

IST 654

Use Case Modelling and Prototyping *(CLAIM PROCESSING SYSTEM)*

BY:

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Meeting Time: Tuesday (8pm-9pm)

Meeting Venue: Hinds Hall – Room 216

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Context

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.

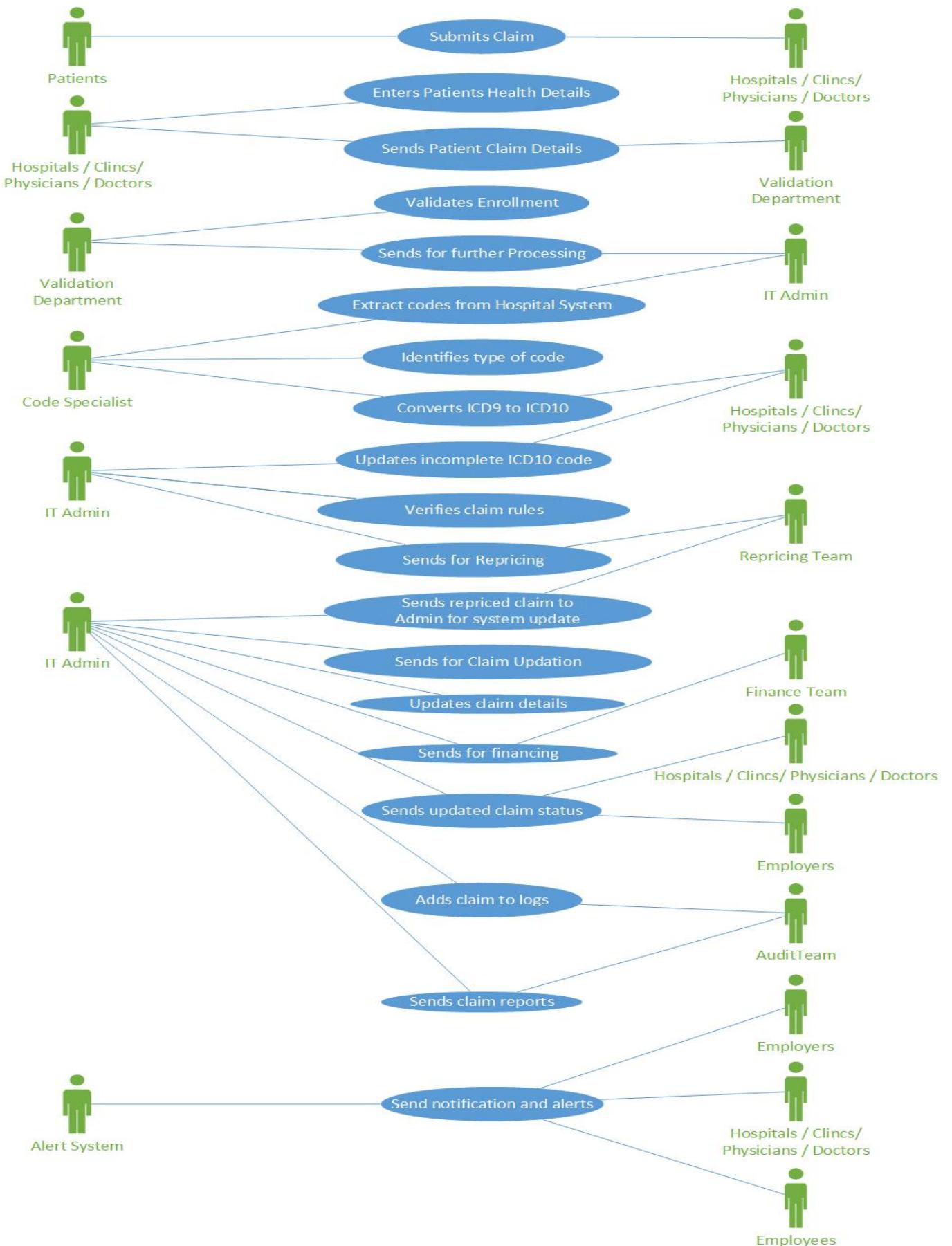
The steps involved in the claim process can be summarized as follows:

1. The insured individual seeks medical attention from a healthcare provider including affiliated hospitals or nursing home etc.
2. The hospital submits charges to the insurer using a health insurance claim form.
3. 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.
4. The health insurance company reviews the charges to make sure they follow their policy guidelines.
5. 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
- Tracking claim status
- Claim report generation

USE CASE DIAGRAM



ACTOR GLOSSARY:

