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| Victorian Integrated Non-Admitted Health Minimum Data Set (VINAH MDS) manual 2023-24Section 5b – VINAH MDS transaction implementation guide |
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| OFFICIAL |



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# Introduction

This section of the VINAH MDS manual specifies best practice for designing and implementing software to generate VINAH MDS HL7 transmissions and maintain compliance with submission requirements over time.

# How to use

Intended audience

This section of the manual is intended for use primarily by software designers and developers responsible for implementation of the VINAH MDS in the information systems used by agencies.

Use of this document

This document is a guide only. Compliance with all aspects of this implementation guide is not mandatory or measurable by the department. Healthcare organisations may reference this standard when specifying requirements for their software.

Where this guide is inconsistent with other parts of the VINAH MDS manual, those other parts will take precedence. If any errors or inconsistencies are found, please notify the HDSS Helpdesk.

Limitations

Applying principles outlined in this implementation guide either in part or in full may not guarantee compliance with the requirements of the data collection. This document is a guide for software developers to develop and understand the mechanics of the VINAH MDS data submission lifecycle.

This document provides guidance around the best practices for VINAH MDS submission processes. The usage of methods outlined within this document does not imply acceptance of any product or process by the department.

The department will on request (where possible and appropriate) review specifications by vendors designing software systems and provide feedback, but such review does not constitute acceptance, sign off or certification of those specifications.

# Conceptual entity integrity and keys

All VINAH MDS entities are related to one another through combinations of data elements that form foreign keys. These relationships are enforced in the VINAH MDS, and as such, each foreign key value must reference a record that has been sent and accepted into the VINAH MDS previously.

The Entity-Relationship diagram below shows the relationship between the conceptual entities and the data elements that will be used as their primary and foreign keys.



## **Transaction model**

The VINAH MDS transaction model is not simply an extract or ‘dump’ of activity that relates to a given period of time. The VINAH MDS submission process is effectively an ongoing synchronisation of a set of data that exists at a health care organisation with a set of data at the department.

In much the same way as a front-end application writes inserts, updates and deletes to a database as a result of user input, VINAH MDS manages data in a similar way.

The aims of the VINAH MDS transaction model include:

* only submitting additions or modifications to data, reducing the overall amount of data sent to the department
* facilitate automated ‘background’ submission of smaller amounts of data more frequently
* receive information on data quality problems earlier in the data lifecycle, making correction easier.

## Basic principles

The VINAH MDS transaction model does not rely on developing an extract containing only information relating to a certain period of time. Rather, all relevant transactions in the health care organisation’s systems that occur between submissions are transmitted.

The following diagram outlines the difference between a period extract model and a transaction extract model as adopted in the VINAH MDS:



## **Message actions**

## Insert

Insert transactions insert data into the VINAH MDS repository.

An insert will fail if a previous insert message has been sent and accepted.

## Updates

Update transactions change existing data in the VINAH MDS repository.

An update will fail if a previous insert message has not been sent and accepted.

An update cannot be used to perform an insert where the sending system is unsure whether an original insert has been sent and accepted.

In all cases, an update will overwrite data in all fields on the record it is updating. The implication of this is that all fields in the message must be populated with the correct data values regardless of whether they have changed or not; it is not acceptable to simply send only the field that has changed. The update is effectively a snapshot of the data as it exists in the sending system.

## Deletes

Delete transactions remove existing data in the VINAH MDS repository.

A delete message will fail if a previous insert message has not been sent and accepted.

In the case of deletes, all data content is ignored except the key fields (e.g.: the Episode Identifier on the Episode). However, if data other than the key values are submitted, they must be valid and meet business rules outlined in Section 4. Where records refer to parent or higher-level records, the deletion of the higher-level entity will automatically delete all included lower-level entities; often termed a cascading delete. For example, when a Delete transaction is sent to delete an existing Episode, any contacts attached to the Episode will be removed from the VINAH MDS repository. If it was desired to keep the contacts but attach them to a different episode, the submitting organisation system should, in the previous example, either send Contact update transactions to alter the Episode Identifier to refer to the new parent episode before sending the Episode delete or send new insert contact messages with the new episode identifiers after sending the new Episode insert message.

Where a submission that has performed deletes is rolled back (purged), the records deleted as a result of that submission will be reinstated; this includes any lower-level entities that were deleted automatically.

## Merges

Merge messages will merge two previously accepted records into one. All records that refer to the Prior Identifier will be changed to point to the New Identifier. The Prior Record is then deleted, although it can be re-created through an insert message after this point. If one or both of the Clients to be merged have not previously been submitted and accepted, then A04 messages for either or both of these clients will need to be included in the same submission file as the Merge message (A40).

The merge transaction is currently only applicable to the Patient/Client; merging other entities such as Episodes is not supported at this point in time.

The merge transaction will be rolled back and the records un-merged in the VINAH MDS when a file is purged. This should be taken into account when implementing submission rollback processes.

# Batches

Batches within the VINAH MDS are Transaction Boundaries defined by the sending system that form areas in which groups of transactions succeed or fail together.

