# HCG

Connecting Lives

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**Weekly Meeting Time** **: 08:00p.m.-09:00p.m.**

**Weekly Meeting Place** **: Hinds Hall**

| Revision History | | | | |
|---|---|---|---|---|
| **Version** | **Author** | **Reviewed By** | **Review Comments** | **Modified By** |
| 1.0 | Team Analyzers | Team Analyzers | More specific to project and highlighting where generic system should be considered | Team Analyzers |

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# BRIEF OVERVIEW

In today's health care scenario, when a customer is hospitalized or visits a doctor to get treatment, he/she submits a claim with the health provider company. The company then checks if the customer is insured with the company. The company then goes on to check the coverage that the employee is under. Ex: Some treatments like dental treatments are not covered. After checking the coverage, companies check for how the coverage may apply i.e. did you go in network or out network? This is then followed by checking and matching the ICDM-9 () diagnosis code currently ICDM-9 to the CPT (current procedural terminology). Each of these assign numbers to diagnoses and medical procedures.

If the claim has broken toe proximal phalanx great toe code as the diagnosis and the procedure is open reduction internal fixation of the humerus as the procedure the claim will be refused. You simply can't treat a broken toe by operating on the arm. So the diagnosis must match the treatment.

The claim that the patient submitted is verified by the claim processing system and if successful the amount is deducted since the patient's employer had registered the patient while availing the self-insured health plan.

The steps involved in the claim process can be summarized as follows:

The insured individual seeks medical attention from a healthcare provider including affiliated hospitals or nursing home etc.

The hospital submits charges to the insurer using a health insurance claim form.

Claim forms are sent electronically using a series of codes. The charges are received by the insurance company with each claim having a dedicated date and code to ensure timely payment.

The health insurance company reviews the charges to make sure they follow their policy guidelines.

Once the claim is verified, the selected claims are paid and notified to the customer. The various services offered by the claim processing system include-

- Verification of claims submitted
- Claim code identification
- Claim code conversion
- Processing of claims
- Sending alerts to individuals about the claim status
- Calculating final claim amount
- Tracking claim status
- Claim report generation

# ITEMS TO BE TESTED

The items to be tested gives a brief overview about the test cases that would be tested during the implementation of an IT system for claims processing.

1. **Claim Compliance and Audit Check**: Claim conversion is to be tested in order to validate if the claims are converted accurately from ICD 9 TO ICD10.

2. **Claim Adjustment**: This item checks whether the claims are converted accurately by validating the values from customer plans. If the claims are adjusted accurately, they are sent to repricing unit.

3. **Value Based Claim check**: This item is to be tested for sending information to the value based care group. They take claims information in order to validate whether the patient is getting value based care or not. This test case also checks if the claim report contains valid information about the patient and his treatment in terms of his health insurance plan.

4. **Work Force and patient engagement**: This item is to be tested in order to confirm patient's details and his appointment details.

5. **Alerts**: This item is to be tested in order to confirm correct notifications are sent to correct patients after the claims have processed.

## ITEMS NOT TO BE TESTED

The items to be tested gives a brief overview about the test cases that would be tested during the implementation of an IT system for claims processing.

1. **Invoice Generation**: We are not testing this item because it is being generated in our system. This generation is a result of pre-tested items and if those items were failed in testing, this output will never be created.

2. **Accumulator**: We are not testing this item because this database is generated within our department. Calculations for every patient's deductibles, out of pocket expense is done automatically. If the calculation is not correct a manual rectification is done.

3. **General Equivalence Mapping**: This tool is predefined in terms of ICD 9 codes to ICD 10 codes. This is not to be tested because these code conversions are industry standards and only how they are being applied needs to be tested.

