediary supporting data exchange between an IIS and a submitter may need to communicate an IIS transport issue back to the submitter via an ACK. See Appendix A for additional guidance when this applies.

Summary: What Can Be Inferred from the ACK?

This section is provided as a summary and reference for key specifications noted in this TAB. Subsequent sections provide additional detail on key terms and use of specific fields.

Table 1. ACK Interpretation Summary

VXU Acceptance/ Rejection	VXU Processing Outcome	MSA-1	ERR-4 Severity Presence	Required Actions
Accept: Core intent fulfilled	**Successful processing**	AA	N/A, no ERR segments	None
		AA	I *(no W or E)*	None
	Qualified successful processing; issue(s) requiring correction	AE	W *(no E)*	Convey and correct
Reject: Core intent not fulfilled	**Unsuccessful processing, resubmission required**	AR	E	Convey, correct, and resubmit

Key Takeaways

- MSA-1 values AA and AE indicate acceptance, i.e., that the IIS associated/created the patient and updated their shot records.
    - MSA-1 value AA indicates no further action is required.
    - MSA-1 value AE indicates correction is required due to issue(s) encountered.
- MSA-1 value AR indicates rejection (i.e., unsuccessful processing); correction and re-submission is required as the core intent was not fulfilled.
- Similarly, the presence of ERR-4 = E severity issue(s) indicates rejection.
- For a rejected (unsuccessful) VXU, the expectation is for the submitter to correct the issue(s) and re-submit the full message. Submitters shall not attempt to ascertain if certain elements of the patient's IIS record were updated. There is no standardized mechanism for an IIS to convey which elements of the submitted message may have been processed/recorded by the IIS. For example, for a rejected VXU:
    - An IIS might associate the patient and update their demographics but reject all immunizations.
    - An IIS might store one immunization but reject the rest.
    - An IIS might store nothing at all.
    - Across each of these examples, the VXU would be rejected, and the submitter would need to re-send a corrected message in its entirety.
- A VXU rejection shall not be interpreted as an indicator to automatically stop submission and processing of additional VXU messages.

- Within an ERR segment, the ERR-2, ERR-4, ERR-5, and ERR-8 fields are key fields to understand and interpret the issue reported:
    - ERR-2: Where the issue was in the submitted message
    - ERR-4: The severity of the issue (which drives required follow-up action)
    - ERR-5: What the issue is, conveyed using a national set of error codes
    - ERR-8: A plain language indication of the issue

Acceptance and Processing Terms

This section defines the key concepts used throughout this guidance to establish a shared vocabulary and to support precise and consistent implementation and interpretation.

IIS Core Intent: Provide Consolidated Immunization Records

IIS acknowledgment messaging is informed by the core intent of the IIS and whether that intent was fulfilled for a submitted VXU. While IIS provide a myriad of functions and a wealth of data, at their most fundamental level, IIS provide an electronic version of a patient's consolidated immunization records, i.e., an electronic version of a patient's paper immunization record card (see Figure 1). Whether recorded on paper or available in an IIS, **the documentation of an individual's shot history – *what shots were received and when* – provides a consolidated, longitudinal record for reference**.

The submission of a VXU serves to electronically update a patient's record within an IIS. Considering whether this core intent was fulfilled (i.e., **was the patient associated/created and were their shot(s) recorded**) serves as a useful framing to inform acknowledgement messaging:

- VXU submitted - > patient was associated/created and their shot history (if submitted) was recorded: Intent fulfilled; therefore, the VXU is accepted.
- VXU submitted -> patient was not associated/created and/or their shot history (if submitted) was not recorded: Intent not fulfilled; therefore, the VXU is rejected.

Therefore, accept and reject mean the following in ACK messaging:

- **Accept**: The IIS received the message; the core intent of associating/updating the patient's IIS record was fulfilled.
- **Reject**: The IIS received the message; the core intent of associating/updating the patient's IIS record was not fulfilled, resubmission of a corrected message is needed.

Local business rules

By defining core intent, this TAB establishes a baseline standard for acceptance versus rejection. However, implementation-specific business rules—such as those governing VXU processing, record matching, and de-duplication—drive how an IIS operationalizes and arrives at those outcomes.

For example, consider a VXU with a missing patient address sent to two IIS with different business rules related to patient address:

- 'IIS A' business rules require patient address to associate/create a patient record.
- 'IIS B' business rules do not require patient address to associated/create a patient record.