As a result, any errors that occur to any message inside the batch will result in all messages within the batch not being committed to the VINAH MDS data store. This includes messages that preceded the failed message in that batch. It is important to note that messages in a batch may not necessarily be invalid or receive a rejection message, but their data will not be stored.

Using batches to group data in this manner is an effective way of isolating errors from other data in the file.

Batches can be created according to any desired methodology that suits the sending system. The suggested practice is for a batch per patient to be sent. It is not recommended to put all data into one batch per file, as this could likely result in the same valid data being excessively re-processed and revalidated during the error correction process and prevent clean data from becoming available for VINAH MDS reporting until invalid data is corrected.

Although not a strict requirement for VINAH MDS, it is a best practice method to ensure that errors that may be affecting only one patient are isolated from other records in the file. As outlined in Section 5, a single batch is accepted/not accepted as a whole, so grouping all patient activity into one batch strikes the right balance.

## Record rejection v acceptance with batches

The primary effect of transaction boundaries is the distinction between explicit rejection and explicit acceptance of a record.

A record may not be accepted, but not rejected. A rejection is a result of a records violation of one or more business rules. All rejected messages are not accepted. However, if a record is in the same batch/transaction boundary as a rejected record, it may meet all the business rules but will not be accepted as the containing batch had failed.



# Implementation approaches

The following section outlines some common implementation methods for implementing a VINAH MDS submission lifecycle.

# Method 1 - Transaction checkpoint method

The VINAH MDS transaction checkpoint method maintains a long-term record of the data interchange between the data provider and the department. It aims to allow the submitting system to know exactly which database action (Insert, Update or Delete) needs to be sent to the department for any given record.

The VINAH MDS transaction log is a concept that can be implemented in many ways. This guide will summarise a generic approach.

## Exceptions

Although VINAH MDS records are accepted or rejected within the scope of their containing batch (transaction boundary), this method does not explicitly deal with batches of records. The data structures outlined here may be extended to include information regarding batches sent, at the discretion of the implementer.

## Logical data structure



## Logical structure data elements

internal\_record\_pointer

A structure which provides references to various data within the local system. Using a pointer structure decouples the VINAH MDS submission process from the local system. The record pointer structure need not be physically implemented; data structures in the local system can be directly referenced where:

* they carry the necessary metadata elements as outlined below, and
* they carry a stable unique key that is not recycled.

Where the record pointer is physically implemented, it may be populated in real time from the local data or assembled at the point of VINAH MDS transaction.

|  |  |
| --- | --- |
| **vinah\_record\_key** | A unique identifier for the VINAH MDS record over time. Where the internal\_record\_key is stable and unique (i.e. a Unit Record Number or equivalent) this can be used, or optionally a surrogate identifier can be generated. Identifiers can also be formed from other local data elements, which when concatenated, are made unique. |
| **vinah\_entity** | A department defined data entity, as defined in Section 2 (and refined in Section 3) e.g., Patient/Client, Episode etc., that maps to the internal\_record\_type. |
| **internal\_record\_key** | A locally generated key which identifies a record in the context of an internal\_record\_type. |
| **internal\_record\_type** | A locally defined identifier of the type of record identified by the internal\_record\_key, e.g., the table name of the record or similar. |
| **create\_datetime** | The date the record was created in the local system. |
| **last\_update\_datetime** | The date (if any) the record was last altered in the local system (may be the same as the create\_date). Dates of individual updates may be collected but the date of the most recent update prior to the checkpoint is referenced in the VINAH MDS transaction method. |
| **delete\_datetime** | The date (if any) the record was deleted or became out of scope for VINAH MDS reporting. |
| **marge\_datetime** | The date (if any) the record and its related child-level data was merged with another record at the same level. For VINAH MDS the only current merge implemented is at the patient/client level. |

vinah\_transaction

Reflects a log of the assembly of all relevant transactions to submit to the VINAH MDS.

|  |  |
| --- | --- |
| **transaction\_id** | A suitable unique identifier of the instance of the VINAH MDS transaction. |
| **checkpoint\_datetime** | The last date that transactions were assembled for a VINAH MDS submission. This may not reflect the actual date of submission of the file – instead it aims to record a moment in time at which all candidate transactions were assembled. |
| **filename** | The name of the file that was generated for the transaction checkpoint. Due to the file size limits in the VINAH MDS, this should be implemented in a way that supports the generation of multiple files for a given checkpoint, which may mean a separate physical structure to keep track of individual files generated by a transaction checkpoint. |
| **submit\_datetime** | Optional; the date/time that the user submitted the packaged VINAH MDS data. If the local system is not performing the submission itself, this information can be gleaned from the user, or from the submission report returned from the VINAH MDS validation engine. |
| **ack\_datetime** | The date/time that the VINAH MDS validation engine? completed the validation process and returned the submission report – this element can be mapped to the process\_end\_date element in the submission report (see Section 7). Note this element does not refer to the file acknowledgement receipt, which only indicates the file has been received by the VINAH MDS validation engine?. |
| **<other metadata>** | Other metadata may be stored at the discretion of the implementer, in particular file names etc. It is suggested that security auditing information be stored to identify the user who performed the VINAH MDS transaction. |

vinah\_record\_transaction

Reflects a log of records that were assembled within a transaction.