## BUSINESS TEST CASES

| I.T. | Business Unit Test Case | Test case ID | Test Case Name | Owner | Test Case Description | Test Case Design | Acceptance Criteria |
|---|---|---|---|---|---|---|---|

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Repricing QA | Claims Repricing | TC001 | Claims Repricing | Repricing System | The test case is to receive adjusted claims and validate them. | • Validate how many adjusted claims are received after. | • System should receive claims in a batch of 250 per day. |
| | | | | | | • Validate the discounts and deals applied in terms of discount percentage after taking into consideration copay, coinsurance, deductible limit and type of network. | • The applied discounts should lie in the range of 5%-25%. |
| | | | | | | • Validate if the erroneous unadjusted claims are resolved. | • The resolution of claims is within 24 hours |
| Compliance QA | Compliance | TC002 | Claims Compliance | Claim Processing System | The test case is to ensure that the claims are following the regulatory compliance | • Validate if the claims received undergo ICD 10 claims conversion process | • The accuracy of ICD 10 conversion. The % should lie between |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | of ICD 10 codes. | no ICD 9 codes.<br>• Validate if pending claims queries have been addressed and resolved. | 90%-100%.<br>• The claims have been resolved and addressed within 3 working days. |
| | | | | | | • Validate if the claims processing audit document is generated. | • The report should be generated quarterly providing detailed review about the claims processing |
| Enrollment QA | Enrollment | TC003 | Enrollment | Enrollment System | The test case is to verify if the patient has provided their personal details for the process of enrolling in the | • Validate if the patient has provided their personal details like name, address, SSN, plan details. | • The patient details are processed within a minimum of 1 hour and maximum of 2 hours' time span. |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | | | |
| | | | | | | • Validate if the patient is enrolled in a plan (silver, platinum, bronze). | • The patient is sent regular monthly alerts for patients which are not enrolled. |
| | | | | | | • Validate if the patient is allocated plans according to their salary status | • The patient receives confirmation/advice within 48 hours. |
| Engagement QA | Engagement<br><br>Alerting | TC004 | Engagement | Engagement System | This test case is used to extract patient information pertaining to the appointment, treatment and other physician related information | • Validate the patient healthcare details such as treatment, scheduled appointment, physician information, healthcare provider | • The patient is informed about their treatment, time period |
| | | | | | | • Validate the patient notification sent after claims | • The alerts should be sent within 24 hours of claims |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | | have been processed | being processed. |
| | | | | | | • Validate if notification was sent to the patient after payment has been made | • The alerts should be sent within 24 hours of patient payment. |

## I.T. TEST CASES

| IT Test Case | Business Unit | Test Case Id | Owner | Test Case Description | Test Case Design | Acceptance Criteria |
|---|---|---|---|---|---|---|
| Claim Conversion Check | Compliance and Audit System | TC001 | Claim Processing Q/A | This test case deals with the conversion of the current ICD 9 code to the corresponding ICD 10 code. Then the code is converted with the help of general equivalence mapping. | Validate that the General Equivalence Mapping file is present in the database. The GEM file is used for converting the ICD 9 code to ICD10 code. | System should contain the latest updated GEM file version. |
| Claim Adjustment Check | Re-pricing | TC002 | Claim Processing Q/A | The test case deals with the claims being processed | Validate that the claims being processed and that are displayed to the conversion team have accurate customer plan | The system should map the customer to the correct enrollment plan type (Gold, Silver, and Basic) before processing the claims. |

| | | | | | | |
|---|---|---|---|---|---|---|
| | Re-pricing | TC003 | | effectively before being sent to the re-pricing system. | Validate that the following claim details:<br>- Deductible limit -<br>Coinsurance<br>- Type of network (IIN/OON)<br>are accurate, before sending the claim to the repricing system for claim adjustment. | The system should verify that the correct customer deductible limit, coinsurance, type of network amounts are mapped to the customer. |
| Claim Details Verification | Value Based Care | TC004 | Claim Processing Q/A | The test case deals with the accurate claim details being sent to the Value Based care system | Validate that the report being sent contains:<br>- Billing details<br>- ICD code details<br>- Medication Details<br>- Treatment Details | The report generation should not take more than 180 seconds. The report should correctly map the corresponding details with the correct customer Id and plan details. |
| Claim Query Resolution | Workforce Management | TC005 | Claim Processing Q/A | The test case deals with resolving the customer queries in a timely and efficient manner. | Validate that the ticket generated in the system is valid with the following criteria:<br>-Customer Id<br>- Customer Plan<br>- Customer Network | The query resolution time should be prioritized with priority levels<br>High – 1 day<br>Medium – 2 days<br>Low – 3 days |