In the case of 'IIS A', the lack of patient address in the VXU would prevent the IIS from associating/updating the IIS record; therefore, the VXU would be rejected. In the case of 'IIS B', the lack of patient address in the VXU does not prevent association/update of the patient's IIS record; therefore, the VXU would be accepted.

The specifications outlined in this TAB standardize how the outcome of applying these local rules is conveyed. Regardless of local policy, whether the VXU was accepted or rejected depends on if the core intent of associating/persisting the submitted patient and their immunizations was fulfilled. Additional examples illustrating core intent are provided in Appendix B.

Successful, Qualified Successful, and Unsuccessful Transmissions

ACKs may also be used to convey the relative *success* of a submitted VXU message transmission:

- **Successful**: Core intent fulfilled: patient and submitted immunization(s) persisted; No further action is required.
- **Qualified Successful**: Core intent fulfilled: patient and submitted immunization(s) persisted; however, issue(s) requiring correction.
- **Unsuccessful**: Core intent NOT fulfilled: patient and/or submitted immunization(s) NOT persisted; correction and resubmission are required.

Both 'successful' and 'qualified successful' VXU messages are characterized as 'accepted' by the IIS, with no resubmission required. Conversely, 'unsuccessful' VXU messages are characterized as 'rejected' given the need for resubmission of a corrected message. Table 2 highlights these relationships.

Table 2. Relationship between ACK acceptance/rejection and VXU processing outcome

VXU Acceptance/Rejection		VXU Processing Outcome	
Accept	The IIS received the message and the patient and their shot(s) if submitted,	**Successful processing**	No further action is required.

	were associated/ recorded in the IIS.	**Qualified successful processing**	Issue(s) require correction.
Reject	The IIS received the message; the patient and/or their submitted shot(s) were not associated/ recorded in the IIS, warranting resubmission of a corrected message.	**Unsuccessful processing**	Correction and resubmission are required.

Clarified Specifications and Guidance

MSA-1 Acknowledgement Code

The **MSA-1** field in the ACK message provides a summary of the overall processing outcome for the submitted VXU message. As a reminder, IIS receipt of the submitted VXU is a precursor to acknowledgement messaging; therefore, ACKs SHALL NOT be used to indicate transport/connectivity issues.

Once the IIS receives and processes a VXU, the ACK MSA-1 value is derived from the most severe[1] **ERR-4** value present in any ERR segment. While systems build the ACK by first assigning severities to individual issues using ERR-4, the MSA-1 value is constructed after the fact to reflect the message-wide disposition.

MSA-1 Values

The MSA-1 value supports submitters and receivers in understanding message-level status by looking at a single field, by rolling up issue-level severities into a coherent summary. Values for MSA-1 include:

- AA - Application accept
- AE - Application error
- AR - Application reject

MSA-1 Specifications

Each MSA-1 value carries implicit constraints on what ERR-4 severities may appear in the ACK. The relationship between MSA-1 and ERR-4 is outlined in Table 3.

Table 3. Conformance relationship between MSA-1 and the presence of ERR-4 severity code in the ACK

[1] 'E' is highest ERR-4 severity, followed by 'W', then 'I'.

MSA-1	ERR-4 Info (I)	ERR-4 Warning (W)	ERR-4 Error (E)
AA	MAY	SHALL NOT	SHALL NOT
AE	MAY	SHALL	SHALL NOT
AR	MAY	MAY	SHALL

For population of MSA-1:

- MSA-1 value 'AA'
  - SHALL be returned to indicate VXU acceptance with no issues requiring correction/resubmission.
  - SHALL NOT be returned when there is an ERR-4 severity 'W' or 'E' error.
- MSA-1 value 'AE'
  - SHALL be returned when the ERR-4 severity is 'W' and there are no severity 'E' error(s).
  - SHALL NOT be returned when there is an ERR-4 severity 'E' error.
- MSA-1 value 'AR'
  - SHALL be returned to convey VXU rejection when core intent is not fulfilled; I.e., SHALL be returned when there is an ERR-4 severity 'E' error.

MSA-1 Guidance

- Per these specifications, an MSA-1 value of 'AE' indicates the VXU was accepted as a qualified successful transmission.
  - Previously, interpretation of 'AE' was ambiguous, with additional inspection of ERR-4 value(s) in ERR segment(s) needed to determine whether the VXU was accepted or rejected.
  - This guidance limits use of 'AE' to when there are severity 'W' error(s) but no severity 'E' error(s).
- An MSA-1 value of 'AR' indicates the VXU was unsuccessful (i.e., rejected).
  - Previously, 'AR' was reserved for the following use cases:
    - Unsupported message type,
    - Unsupported event code,
    - Unsupported processing ID, and
    - Unable to process for reasons unrelated to format or content.
  - This guidance removes "Unable to process for reasons unrelated to format or content" as a reason to return 'AR' as this is a transport/connectivity issue.
- MSA-1 (and ACKs more generally) cannot be used to convey transport/connectivity issues.