|  |  |
| --- | --- |
| **record\_x\_id** | An identifier of an instance of a record being sent to the VINAH MDS within a transaction. |
| **transaction\_id** | A pointer to the vinah\_transaction instance. |
| **vinah\_record\_key** | A pointer to the internal\_record\_pointer. |
| **vinah\_entity** | A department defined data entity, as defined in Section 2 (and refined in Section 3). |
| **transaction\_type** | Indicating if the transaction type was an insert, update or delete. |
| **record\_transaction\_datetime** | The date that the record was inserted, updated or deleted in the local system. Used to order transactions correctly. |
| **mcid** | The Message Control Identifier of the instance of the record. The record\_x\_id field can be used as the Message Control Identifier, or alternatively it can be constructed in any fashion that ensures their uniqueness, i.e. concatenate several record transaction fields:left([transaction\_type],1) & ‘-‘ & left([vinah\_entity],3) & ‘-‘ & [vinah\_record\_key] & ‘-‘ & [record\_x\_id]with the resultant value i.e.: ‘i-pat-10234-123123’The above example does not guarantee more uniqueness than the [record\_x\_id] field alone but is useful when tracing messages sent to the department as other relevant information is embedded in the identifier. |
| **accepted\_flag** | Boolean flag set from the VINAH MDS submission report indicating if the message was accepted or not. Note the difference between message acceptance and message rejection. |
| **rejected\_msg** | A validation message as returned by the VINAH MDS validation engine? A null value would indicate there is no rejection on the message. |

## Checkpoint procedure

The following section contains some code examples in Transact-SQL (T-SQL) format. Each query outlined in this section may need to be repeated for each VINAH MDS entity (e.g. referral in, patient, episode etc.).

1. **Create transaction checkpoint**

Insert a record into the vinah\_transaction table > populate the checkpoint\_datetime with date/time the procedure was executed (or other point in time as necessary). Populate security metadata for audit purposes.

INSERT INTO [vinah\_transaction] ([checkpoint\_datetime])

VALUES (getdate())

1. **Select candidate records affected since last checkpoint and current checkpoint**

The following pseudo SQL is applied at this level, with the select statements to return data listed within:

INSERT INTO [vinah\_record\_transaction]

([transaction\_id], [vinah\_record\_key], [vinah\_entity], [transaction\_type],

[record\_transaction\_datetime], [mcid])

* 1. *Select deleted records - select records that have been deleted since the last checkpoint, where the insert transactions for those records have been previously sent to and accepted by the VINAH MDS.*

SELECT @this\_transaction\_id, [vinah\_record\_key], [vinah\_entity],

 ‘delete’, [delete\_datetime]

FROM [internal\_record\_pointer] del\_records

WHERE [delete\_datetime]

 (BETWEEN @last\_checkpoint\_datetime and @this\_checkpoint\_datetime)

AND EXISTS (

 SELECT [record\_x\_id]

 FROM [vinah\_record\_transaction]

 WHERE [vinah\_record\_key] = del\_records.[vinah\_record\_key]

 AND [vinah\_entity] = del\_records.[vinah\_entity]

 AND [transaction\_type] = ‘insert’

 AND [accepted\_flag] = 1

)

* 1. *Select inserted records - select records that have been created since the last checkpoint, and were not deleted in the same period, where the insert transactions for those records have not been previously sent to and accepted by the VINAH MDS.*

UNION SELECT @this\_transaction\_id, [vinah\_record\_key], [vinah\_entity],

 ‘insert’, [create\_datetime]

FROM [internal\_record\_pointer] ins\_records

WHERE [delete\_datetime] is null

AND [insert\_datetime]

 (BETWEEN @last\_checkpoint\_datetime and @this\_checkpoint\_datetime)

AND NOT EXISTS (

 SELECT [record\_x\_id]

 FROM [vinah\_record\_transaction]

 WHERE [vinah\_record\_key] = ins\_records.[vinah\_record\_key]

 AND [vinah\_entity] = ins\_records.[vinah\_entity]

 AND [transaction\_type] = ‘insert’

 AND [accepted\_flag] = 1

 )

* 1. *Select updated records - select records that have been modified since the last checkpoint, where the insert transactions for those records have been previously sent to and accepted by the VINAH MDS.*

UNION SELECT @this\_transaction\_id, [vinah\_record\_key], [vinah\_entity],

 ‘update’, [last\_update\_datetime]

FROM [internal\_record\_pointer] upd\_records

WHERE [delete\_datetime] is null

AND [update\_datetime]

 (BETWEEN @last\_checkpoint\_datetime and @this\_checkpoint\_datetime)

AND EXISTS (

 SELECT [record\_x\_id]

 FROM [vinah\_record\_transaction]

 WHERE [vinah\_record\_key] = upd\_records.[vinah\_record\_key]

 AND [vinah\_entity] = upd\_records.[vinah\_entity]

 AND [transaction\_type] = ‘insert’

 AND [accepted\_flag] = 1

 )

* 1. *Select merged records - select records that have been merged since the last checkpoint. As the merge operation has already been committed at the client end it cannot be simulated at a later date like the other transaction types. Hence this select statement does not check if either of the records involved in the merge have been previously accepted by the VINAH MDS, as the merge operation needs to happen at this point in time.*

UNION SELECT @this\_transaction\_id, [vinah\_record\_key], [vinah\_entity],

 ‘merge’, [merge\_datetime]

FROM [internal\_record\_pointer] mer\_records

WHERE [merge\_datetime]

 (BETWEEN @last\_checkpoint\_datetime and @this\_checkpoint\_datetime)

1. **Select candidate records that were not previously accepted**
	1. *Select deleted records - select records that were sent as deletes in the last transaction and were a part of a batch of messages not accepted by the VINAH MDS (due to one or more messages within the containing batch being rejected). The records will be resent in this case even though they have not changed in the local system*.