# TESTING

Testing is an investigation conducted to provide stakeholders with information about the quality of the product or service under test. Software testing can also provide an objective, independent view of the software to allow the business to appreciate and understand the risks of software implementation. This document talks in length about the different types of testing to be done, test cases, issue log, etc.

A test case, in software engineering, is a set of conditions under which a tester will determine whether an application, software system or one of its features is working as it was originally established for it to do. The mechanism for determining whether a software program or system has passed or failed such a test is known as a test oracle. In some settings, an oracle could be a requirement or use case, while in others it could be a heuristic. It may take many test cases to determine that a software program or system is considered sufficiently scrutinized to be released. Test cases are often referred to as test scripts, particularly when written - when they are usually collected into test suites.

In order to fully test that all the requirements of an application are met, there must be at least two test cases for each requirement: one positive test and one negative test. If a requirement has sub-requirements, each sub-requirement must have at least two test cases. Keeping track of the link between the requirement and the test is frequently done using a traceability matrix. Written test cases should include a description of the functionality to be tested, and the preparation required to ensure that the test can be conducted.

## PERFORMANCE TESTING

Performance testing is in general, a testing practice performed to determine how a system performs in terms of responsiveness and stability under a particular workload. It can also serve to investigate, measure, validate or verify other quality attributes of the system, such as scalability, reliability and resource usage.

Performance testing, a subset of performance engineering, is a computer science practice which strives to build performance standards into the implementation, design and architecture of a system. This document talks in length about the performance testing of the claims processing system. The following types of performance testing,

- Load Testing
- Capacity Testing
- Endurance Testing

**METHODOLOGY**

- There will be automated scripts and virtual users created using HP Virtual user generator and Load Generators.
- The tests will be conducted in an environment as specified by the business unit.
- The usage pattern of number of users for each test will be discussed and finalized with the business unit.
- The app, web and DB servers will be monitored during the entire duration of the test with the help of the respective teams.
- The time of tests will be from 2-5 PM EST as discussed with the business unit.

## LOAD TESTING

Load testing is the simplest form of performance testing. A load test is usually conducted to understand the behavior of the system under a specific expected load. This load can be the expected concurrent number of users on the application performing a specific number of transactions within the set duration. This test will give out the response times of all the important business critical transactions. The database, application server, etc. are also monitored during the test, this will assist in identifying bottlenecks in the application software and the hardware that the software is installed on.

| USE CASE | USE CASE DESCRIPTION |
|---|---|
| Claim Conversion | This test case deals with the conversion of the current ICD 9 code to the corresponding ICD 10 code. Then the code is converted with the help of general equivalence mapping |

- The load of the system will be 50 users (users will be created by HP Virtual user generator and load generator).
- The ramp up pattern will be 2 users every 15 seconds as shown in the test scenario mentioned below.
- The web, app, DB servers will be monitored to know the server metrics throughout the test.
- The acceptance criteria will be divided by half as used in the load test.
- The duration of this test will be 3 hours as discussed with the business unit.