Table 4 indicates the historical, previous relationship between MSA-1 value and VXU processing outcome and acceptance when use of 'AR' is tightly limited. Table 5 indicates this relationship when use of 'AR' is expanded to indicate additional reasons that indicate core intent has not been fulfilled.

Table 4. *Historical* relationship between MSA-1 and VXU processing outcome and acceptance

VXU Processing Outcome	VXU Accept/ Reject	MSA-1 AA	MSA-1 AE	MSA-1 AR
Successful	Accept	✓	n/a	n/a
Qualified Successful	Accept	n/a	✓	n/a
Unsuccessful	Reject	n/a	✓	✓

Historically, the interpretation of the MSA-1 value '**AE'** has been ambiguous, as it can indicate either **acceptance** (qualified successful processing with issue(s) that require correction) or **rejection** (unsuccessful processing requiring correction and resubmission).

Table 5. *Updated* relationship between MSA-1 and VXU processing outcome and acceptance

VXU Processing Outcome	VXU Accept/ Reject	MSA-1 AA	MSA-1 AE	MSA-1 AR
Successful	Accept	✓	n/a	n/a
Qualified Successful	Accept	n/a	✓	n/a
Unsuccessful	Reject	n/a	n/a	✓

As per the specifications in this TAB, IIS shall 1) reserve MSA-1 value 'AE' to indicate VXU acceptance, specifically, qualified successful processing with issue(s) that require correction, and 2) use MSA-1 value 'AR' to indicate rejection, i.e., unsuccessful processing requiring correction and resubmission. This disambiguation supports clarity in interpreting the ACK MSA-1 value.

ERR-2: Error Location

The ERR-2 field identifies the specific location in the message where an issue was identified.

ERR-2 Specifications

- When populated/returned, SHALL indicate a single location for understanding and resolving the issue.

ERR-2 Guidance

- **Use the HL7 ERL format, not shorthand:** ERR-2 uses the HL7 ERL data type format, which differs from the commonly used shorthand to indicate location within an HL7 message. For example, if the error location is the patient's name field (commonly referred to as the 'PID-5' field, the error location is noted per the ERL data type as PID^1^5).
- **Be specific:** ERR-2 should point to the most helpful location for understanding and resolving the issue. For repeating segments (e.g., multiple RXA or OBX segments) in a submitted VXU, it is especially important to identify which repeat the error applies to.
- **Reference *one* location:** If an issue involves multiple fields (e.g., a vaccination date that precedes the patient's date of birth), ERR-2 can reference only one location. Two approaches are acceptable:
    a. Return **a single ERR segment** pointing to the most relevant field (e.g., the RXA segment with the problematic vaccination date), with the error description in ERR-5 or ERR-8 describing the conflict between the birth date and vaccination date.
    b. Return **two ERR segments**, one for each field involved in the conflict, each with its own ERR-2 and explanatory context.
- **For a missing segment, reference the group it would have appeared in:** Some issues arise from an entire segment being absent, such as a missing OBX. In this case, ERR-2 cannot point to the missing segment directly. Instead, reference the segment group it would have appeared in. For example, if an OBX segment is missing under a vaccination event, ERR-2 should point to the associated ORC group by referencing the ORC segment (e.g., ORC^2).
- **Leave ERR-2 blank if the issue is not tied to a specific segment/field:** Some issues are not tied to a specific segment or field—such as "Patient not consented" or a message-level success confirmation. In these cases, ERR-2 should be left blank. ERR-2 is a RE (Required but may be empty) field; it is valid to omit it when there is no specific location to reference.

Accurate use of ERR-2 enhances the interpretability of ACK messages for both technical and clinical users. It helps implementers troubleshoot efficiently and ensures that data quality issues can be precisely identified and resolved. Getting ERR-2 right is not just a technical requirement—it directly supports effective interface monitoring, data quality management, and national interoperability efforts.