UNION SELECT @this\_transaction\_id, [vinah\_record\_key], [vinah\_entity],

‘delete’, [delete\_datetime]

FROM [internal\_record\_pointer] del\_records

WHERE [delete\_datetime] <= @last\_checkpoint\_datetime

AND EXISTS (

 SELECT [record\_x\_id]

 FROM [vinah\_record\_transaction]

 WHERE [transaction\_id] = @last\_transaction\_id

 AND [vinah\_record\_key] = del\_records.[vinah\_record\_key]

 AND [vinah\_entity] = del\_records.[vinah\_entity]

 AND [transaction\_type] = ‘delete’

 AND [accepted\_flag] = 0

* 1. *Select inserted records - select records that were sent as inserts in the last transaction and were a part of a batch of messages not accepted by the VINAH MDS (due to one or more messages within the containing batch being rejected). The records will be resent in this case even though they have not changed in the local system.*

UNION SELECT @this\_transaction\_id, [vinah\_record\_key], [vinah\_entity],

‘insert’, [insert\_datetime]

FROM [internal\_record\_pointer] ins\_records

WHERE [insert\_datetime] <= @last\_checkpoint\_datetime

AND [delete\_datetime] is null

AND EXISTS (

 SELECT [record\_x\_id]

 FROM [vinah\_record\_transaction]

 WHERE [transaction\_id] = @last\_transaction\_id

 AND [vinah\_record\_key] = ins\_records.[vinah\_record\_key]

 AND [vinah\_entity] = ins\_records.[vinah\_entity]

 AND [transaction\_type] = ‘insert’

AND [accepted\_flag] = 0

)

* 1. *Select update records - select records that were sent as modified in the last transaction and were a part of a batch of messages not accepted by the VINAH MDS (due to one or more messages within the containing batch being rejected). The records will be resent in this case even though they have not changed in the local system.*

UNION SELECT @this\_transaction\_id, [vinah\_record\_key], [vinah\_entity],

‘update’, [last\_update\_datetime]

FROM [internal\_record\_pointer] upd\_records

WHERE [last\_update\_datetime] <= @last\_checkpoint\_datetime

AND EXISTS (

 SELECT [record\_x\_id]

 FROM [vinah\_record\_transaction]

 WHERE [transaction\_id] = @last\_transaction\_id

 AND [vinah\_record\_key] = upd\_records.[vinah\_record\_key]

 AND [vinah\_entity] = upd\_records.[vinah\_entity]

 AND [transaction\_type] = ‘update’

 AND [accepted\_flag] = 0

)

* 1. *Select merge records – select merge records sent in the last transaction and were part of a batch of messages not accepted by the VINAH MDS (due to one or more messages within the containing batch being rejected). As a merge message generally cannot be changed in the system, it is generally resent without change.*

UNION SELECT @this\_transaction\_id, [vinah\_record\_key], [vinah\_entity], ‘merge’, [merge\_datetime]

FROM [internal\_record\_pointer] mer\_records

WHERE [merge\_datetime] <= @last\_checkpoint\_datetime

AND EXISTS (

 SELECT [record\_x\_id]

 FROM [vinah\_record\_transaction]

 WHERE [transaction\_id] = @last\_transaction\_id

 AND [vinah\_record\_key] = mer\_records.[vinah\_record\_key]

 AND [vinah\_entity] = mer\_records.[vinah\_entity]

 AND [transaction\_type] = ‘merge’

 AND [accepted\_flag] = 0

)

1. **Sort records**

The dataset resultant from the previous SQL SELECT statements can be sorted as such:

ORDER BY [record\_transaction\_datetime] ASC

This ensures that transaction records are created in the order in which they occurred.

1. **Apply batching**

Further sorting and grouping can be undertaken to assemble records together in the desired fashion. For a patient-per-batch approach, the result set could be grouped by patient identifier, then by ordered record\_transaction\_datetime. It is recommended that merge operations be isolated in their own batch to ensure the correct processing order.

1. **Write submission file(s)**

Generated messages for each batch in the appropriate format (e.g. HL7), according to the rules of that format.

# Implementation notes

## Scope of selected data

The transaction checkpoint method does not explicitly deal with the business criteria for selecting data. The selection of records should be in line with the concepts defined in Section 2 of the manual. The transaction checkpoint method also allows the scope of data to be increased as requirements change. This extends to reporting historical data where new criteria are introduced; the record pointer structure can simply reference a wider range of records.