**ACCEPTANCE CRITERIA**

| UC Name | Steps | Acceptance Criteria |
|---|---|---|

| | | Min. | Max. |
|---|---|---|---|
| ICD Code Conversion | Step 1 : The code converter will login into the system to check the records after the data extracts. | 3 | 5 |
| | Step 2: Enrollment Check | 3 | 5 |
| | Step 3 : ICD Code Compliance Check | 3 | 5 |
| | Step 4 : After verifying the records the code converter converts the records according to the ICD 10 with the help of General Equivalence Mapping. | 3 | 5 |
| | Step 5 : The code converter sends alert to the doctors and a team of medical experts who can log in to view and update the converted claim. | 3 | 5 |

**TEST SCENARIO**

| USE CASE | USE CASE DESCRIPTION | User Load(Concurrent users) | Duration | Ramp up pattern of users | Ramp Down | Acceptance Criteria |
|---|---|---|---|---|---|---|
| Claim Conversion | This test case deals with the conversion of the current ICD 9 code to the corresponding ICD 10 code. Then the code is converted with the help of general equivalence mapping | 100 | 3 hours | 2 users every 15 seconds | 2 users every 15 seconds | 3- 5 seconds |

**Tools Used for running the test: HP Performance Center, Load Runner, Virtual User Generator**

**PASS/FAIL CRITERIA**

- The test is considered pass only when the response times of the transactions fall between 0-5 seconds.
- There should not be any spikes or deadlocks on the web, App or DB servers.
- The application behavior should be stable throughout the duration of the test.
- There should not be any spikes during the test or fall in throughput from the server.

## CAPACITY TESTING (STRESS TESTING)

Capacity (Stress) testing is normally used to understand the upper limits of capacity within the system. This kind of test is done to determine the system's robustness in terms of extreme load and helps application administrators to determine if the system will perform sufficiently if the current load goes well above the expected maximum.

- The load of the system will be doubled as used in the load testing. (Users will be created by HP Virtual user generator and load generator).
- The ramp up pattern will be in two phases as shown in the test scenario mentioned below.
- The web, app, DB servers will be monitored to know the server metrics throughout the test.
- The acceptance criteria will be doubled for this test.

**ACCEPTANCE CRITERIA**

| UC Name | Steps | Acceptance Criteria | |
|---|---|---|---|
| | | Min. | Max. |
| ICD Code Conversion | Step 1 : The code converter will login into the system to check the records after the data extracts. | 6 | 10 |
| | Step 2: Enrollment Check | 6 | 10 |
| | Step 3 : ICD Code Compliance Check | 6 | 10 |
| | Step 4 : After verifying the records the code converter converts the records according to the ICD 10 with the help of General Equivalence Mapping. | 6 | 10 |

| | | | |
|---|---|---|---|
| | Step 5 : The code converter sends alert to the doctors and a team of medical experts who can log in to view and update the converted claim. | 6 | 10 |

**TEST SCENARIO**

| USE CASE | USE CASE DESCRIPTION | User Load(Concurrent users) | Duration | Ramp up pattern of users | Ramp Down | Acceptance Criteria |
|---|---|---|---|---|---|---|
| Claim Conversion | This test case deals with the conversion of the current ICD 9 code to the corresponding ICD 10 code. Then the code is converted with the help of general equivalence mapping | 200 | 1 hour | 2 users every 15 seconds until 100 users are ramped up and the test will run for 15 mins and then the second set of 100 users will be ramped up at the rate of 2 users every 15 seconds. Once the 200 users are ramped up, the test will run for 1 hour at steady state. | 2 users every 15 seconds | 6- 10 seconds |

**Tools Used for running the test: HP Performance Center, Load Runner, Virtual User Generator**

**PASS/FAIL CRITERIA**

- The test is considered pass only when the response times of the transactions fall between 0-10 seconds.
- There should not be any spikes or deadlocks on the web, App or DB servers.
- The application behavior should be stable throughout the duration of the test.
- There should not be any spikes during the test or fall in throughput from the server.

## ENDURANCE TESTING (DURABILITY TESTING)

Endurance testing, is usually done to determine if the system can sustain the continuous expected load. During soak tests, memory utilization is monitored to detect potential leaks. Also important, but often overlooked is performance degradation, i.e. to ensure that the throughput and/or response times after some long period of sustained activity are as good as or better than at the beginning of the test. It essentially involves applying a significant load to a system for an extended, significant period of time. The goal is to discover how the system behaves under sustained use.