ERR-4 Severity Code

Each issue identified in an ACK message includes a **severity code** in the **ERR-4** field. These severities are not limited to reporting failures. ERR segments may also indicate success, informational notices, or business rule constraints. For example, an ERR segment may confirm that an immunization was successfully added to the IIS record or may notify the

sender that a deletion was not permitted due to jurisdiction policy. Overall, the ERR-4 severity communicates the required level of response for that individual issue noted in the ERR segment.

ERR-4 Values

Values for ERR-4 include:

- **Information (I):** A positive or neutral statement—no required follow-up action needed.
- **Warning (W):** An issue that requires correction.
- **Error (E):** An issue that requires correction and resubmission.

ERR-4 Specifications

For use of ERR-4:

- IIS SHOULD implement different validation rules based on the submitter or submitter class, to align with operational priorities and needs. E.g., providers participating in vaccine programs may be subject to stricter data quality requirements. For these submitters, an issue flagged as a warning (W) for general providers might escalate to an error (E).

For ERR-4 severity values:

- ERR-4 severity 'E'
    - IIS SHALL return to convey when core intent is not fulfilled (correction and re-submission is required).
    - IIS SHALL NOT return for conformance violations (e.g., segment mis-ordering, missing required delimiters), unless the issue prevents the IIS from fulfilling the core intent.
    - IIS SHALL NOT return for a requested *update* or *delete* action from a conformant VXU that was not applied (e.g., deletion not honored).
    - Systems SHALL NOT *automatically* block the transmission or processing of subsequent messages for other patients/immunizations due to a severity 'E' error.
- ERR-4 severity 'W'
    - IIS SHALL return to convey an issue requiring correction.
- ERR-4 severity 'I'
    - IIS SHALL return to convey an issue that does not require correction (e.g., submitted precaution not stored, VIS information not stored).
    - IIS SHOULD return to convey that a requested *update* or *delete* action from a conformant VXU was not applied.
    - IIS MAY return to convey a positive or neutral statement (no follow-up is required).

- Systems SHALL NOT use informational errors to determine what data may need to be re-submitted.

ERR-4 Guidance

- Informational feedback
  - IIS may choose to include informational-level ERR segment(s) (ERR-4 = I) to confirm what was accepted. For example: "Patient record accepted." Or "3 of 4 immunizations accepted."
  - IIS are encouraged to generate and return informational errors if they can be generated consistently and clearly.
  - These messages can assist with interface troubleshooting and provide insight to technical users; however: they do not override the requirement to resubmit, they are not actionable by clinical users, and they carry no expectations of actions for the submitter.
- Error Severity 'E': aka Hard Error, Fatal Error
  - An error with severity 'E' may also be referred to as a 'hard error' or 'fatal error'. These terms relay that the issue resulted in rejection of the submitted VXU due to core intent not being fulfilled, with correction and resubmission required.

ERR-4 Actions: Convey, Correct, Resubmit

There are three key actions that define the expected follow-up when issues are identified in the ACK message: convey, correct, and resubmit.

- **Convey:** Communicate the issue to the appropriate user/audience, ensuring it is available, accessible, and presented in a way that is understandable and actionable by the intended user/audience. I.e., this issue shall be presented in the context of a specific transaction and shall be presented in an aggregate format.
- **Correct:** Address the issue in the source system and/or the originating workflow, if possible. This typically refers to improving the underlying patient record or immunization history—for example, correcting demographic information, filling in missing fields, or fixing invalid codes. In some cases, the issue may be outside the control of the system (e.g., missing data at the time of vaccination), and the system may not be able to update the existing record. In those cases, the focus should be on improving upstream workflows or processes so that the issue does not recur. Importantly, the "Correct" action refers to correcting the original source of truth and does not necessarily imply that a revised message must be submitted to the IIS.
- **Resubmit:** Send an updated (i.e., corrected) message to the IIS. This action is required when the IIS is unable to associate/persist the submitted patient and/or their shot history. In many cases, the issue originates in the submitting system (e.g., an invalid or missing CVX code, malformed patient data, or missing identifiers).

However, in some cases, the problem lies in the IIS itself—for example, a valid CVX code may be incorrectly rejected due to outdated or misconfigured code tables.

Table 6 shows how each ERR-4 severity level maps to the expected follow-up action.

Table 6. Expected actions associated with ERR-4 severity values

ERR-4	Label	Convey	Correct	Resubmit
I	Information	SHOULD	MAY	MAY
W	Warning	SHALL	SHALL	SHOULD
E	Error	SHALL	SHALL	SHALL

The actions are cumulative and hierarchical, i.e., each higher action includes the responsibilities of the lower ones. Furthermore, these actions apply only to the individual issue described in the ERR segment. The overall message disposition is calculated separately, based on the most severe issue present in the message, for return in MSA-1.