For data that has changed to no longer be in scope (for example data was incorrectly assigned to a program/stream, has been corrected and is subsequently not in scope) it is conceivable that the record pointers may no longer resolve to these records, even though VINAH MDS record transaction entries still exist. When implementing this method an approach to handle the removal of data from scope (i.e., issuing delete messages if record pointers disappear, as opposed to if there is a delete date) may be considered.

## Archiving, migrating, or moving data

During the lifecycle of clinical data systems, it is possible that historical data that is in the scope of the VINAH MDS may be archived or moved to another system. Care should be taken to ensure any remaining data referring to the removed data maintains its referential integrity; for example, ensure that if a patient is archived, episodes for that patient do not remain in the system.

Consideration should also be given to the record selection functionality to ensure that delete messages are not sent to the VINAH MDS due to records being archived.

## Ephemeral records

Where records are created in local systems but are not persisted due to their entry being in error or similar reasons, these records will not be assembled using the transaction checkpoint method.

## Non record-level errors

The logical data structures outlined in the transaction checkpoint method do not outline a mechanism to handle errors that are returned from the VINAH MDS at a file level. These errors should be attached to the submission file record in the local system and made available for the user to view and action where appropriate.

## Submitted corrected rejections

The process for selecting records from the transaction log covers the re-submission of corrected records; the action of correcting a record will set the last local update date to a date greater than the last submission date resulting in the corrected records being included in the next submission.

It is acceptable to resubmit records that were previously rejected even though they have not changed, with the expectation that the records will again receive a rejection.

## Resending previously accepted records

In the normal VINAH MDS lifecycle, messages are created in response to user triggers such as changing the value on a clinical record.

In some cases, it may be necessary for a user to resend a record even though it has not changed. An example of this would be an existing record that needs to exist in the system as it is referenced by another record.

Another scenario is if a data quality investigation found previously undetected errors in previously submitted records, those records could be extracted and re-sent to the VINAH MDS in order to be re-validated.

In this case, the software designer may include functionality to allow users to flag that a record or set of records should be sent to the VINAH MDS, without requiring a change to be made to the record.

## Record locking and concurrency issues

This method avoids some of the issues relating to record locking and concurrency, as the checkpoint date/time provides a fine-grain fixed boundary around which to select data. Local database transactions can continue to occur after the checkpoint date, even if the checkpoint procedure is still running; it is conceivable that the system should be able to remain accessible during this period.

## Patient merges

In addition to the data selection logic outlined in the checkpoint procedure, further logic will have to be applied in the case of a patient merge. As the Patient Identifier is effectively changed on all the clinical record types, the vinah\_record\_transaction structure will likely need to be updated to ensure that the same record\_id is recorded. This will ensure that the altered records are not re-flagged as inserts or deletes to the VINAH MDS.

# Method 2 - Message/Transaction queuing

This method involves generating transaction messages on the fly and queuing them until submission. The advantages of this method include attaching trigger mechanisms to either entry screens or database structures to assemble VINAH MDS messages as the local transactions occur.

There are several downsides to this method which would make implementation highly unlikely to be successful and in some cases near impossible:

* It is extremely likely that the VINAH repository and health services data will get out of sync and correcting such scenarios is difficult; one or more messages in the queue may be rejected for data quality reasons, and the stream could then be broken due to the referential integrity requirements of the VINAH MDS.
* Where ephemeral records are frequently created, for example records entered in error and deleted shortly after or temporary records, the message queuing approach will most likely pick up these transactions and submit them to the VINAH MDS; this would create unnecessary overhead on the VINAH MDS processing lifecycle.
* Many data entry screens would generate update transactions to records as they are progressively built-up during data entry. In many cases these updates are irrelevant to the VINAH MDS and are not necessary to submit. Excessive update transactions would create unnecessary overhead on the VINAH MDS processing lifecycle.
* In many systems, the conceptual VINAH MDS record is built up of data from various screens or physical database structure. Attempting to assemble a VINAH MDS transaction from various locations as a result of a data entry trigger may prove problematic.

# Method 3 - HL7 message interception

This method is similar to the message/transaction queuing. It involves effectively listening to an internal HL7 message stream to the VINAH MDS system. The advantages of this method include being able to plug into an existing stream of transaction messages which could make implementation of an existing system quite simple.

There are several downsides to this method which would make implementation highly unlikely to be successful and in some cases near impossible:

* In many cases, VINAH MDS enforces different validation rules than those provided by both the HL7 standard and local systems.
* Where HL7 messages are sent between local systems, these messages are usually accepted as-is; data may be invalid from a business point of view however systems generally do not enforce rules at this level.
* VINAH MDS data must meet the business rules as set out in Section 4 – messages are not accepted unless they are valid in order to preserve data quality of the entire collection.
* Given that the VINAH MDS may not accept a particular message for any given reason, the stream of data may effectively be broken, and transactions will be out of order or synchronisation.
* Some standard HL7 messages do not carry the data elements as required by the VINAH MDS; any intercepted messages would have to be at the very least transformed to meet the VINAH MDS message profiles and data element definitions/code sets; in the worst case would be unusable.
* In many systems, the conceptual VINAH MDS record is built up of data from various screens or physical database structure. Attempting to assemble a VINAH MDS transaction from various locations as a result of a data entry trigger may prove problematic.
* VINAH MDS is a statutory data collection which relies on enforcing data quality rules to ensure that decisions can be made on accurate data. This principle is at odds with the free-flowing nature of automated HL7 which enforces little or no business rules in order to guarantee the delivery of messages.