- The load of the system will be divided by half as used in the load testing.
- The ramp up pattern will be 2 users every 15 seconds as shown in the test scenario mentioned below.
- The web, app, DB servers will be monitored to know the server metrics throughout the test.
- The acceptance criteria will be the same as used in the load test.
- The duration of this test will be 24 hours as discussed with the business unit.

**ACCEPTANCE CRITERIA:**

| UC Name | Steps | Acceptance Criteria | |
|---|---|---|---|
| | | Min. | Max. |
| ICD Code Conversion | Step 1 : The code converter will login into the system to check the records after the data extracts. | 3 | 5 |
| | Step 2: Enrollment Check | 3 | 5 |
| | Step 3 : ICD Code Compliance Check | 3 | 5 |

| | | | |
|---|---|---|---|
| | Step 4 : After verifying the records the code converter converts the records according to the ICD 10 with the help of General Equivalence Mapping. | 3 | 5 |
| | Step 5 : The code converter sends alert to the doctors and a team of medical experts who can log in to view and update the converted claim. | 3 | 5 |

**TEST SCENARIO**

| USE CASE | USE CASE DESCRIPTION | User Load(Concurrent users) | Duration | Ramp up pattern of users | Ramp Down | Acceptance Criteria |
|---|---|---|---|---|---|---|
| Claim Conversion | This test case deals with the conversion of the current ICD 9 code to the corresponding ICD 10 code. Then the code is converted with the help of general equivalence mapping | 50 | 24 hours | 2 users every 15 seconds | 2 users every 15 seconds | 3- 5 seconds |

**Tools Used for running the test: HP Performance Center, Load Runner, Virtual User Generator**

**PASS/FAIL CRITERIA**

- The test is considered pass only when the response times of the transactions fall between 0-5 seconds.
- There should not be any spikes or deadlocks on the web, App or DB servers.
- The application behavior should be stable throughout the 24 duration of the test.
- There should not be any spikes during the test or fall in throughput from the server.

- There should not be any performance degradation in the test in terms of response times, throughput, and server performance.

## SIGN OFF ON PERFORMANCE TESTING

The sign off on performance testing will be given only if the application satisfies the following criteria,

- All three tests are passed satisfying all the criteria.
- There is no application performance spikes or downtimes during the tests.

## REQUIREMENTS TRACIBILITY MATRIX

| Use Case | Requirement | Test Scenario | Expected Result | Test Data set | Validation | Actual Result | Pass/Fail | Rectification strategy/Next steps |
|---|---|---|---|---|---|---|---|---|
| Validation of ICD | ICD code version shall be viewable to HCG Claims Admins | Claims Admin opens up claim | ICD code version should be listed | Claim(s) opened from HCG claims processing system | Validate if claim contains all the details including ICD code | ICD code is missing or incomplete | Fail | Claim will be flagged and sent back to provider origin |
| | ICD code description shall be viewable to HCG claims Admins | the user clicks the ICD code | description of ICD code shall be presented when code is clicked | Claim(s) opened from HCG claims processing system | Validate if accurate description is given for each claim respectively | A pop up is opened describing the ICD code when the claim is clicked | Pass | confirm description is relevant sensible |
| | System shall provide the ability to convert ICD-9 to | the user applies general equivalence mapping | ICD-9 will be converted to ICD-10 accurately | Claim(s) opened from HCG claims processing | Validate manually if the conversion is execute | Wrong conversion is executed giving erroneous result | Fail | flag the claim for manual review |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | ICD-10 when a 1:1 map exists | | | system and General Equivalence Mapping Data base | d accurately | | | |
| | System shall provide the feature to flag claims with ICD errors | Claims enter the system. | Claim marked as flagged will be displayed as red with a flag icon in claims processing system. flagged claims will be directed to the ticketing system for inaccurate claims | Claims data set | Validate if red flag is represented in front of those claims only which have ICD errors | A small flag is represented in front of all the claims which have wrong ICD codes | Pass | ensure flagged claims are sent to issue escalation/ticketing system |
| | system shall alert claims admins when ICD-9 code is present after October 1, 2015 | Admin clicks on the received claim | the claim shall not be able to be marked as finalized when wrong code version is present | Claims data set | claim created after October 1, 2015 shall all be ICD-10 | An incomplete status still exists when a wrongly converted claim is opened | Pass | flag the claim for manual review |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | system shall provide the ability to manually update ICD codes | Right click the ICD code | Right clicking the ICD code shall provide the option to edit an ICD code | ICD code present on claims | Editing option present | Right clicking the ICD code doesn't show option to edit it. | Fail | flag the claim for manual processing |