ACK Integration into Submitting and Receiving Systems

Each ERR segment with a severity of W (Warning), or E (Error) shall be conveyed (i.e., parsed and available/accessible) to appropriate users as determined by the submitting system, not as raw HL7, but as structured, understandable information—e.g., individual error rows in a user interface, report, and/or workflow-integrated feedback view. This presentation should make use of information from ERR-2, ERR-4, ERR-5, and ERR-8 to support the required follow-up action.

Additional information on ACK integration and use is available in the Healthcare Information and Management Systems Society (HIMSS) *Aggregate Immunization Acknowledgment Message Reports Guidance White Paper*.

Correction and Resubmission for Rejected (Unsuccessful) VXUs

Resubmission is not merely a retransmission of the original data; it is the culmination of identifying and correcting the issue—regardless of where it originated—to ensure complete data submission to the IIS. Resubmitting the same message without correction is not appropriate and can overload IIS systems. Correct and resend.

The ACK message does not distinguish between sender-side and receiver-side faults, nor can it reliably determine at runtime which system must take corrective action. Therefore, any message requiring resubmission signals that at least one system must resolve the issue, and the appropriate operators—on either or both sides—must investigate and determine where the correction is needed. Once resolved, the updated message must be resent to ensure the IIS has a complete and accurate record.

ERR-5: Application Error Code

The ERR-5 field is used to communicate the specific issue encountered during the processing of a message. It supplements ERR-2 (where the issue occurred) and ERR-4 (which specifies the severity), by answering the key question: what was the problem?

ERR-5 Values

The identification of the issue identified is provided in the form of an ERR-5 code from a national code set, as provided in the *National Set of ERR-5 Application Error Codes for Immunization ACK Messaging*. These codes are organized into ranges based on the type of issue:

- 1–7: Legacy HL7 codes (e.g., Invalid Value, Required Data Missing) – use only when no more specific code exists.
- 2000–2099: Conflicting Data – fields that contradict each other (e.g., date of birth after date of death).
- 2100–2199: Inappropriate Data – data present but inappropriate (e.g., future date).
- 2200–2299: Invalid Data – syntactically or semantically wrong (e.g., unrecognized code system).
- 2300–2399: Lookup Failures – values could not be matched (e.g., no matching vaccine dose).
- 2400–2499: Message Construction – structural or message format issues.
- 2500–2599: Missing Data – required or expected data was not included.
- 2600–2699: Processing Errors – system-level or runtime issues (e.g., data truncation).
- 2700–2799: Data Sharing or Consent – patient record restricted by policy.
- 3001–3499: Missing Endorsed Data Elements – one code for each core data element.
- 3501–3999: Invalid Endorsed Data Elements – present but incorrect, for each data element.
- 5000-5999: Processing results

These codes use matching endings across the missing/invalid ranges to clearly pair each data element.

ERR-5 Specifications

For ERR-5:

- IIS SHALL implement High priority codes
- IIS SHOULD implement Medium priority codes
- IIS MAY implement Low priority codes

For implementation of the *optional* ERR-5 code 5044:

- IIS MAY support code 5044, Patient identifying information saved, IIS identifier for patient is {1}. If implemented, IIS SHALL adhere to the following constraints to ensure consistency and interoperability:

- This code MAY be used by an IIS only when the patient record was:
  - Newly created in the IIS, or
  - Matched to an existing patient and successfully updated.
- When used in ERR-5, the IIS SHALL include the corresponding internal patient identifier in ERR-6 (Application Error Parameter).
  - The identifier returned in ERR-6 SHALL be suitable for use in a future QBP^Q11 query as a State Registry ID (SR) or Local Registry (LR). That is, it must be a valid and query-able identifier recognized by the IIS for record retrieval. It may be combined with other identifiers in QPD-3, e.g.: |D26376273^^^NIST MPI^MR~1234567^^^IIS^SR|

ERR-5 Guidance

Detection

To implement a code means that if the IIS detects a condition matching that code, it returns it in ERR-5. This guidance does not specify how the IIS should treat the underlying data (e.g., whether to accept or reject it) or what ERR-4 severity to assign the issue; those decisions are governed by local policy. For example:

- Code 2001 "Conflicting Date of Birth and Date of Death" is marked as High priority. The IIS shall return this code if this situation is detected, but it is up to the jurisdiction whether this condition results in storage of one date or results in rejection of both dates, and the ERR-4 severity to return.
- Code 3002 "Ethnicity is missing" is indicated as medium priority. The IIS should return this code if the situation is detected. The severity (Error, Warning, etc.), as determined by the IIS, is independently specified in ERR-4.