# Data submission lifecycle

## Overview

The submission process lifecycle for the VINAH MDS data transmissions is illustrated in the following diagram.



Queries on the HealthCollect portal or VINAH MDS processing system availability, for example in the event of non-receipt of a message acknowledgment file after a reasonable time, may be directed to the HDSS Helpdesk via the email address hdss.helpdesk@health.vic.gov.au.

Unlike other health data collections, a given VINAH MDS submission need not contain all data for a particular month; nor is it restricted to only data for a given month. A VINAH MDS submission can contain one or more individual data records, represented as HL7 messages.

In the VINAH MDS, monthly submission requirements are assessed by analysing all data submitted at a point in time. It is expected that all data pertaining to the relevant period has at some point in time, before the due date, been submitted. This data may indeed have been submitted in one large file or may have come in a series of smaller files, or indeed on a message-by-message basis.

## File transmission automation

Once the submission package(s) are compiled, the files should be transmitted to the HealthCollect portal – see Section 5d – HealthCollect portal manual submission process. Requiring users to manually upload files to the HealthCollect portal user interface is acceptable but discouraged. It is strongly recommended that the function of submitting VINAH MDS files and receiving reports be built into the submitting software using the VINAH MDS web services. This will eliminate the need for users to manually upload and download reports. This also presents the opportunity for the system to perform submissions in the background, and only present errors to users where actions are required.

### HealthCollect portal (user interface)

Advantages:

* Dump files to disk, let users handle the process - little or no implementation required

Disadvantages:

* Possibility of uploading the wrong or incorrect version; incomplete file uploads or other user error issues
* Burden on users to manually handle files
* Users must log in frequently to check for submission reports
* Weakened auditing capability by the sending system
* Each user of the system has to gain proficiency in the manual transfer process, creating support overhead when new users or systems introduced at a new site.

### HealthCollect web services

Advantages:

* Allows systematic control, auditing and logging of transmissions
* Allows automatic retrieval of submission reports, saving users time
* No manual handing of files avoids user error problems, reducing support calls
* Allows for the possibility of automatic submissions

Disadvantages:

* Implementation required

## Uploading multiple files

Where multiple files are being uploaded, files will be run in order of the date/time of upload/submission. Files should not be uploaded all at once using the website as they are all assigned the same upload date, and there is no guarantee that files will be processed in order of file name. Instead, files should be uploaded one at a time, i.e. spaced by a period of at least a second).

## Submission file naming

The file naming convention to be used when submitting VINAH MDS files is as follows:

* The file name is defined and tested by the following regular expression:
* [0-9\_a-zA-Z]{1,30}[.](hl7|xml|zip)
* The file extension should be .hl7 for an HL7 file
* A valid organisation identifier must be the first characters in the file name
* The organisation identifier must exist in the code table HL70362
* The file name must be unique in time. File names may only be re-used if the original file was not acknowledged by the HealthCollect portal
* It is highly recommended that the date and time the file is created by the health service be used to form the file name. This ensures that unique file names are always submitted
* It is recommended that the time period of data in the file is not used as part of the file name, as this may not generate unique file names.

Example: hs\_20100601\_01.hl7

In the example, the organisation identifier is the first two characters (‘hs’) and the date of data extraction (01 June 2016) has been used along with a sequence number (‘01’) to provide a unique file name. The structure of the file name should reflect the time of generation of the file and should not attempt to reflect a time period of the data contained within. It is acceptable to include in the file name other metadata such as the system or application that generated the file to avoid the possibility that two different systems at the same health service produce the same file name. It is important that the system that generates the VINAH MDS submission file also generates the file name. Users should be instructed not to alter the file name unless instructed otherwise.

File names must be unique for each submission across the life of the data collection. A file name must never be reused if it has been received by the VINAH MDS system. This holds even if the file is empty, corrupt, contains numerous errors and is subsequently resubmitted, or the file has been purged and the same data is to be re-submitted.

## Submission file persistence

Although it is possible that a submission may be made directly from an application to the HealthCollect web service without writing a physical file to disk, for auditing purposes it is recommended that a copy of each submission file is persisted to a local or shared disk.

## Submission authorisation

In addition to receiving a HealthCollect portal username, each username must also be registered to submit VINAH MDS data for a particular organisation identifier. In addition, organisations must be registered to submit VINAH MDS data for a particular program. These registrations can be undertaken by contacting the HDSS Helpdesk.

## Character encoding

Data must be transmitted as a 7-bit ASCII encoded file.

## File sizes

Submission files should contain no more than 50000 records/messages.

The ideal file size providing optimum processing speeds is between 2-5MB.

Submission file sizes shall be no greater than 25MB.