# ISSUE AND ACTION MANAGAMENT

An issue is functionality currently being expressed by the system that is creating unintended result or impacts. Issues require resolution for the system to function successfully as designed. The Issue action log defines the identification, analysis, and management of issues for HCG. The log creates a formal process for addressing importance and assigning ownership of various problems present in the system. Issues will arise in all phases of testing and can have severe impacts on the effectiveness of the HCG system if not managed properly.

**Purpose**

It is of high importance that HCG maintains an issue management process that provides visibility into problems and issues, accountability as to who will resolve them, and how they will be resolved in a timely manner. Without an issue management process the system runs the risk of experiencing team and customer discord.

- Issues are identified, assessed for impacts to the HCG claims system and resolved.
- Issue resolutions that have significant impacts to functionality, information displays, and account calculations are to become part of the change management process.
- Resolved issues are to be properly documented and communicated to test team members and stakeholders.

The test team will consider the following general guidelines for prioritizing issues:

- High priority issues:

  - Have a significant impact on data displays, functionality, account calculations or quality
  - Impact more than one project area (e.g. engagement, repricing)
  - Have near-term due dates (0-14 days) for the completion of resolution activities.
  - Have resolution activities that are within the developers and system architects control

- Medium priority issues:

- May cause issues in critical path activities in the future – action now will prevent that from happening
- Have a moderate impact on data displays, functionality, account calculations or quality
- Impact is contained to a specific functional area
- Few or no dependencies on other functional areas
- Medium term due dates for completing resolution steps (14-28 days)