Extensibility and Coordination

If a concept needed by an IIS is not already in the national set, implementers should contact AIRA. New codes can be added quickly in coordination with the community. There is no requirement for jurisdictions to invent local codes; in fact, doing so is discouraged, as it increases burden and inconsistency across interfaces.

IIS are encouraged to implement codes as needed, and submitters should expect that ERR-5 will contain new values as the set is expanded and new data quality issues are identified.

Optional Use of Code 5044 – Patient Identifier Returned

ERR-5 code 5044 – Patient identifying information saved, IIS identifier for patient is {1} – is defined to enable IIS systems to return the internal IIS patient identifier (commonly referred to as the State Registry ID or SR) assigned to the patient record that was created or updated as a result of the incoming VXU message. Use of ERR-5 code 5044 provides a standard way for an IIS to communicate the resolved patient identifier, aiding downstream systems in reliably querying and reconciling patient records without requiring out-of-band processes.

ERR-6 remains optional in the broader guidance, but its presence is required when used in conjunction with ERR-5 code 5044.

ERR-8: User Message

The ERR-8 field provides a human-readable explanation of the issue described in an ERR segment.

ERR-8 Specifications

When an ERR segment is returned, ERR-8:

- SHALL indicate a locally specified, clear, non-technical message intended for display to end users without HL7 expertise that describes the issue noted in the ERR segment in plain language.
- SHOULD NOT reference an HL7 segment/field/component (e.g., “PID-5").
- SHOULD NOT include information about the overall message processing outcome (e.g., “message rejected”).

ERR-8 Guidance

The ERR-8 field is intended for end users, e.g., clinical or operational, not interface developers. Its primary function is to clearly and concisely describe the problem using plain language, without requiring knowledge of HL7 syntax or message structures. Additional guidance for ERR-8 includes the following:

- **Write for end users:** ERR-8 should use plain, non-technical language that is understandable by individuals responsible for addressing data quality issues. Example: "Patient first name is missing" (avoid: "PID-5.2 is not populated").
- **Avoid repeating structured data:** ERR-8 should not duplicate information already present in ERR-2 (location), ERR-4 (severity), or ERR-5 (classification). These values are available separately and should be exposed by the submitting system in their own appropriate fields. For example, there is no need to include phrases like “Required field” or “Message rejected” in ERR-8. The severity is clearly indicated by ERR-4 (e.g., E for errors requiring resubmission), and the overall disposition is reflected in MSA-1.

Appendices

Appendix A. Conveying transport/connectivity-layer issues using ACKs

This guidance scopes out transport because transport issues are handled at the transport/connectivity layer (e.g., CDC WSDL). However, when intermediaries support data exchange between a submitter and an IIS, there may be a need for the intermediary to communicate what an IIS is indicating as a transport-layer issue back to the submitter via an ACK message. In this case, the intermediary should communicate this issue to the submitter using enhanced mode acknowledgements, with MSA-1 value 'CR' indicating Commit Reject. The intermediary should not communicate the issue to the submitter using MSA-1 value 'AR' to avoid issues in interpretation of the ACK.

Appendix B. Core intent and acknowledgement messaging: Examples

Additional examples illustrating core intent and its relationship to acknowledgement messaging are provided.

Table 7. Core intent and VXU acceptance/rejection scenarios

Scenario	Result in IIS	Core Intent	Accept/ Reject
Patient has no name	IIS unable to create/associate patient record without a name.	Not Fulfilled	Reject
Patient with immunizations submitted, but name has characters IIS will not accept	IIS unable to create/associate this patient record.	Not Fulfilled	Reject
Patient phone number was invalid	IIS able to create/associate patient record and record immunization but problem with phone number is detected.	Fulfilled	Accept
Administered immunization submitted by VFC program participant without a valid lot number	IIS has policy to only accept administered vaccinations from VFC providers that meet VFC program guidelines, including lot number requirements.	Not Fulfilled	Reject
Patient submitted with no immunizations	IIS creates/associates the patient record.	Fulfilled	Accept

Patient submitted with three immunizations	IIS can accept one but not all, because of problems in the data for two of the immunizations.	Not Fulfilled	Reject
Immunization and TB skin test result	IIS accepts the immunization but as a policy, does not store TB skin test results.	Fulfilled	Accept