If the need arises to submit more than this amount (e.g. if submitting historical data) then the messages should be spread across multiple files.

VINAH MDS developers should include provisions to output data across multiple files based on a configurable threshold number of messages per file. Consideration should be given to the fact that one submission report is returned for each file.

# VINAH MDS submission reports

Each submission is responded to in two ways:

* Upon submission of the file and receipt by the VINAH MDS validation engine, a text file ([filename].ack.txt) is returned to the sending user’s HealthCollect portal account. This file indicates that the file has been received by the system and has been placed in a queue for processing. It also contains information on how long the system expects to take to process the file with respect to the amount of data ahead of it in the queue and the amount of data in the submission file itself. The acknowledgement is further documented in Section 7.
* Once the submission file has been processed, an XML submission report file is returned to the sending user’s portal account. This file summarises the processing operation, lists all validation events that occurred during the processing, and provides an acceptance status for each batch and message submitted. The size of this submission report can in some cases be proportional to the size of the submitted file, especially where large numbers of errors are resultant. The submission report is further documented in Section 7.

## Manual v automatic submission/acknowledgement

The follow sections outline some of the best practices to consume the submission report. Although at the start of the VINAH MDS development cycle many vendors opt for manual uploads and downloads, it should be noted that this cycle is expensive timewise.

It is strongly recommended that the function of submitting the VINAH MDS files and receiving reports be built into the submitting software using the HealthCollect portal web services. This will eliminate the need for users to manually upload and download reports. This also presents the opportunity for the system to perform submissions in the background, and only present errors to users where actions are required. For more information regarding the use of the VINAH MDS web services, please contact the HDSS Helpdesk.

## Consuming the submission report

Although the submission report provides information for the sending user around invalid data that needs to be corrected, it is important to note that validation messages in the submission report are only a part of the overall process.

The submission report contains important flags which need to be captured in the sending system’s VINAH MDS transaction log to ensure ongoing synchronicity. As such, it is not a viable approach to expect the sending user to interrogate the submission report file to investigate errors and control the submission process manually. The report does not contain identifying information for each record apart from the key for that record. Unless the key can enable the user to easily locate the record in error, using the XML report in isolation to identify records will be difficult for a user.

The recommended approach is to implement a process in the sending system’s VINAH MDS component which can consume the returned submission report. The XML in the report is easily readable by a machine and implementing this process through the software is far more reliable than any manual process involving the user and allows the sending system to manage the VINAH MDS submissions in a structured way.

## Consumption process

The consumption process can be summarised using the following narrative, with reference to the transaction checkpoint method:

1. Provide a function to allow the user or automatic process to import the XML submission report into the VINAH MDS submission generation software. The optimal model is to implement a service at the user end to automatically poll the HealthCollect portal (via the web services) for submission reports.
2. Process the <Acceptance> node and for each batch and message, set the value of these data elements in the VINAH MDS transaction log:

**vinah\_transaction**

* File name - \submission\filename
* ack\_datetime - \submission\ process\_end\_date

**vinah\_record\_transaction**

Fields such as transaction\_type, vinah\_entity etc. can be inferred by linking to the mcid.

* mcid - \acceptance\batch[n]\message[n]\mcid
* rejection\_msg - \validations\validation[n]\edit\_text
* accepted\_flag - \acceptance\batch[n]\message[n]\accepted
1. Collate errors listed in the <Validations> node in a manner that suits the users and the local software. It is recommended to summarise the errors by error code and by patient and provide links to screens where local administrative staff can click through easily to correct errors. It is also recommended that information that will be useful to identify records be included, such as Contact date/time, Referral received date, Episode start date/time, etc.
2. Where a <Validation> node exists without a <mcid> value, the error exists at a file or batch level. These errors should be attached or associated to metadata about the individual transaction file (this may be more than one file), and available for users to view where appropriate.

## Waiting for a submission report

Once the VINAH MDS submission has been packaged and exported and/or uploaded, the sending system is effectively in a ‘waiting’ state and expects to be able to consume the submission report to complete the submission process and flag the appropriate records.

Software designers may wish to build in the ability to rollback this state where a submission report is not or cannot be received. This will avoid situations where the sending system is waiting for a report that it can never receive, or for a set of data generated in error that has been retracted from the department.

## Persisting messages

The validations, or rejection messages generated by the VINAH MDS, are generally associated with the version of a record in the local system that was submitted. It should be noted that a record may be changed by a user in the local system between the times that the submission is made and the VINAH MDS rejection received.

The rejection should stand in the system until such time that the record is subject to either an update or a delete and a user of the system has marked the rejection as repaired. At this juncture the VINAH MDS rejection is deemed to be no longer applicable to the record.

## Non record level errors

Several classes of VINAH MDS errors do not relate to a specific record in the system, rather a set of records, the entire submission file or other data quality scenarios. These error messages, where repairable by the user, should be presented to them and an option included to flag the error as repaired.

## Errors that users cannot repair

There are several VINAH MDS errors that aim to preserve the integrity of the data relative to both the submission itself and previously submitted data. Much of the referential integrity class of VINAH MDS errors are not data quality errors, rather, they reflect errors in the submission process, the logic used to extract and package VINAH MDS data, or the process used to maintain a VINAH MDS Transaction Log.