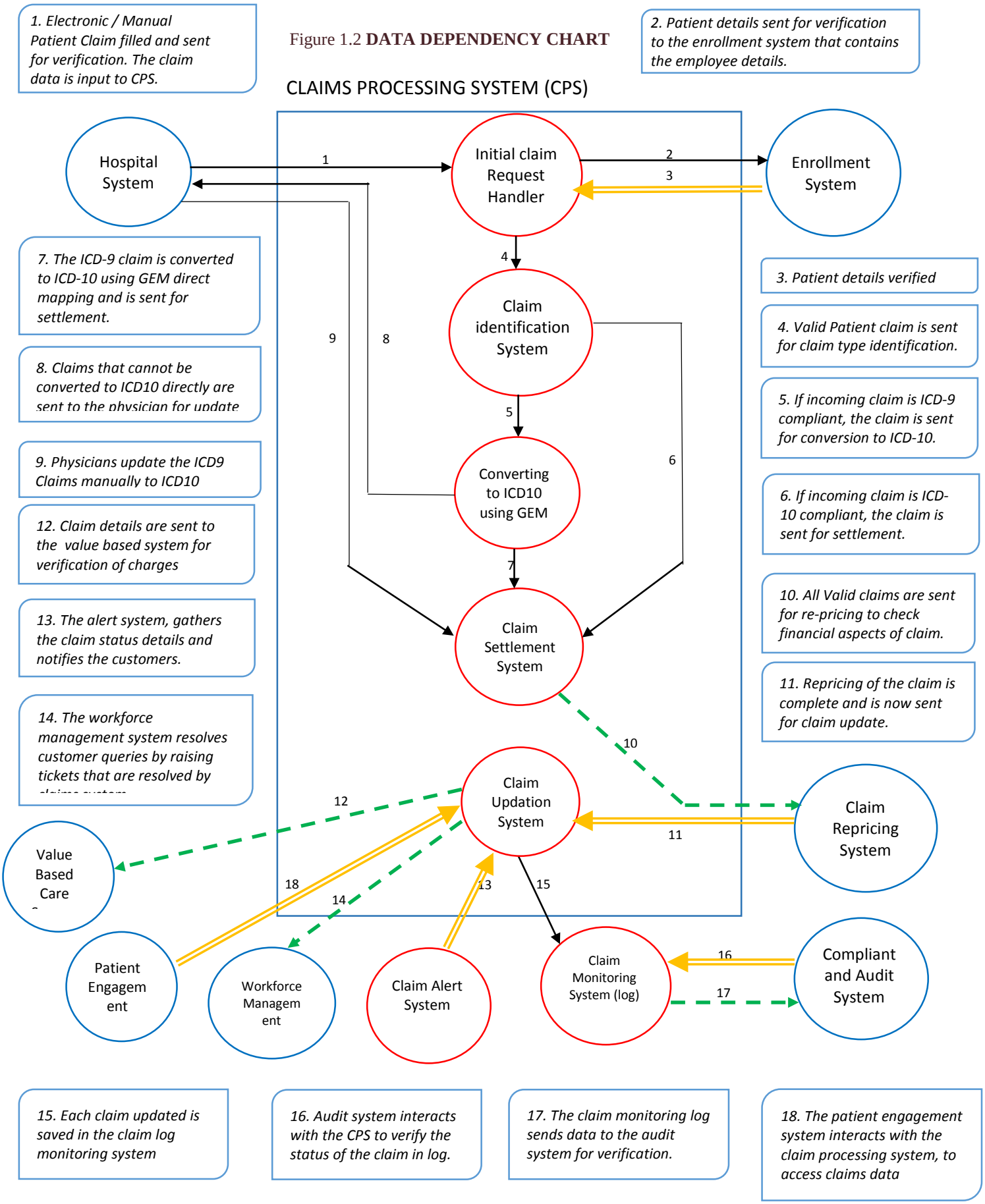
• Low priority issues:

- Have little or no impact on the HCG system
- No dependencies on other functional areas
- Long term due dates for completing resolution steps (28-42 days)

| # | Issue | Status | Owner | Priority | Due Date | Resolution |
|---|---|---|---|---|---|---|
| **1** | Accumulator not accounting for out of pocket expenses | Closed | Data architect | High | 14 days | Accumulator source data records shall be updated to include the out of pocket expense data elements and input the data into the accumulator metrics |
| **2** | e-form information not symmetrically displayed | Open | Developer | Low | 32 days | Form layout shall be redesigned to ensure populated boxes are symmetrically aligned |
| **3** | Edit account information button redirects to password reset page | Closed | Developer | Medium | 16 days | Edit account information button shall redirect users to a page displaying options to update address, employment title/status and general account preferences |
| **4** | e-forms saved as .png file when downloaded by users | Open | Data architect/ Developer | Low | 32 days | e-forms shall save as .pdf formatting when downloaded by users |

| | | | | | | |
|---|---|---|---|---|---|---|
| **5** | Physician name(s) not being displayed alongside health service information when claim originates from pharmacy's in claims summary page | Open | Data architect /Developer | Medium | 16 days | Prescribing physician information must be sourced from claims data store and displayed in health service information on claims summary page in enrollee portal |

Figure 1.2 **DATA DEPENDENCY CHART**



| ARROW REPRESENTATION | SIGNIFICANCE |
| --- | --- |
|  | CLAIM PROCESSING SYSTEM, As An IT SYSYTEM |
|  | CLAIM PROCESSING SYSTEM, As A BUSINESS UNIT |