As a rule, when non-user repairable errors occur, this should place the system in a state of exception and require support. These errors should not be presented to the user as they are confusing and not errors that they have control over. The VINAH MDS submission system may intercept these classes of errors and respond to them with predefined processes if necessary.

Where a System, Process or File level message has been received, all records should be flagged as not accepted, but not invalid.

## Purging submissions

There will be occasions when a series of submissions to the VINAH MDS will need to be cleared or purged so that a fresh set of data can be submitted. This is a common case where an upgrade is taking place or a systematic error has been detected.

There should be no reliance on using the purge or purge-after-load process in order to submit regular data. If a file contains validation errors, a purge should not need to take place in order to submit a corrected file. This creates significant overhead at both ends of the process. Effort should be assigned to ensuring that a VINAH MDS transaction log is developed to avoid the need for regular purging and bulk loading.

Where a major synchronisation issue has occurred, purge request files should be sent in order to purge back to a certain point in time. These purge request files can easily be created from the VINAH MDS submission report files.

Manual data purges will only be undertaken by the department where the history of submission has been lost or corrupted and the sending system cannot request the purges.

The procedure to generate purge request files is documented in Section 5e –Submission purge procedure.

# Implementation considerations

## Keeping track of transmissions

The first time a new entity (e.g.: Patient/Client, Episode, etc.) is successfully sent to the VINAH MDS, it is created with an Insert message. Subsequent changes to that entity must be sent with an Update message. Further transmission of an Insert message once the first has been accepted will reject, as will transmission of an Update message without first sending an Insert message. For this reason, software systems transmitting to the VINAH MDS will need to keep track of what information has been sent in order to know which type of message to send next time around.

Once processed by the VINAH MDS validation engine the XML submission report may be collected from the HealthCollect portal. Organisations' software systems should have a method of reading this information to determine which messages have been successfully processed and which need to be resent. For example, if a Patient/Client Insert message is transmitted and succeeds and the Patient/Client's details are subsequently changed an Update message must be sent next time. However, if the original Insert failed, the Insert message must be re-transmitted, either with the updated details included or as originally sent and followed by an Update message.

The transaction checkpoint method outlined in this document outlines practical approaches to manage the submission lifecycle.

## User data amendments

In general, once software development and implementation issues are resolved, the bulk of the VINAH MDS validations that are triggered will be data-related, that is, data entered into the source system that violates a VINAH MDS business rule or validation. Ideally the source systems will identify these instances prior to transmission, however in the event that processing does generate errors of this type, the source system must provide a method for users to access and correct the information and then re-transmit the information to the VINAH MDS.

Correction of the information should be through the source system's user interface and must be applied to the source data and not the HL7 extract or other extract database. Users should be able to identify the information in need of updating from the edit report and access that information for amendment.

## Identifier schemes

Clinical systems often undergo reengineering which affects the way in which identifiers are issued (e.g., patient identifiers/unit record numbers etc.). Consideration should be given to the effect of changing identifier schemes; these changes should not cause integrity issues, nor should they affect the ability of related records to be reconciled.

## Program/Stream changes

In order to preserve the integrity of the VINAH MDS repository and ensure the appropriate validation logic is applied to all data, the changing of the Program/Stream value on an Episode is restricted. This means that once an Episode has been inserted, the Program/Stream data element value cannot be changed through an update message.

If an episode program/stream needs to change, all affected episodes should be deleted and re-inserted.

## Multiple source systems

While the department recommends use of a single source system for all VINAH MDS transmissions within an organisation, it will not always be possible to achieve this in practice. Accordingly, many of the significant changes to the VINAH MDS specification for 2007-08 were implemented to facilitate reporting from multiple systems - particularly the shift from derived to explicit episode reporting.

* Further changes in 2012-13 allow for organisations to use the same patient identifiers, referral identifiers, episode identifiers and contact identifiers across multiple systems for different patients.
* The Local Identifier Assigning Authority (LAA) reported with the patient identifier has been applied across all identifiers when determining whether an identifier is unique. This relies on LAA values being unique to a vendor system within an organisation.
* Submission timelines apply across all VINAH MDS data.

Organisations must manage the logistics of separate system submissions to the HealthCollect portal.

## Front end validations v VINAH MDS validations

Software vendors are encouraged to implement validations in their systems to enforce the appropriate business rules, VINAH MDS or otherwise, at the point of entry. This will reduce the number of validations triggered by the VINAH MDS validation engine.

It should be noted that while exercises to map VINAH MDS business rules and validations into a user-facing application are encouraged, such an effort should not be deemed to have eliminated the possibility of an error being returned from the VINAH MDS validation engine; systems need to have the capability to deal with any error returned from the VINAH MDS validation engine even where a front end validation was designed to capture that error.

As outlined in Section 8, if one or more validations are triggeredin a certain group, the processing for that level will discontinue. This means that certain validations will not be applied to data at a certain point in time, but this does not mean that the validation will not be triggered in the future.

Therefore, any attempts to reconcile local validations and the VINAH MDS validations may result in inconsistencies due to the fact that rules may be applied at different points in time.