ACTOR	DESCRIPTION
Patient/Employee	The patient submits his claim at the hospital or clinic. He can track the status of the submitted claim. He receives notification and alert once the claim is approved or rejected.
Employers	They receive the status of the updated claims and alert notifications.
Hospital/ Doctor/ Physician/ Clinic	They treat the patient. Update the patient health details and sends the patient claim to the validation department. They verify the ICD10 codes updated by the system and manually update the ICD9codes that do not have ICD10mapping available. They receive the status of the claim once updated and notification alerts once the claim is processed successfully.
Claim Collector	They collect all the claims that have been submitted on a daily basis and store them in the claim processing system database for further validation. They update the status of the claims that are new or have been sent for verification.
Validation Department	They validate the details of the employee who submits the claim and either reject the claim or approve it and send it for further processing.
IT Admin	They receive the claim submitted by the user. They convert the claim from ICD9 to ICD10, apply claim rules, sends for repricing, updates the status of the claim post verification, adds claim to logging system and generates claim status reports periodically.
Code Specialist	They are specialists in reading ICD codes. They convert ICD 9 codes to ICD 10 codes using the General Equivalence Mapping.
Repricing Team	They are another system that are involved in the repricing of claims.
Finance Department	They are involved with the actual transfer of funds once it has been repriced and approved.
Audit and Compliance Team	They are involved with the verification of the claims that have been approved or rejected by the system.

USE CASE GLOSSARY:

USE CASE	USE CASE DESCRIPTION	PARTICIPATING ACTORS
1. Submits Claim	The patient (employee) undergoes medical treatment at the hospital/ clinic/ physician/ doctor. He submits his claim at any date after the treatment is complete.	Patient/ Employee, Hospitals/ Clinics/ Physicians/ Doctor
2. Enter Patient Health Details	The hospital/ clinic/ physician/ doctor enters the health information of the patient. This includes filing details such as symptoms, location of injury, medication provided, date of treatment and other such details.	Hospital/ Clinic/ Physician/ Doctor
3. Send Patient Claim	The hospital/ clinic/ physician/ doctor send the claim submitted by the patient for further processing of the claim.	Hospital/ Clinic/ Physician/ Doctor, Validation department
4. Collect all claims	All the claims that have been submitted on a daily basis are tracked and stored in the claim processing system database for further validation.	Claim collector, Hospital/ Clinic/ Physician/ Doctor
5. Validate Enrollment	The validation department verifies the details of the user that had submitted the claim. It checks if the patient has an active insured plan that has been covered by the employer. It also checks whether all the claim details have been filled correctly and checks for any incorrect fields/ details entered in the claims form.	Validation Department
6. Send to Claim Processing	Post verification, the validation department sends the claim for further processing to the IT admin of the Claim Processing department.	Validation department, IT Admin
7. Extract codes from Hospital System	The claim processing system has a code specialist that will extract the data from the hospital/ Clinic/ Physician/ Doctor system.	Code Specialist, hospital/ Clinic/ Physician/ Doctor
8. Identify type of code	The code specialist receives the ICD codes sent by the hospital/ Clinic/ Physician/ Doctor and identifies it type.	Code Specialist
9. Convert ICD9 to ICD10	The code specialist, uploads a general equivalence mapping file using which he converts the received ICD9 codes to ICD10 codes.	Code Specialist

USE CASE GLOSSARY (Cont.)

USE CASE	USE CASE DESCRIPTION	PARTICIPATING ACTORS
10. Update incomplete ICD10code	Some iCD9 codes do not have direct mapping to ICD10 codes. In such scenarios the hospital/ Clinic/ Physician/ Doctor need to manually update the ICD9 code to ICD 10.	hospital/ Clinic/ Physician/ Doctor, IT Admin
11. Verify claim rules	The updated ICD10 code is then sent for further processing. Here the claim rules are applied by the IT Admin, to check for other discrepancies like incorrect symptom and treatment mapping, duplicate claim, invalid date and amount etc.	IT Admin
12. Send for repricing	Post verification of the accuracy of the claim, the claim is forwarded by the IT Admin to the repricing team for readjusting the prices.	IT Admin, Repricing team
13. Update claim details	The repricing team adjust the amount and reprices the claim. Post repricing, the claim details are updated by the IT Admin in the database.	IT Admin, Repricing team
14. Send for financing	After approval and updation of the claim amount, the accepted claim is forwarded to the financing team for cheques to be drawn.	IT Admin, Finance Team
15. Send updated claim	The updated claim status 'Approved' or 'Rejected' is then sent to hospital/ Clinic/ Physician/ Doctor, Employers and Employees/ Patient	IT Admin, hospital/ Clinic/ Physician/ Doctor, Employee, Employer
16. Add claim to logs	The IT Admin, sends the claim details and saves it in a database in two separate tables- approved claim and rejected claim.	IT Admin, Audit Team
17. Send claim report	The IT Admin, generates periodic reports on the claim status and details which help other organization in statistical analysis.	IT Admin, Audit Team
18. Send notification and alerts	The claim alert system, generates notification and alerts and sends it to Employers, hospital/ Clinic/ Physician/ Doctor and Employees	Employees, Alert System, Employers, hospital/ Clinic/ Physician/ Doctor

USE CASE TABLE:

Actor / External Agent	Event	Trigger	Dependency	Responses
Patient/ Employee	Fills and submits claim form.	Ad-hoc: Patient fills the claim submission form and clicks on the submit button on the system or manually hands over the form to the hospital/ Clinic/ Physician/ Doctor after treatment.	Patient is registered in the health plan by the employer. The patient has also created an account and registered on the system.	The health claim is accepted by the hospital/ Clinic/ Physician/ Doctor in case of manual submission. While, the health form is sent to the hospital/physician/ clinic for health details update.
Hospital/ Clinic/ Physician/ Doctor	Enters patient health details that includes the ICD code, patient health report and patient information and sends it for verification.	Adhoc: The hospital/ Clinic/ Physician/ Doctor updates the health status of the patient when they come for treatment and submit the claim. The patients can submit the claim at an adhoc basis any time after their treatment is complete.	The patient has to submit the claim and provide their information. Also, health reports are created by the hospital once the patient has been treated.	The patient details and claim details are sent to the validation team to verify if the employee is registered in the insured plan by its employer.
Claim Collector	They collect all the claims that have been submitted.	Time: Every morning at 6am, all the claims that have been submitted are collected in the claim processing system database with status as New. The collecting process runs every 60 minutes.	The claim collector depends on the hospital system and patient to submit the claim correctly.	All the claims that have been marked as 'New' and are sent to the validation team for verification and the status is changed to 'Sent for validation'.
Validation Department	Verifies if the employee/ patient has been registered by its employer for the insured plan.	Adhoc: This verification is done once the team receives a new request from the hospital/ Clinic/ Physician/ Doctor through the claims collector.	The database contains all the employees that have been registered by the employers in the self insured plan.	The validation department provides the validation status. If the status is approved, the claim is sent to the claim processing system for further update. While if the validation was invalid, the department rejects the claim and informs the hospital/ Clinic/ Physician/ Doctor and the employee.

Actor / External Agent	Event	Trigger	Dependency	Responses
Code Specialist	They extract the codes from the hospital systems once the claim has been verified by the validation department.	Adhoc: After claim verification by the validation department, the claim status is updated to 'Valid'. The code specialist begins with the extraction of code details of these claims.	The code specialist depends on the validation department to verify and update the status of the claim.	The extracted details along with the codes are now ready for conversion.
Code Specialist	They Identify the ICD code if it is ICD9 or ICD10. They convert the ICD9 codes to ICD10.	Adhoc: The 'Valid' claims are then checked one by one. The ICD9 codes are converted to ICD10 code using GEM and the claim details are updated and saved.	General Equivalence Mapping is used to convert ICD9 code to ICD10 code and requires a specialist to read and convert the code.	The code is updated to ICD10 by the Code specialist and is sent to hospital/ Clinic/ Physician/ Doctor to verify the health information.
Hospital/ Clinic/ Physician/ Doctor	Verifies the ICD 10 code that it receives from the claims conversion department. They login to their systems and need to manually update the data fields for codes that are in incorrect ICD 10 format.	Ad-hoc: They verify the ICD10 code only after it has received the updated code from the code specialist.	Hospital/ Clinic/ Physician/ Doctor are experts in their field and they are also aware of the ICD10 codes.	The updated codes are in ICD10 format and have been verified. These are now sent to IT Admin for further processing.
IT Admin	Once the claims are converted to ICD10 code the IT Admin, verifies others aspects of the claim by applying claim rules.	Ad-hoc: They verify the claim only after it is converted to ICD10 code and verified by the hospital.	The claim rules are a set of rules that involves checking against duplicity, amount insured and correct reimbursement of claim depending on the treatment of disease.	The verified claim is then sent to the repricing team for financial calculations and repricing.
IT Admin	Updates the claim details in the database and send the updated claim amount to the financing team.	Ad-hoc: The claim details are updated only after the repricing team reprices and updates the claim amount.	The repricing department has to send the correct values of the claim after repricing.	The repriced claim is sent to the finance team for drawing cheques and handle the financial aspects related to the claim.

Actor / External Agent	Event	Trigger	Dependency	Responses
IT Admin	Updates the claim details and claim status in the system for users to verify.	Ad-hoc: The claim details are updated only after the repricing team reprices and updates the claim amount. This completes the claim processing and the status is displayed as successful.	The repricing department has to send the correct values of the claim after repricing and the claim that is being updated, was initially present.	The updated status of the claim along with its details are available in the system for users to view and update.
IT Admin	Adds the updated claim to the log monitoring system.	Ad-hoc: Once the claim has been approved or rejected the status of the claim is updated, and according to this status of the claim, the claim details are logged.	Each claim is either logged in under Approved claims log or under Rejected claims log.	The accepted and rejected claim logs are used by the Audit and Compliance system to verify the history of all the claims.
IT Admin	Sends claim reports	Time/Ad-hoc: IT Admin generates reports on a periodic basis.	The claims are saved in the database. Time triggered queries are run which extract information out of those.	The report generated is used by various parties to monitor claim details, perform statistical analysis etc.
IT Admin	Sends claim update notifications and alerts.	Time/Ad-hoc: IT Admin sends notifications to all concerned parties about the status and details of the claim that has been processed.	The notifications are sent only after the claim has been processed.	The notification and alerts generated are sent to the Employee/ Patient, Hospitals/ Clinics/ Doctors/ Physicians and the Employers.

USE CASE NARRATIVE:

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Date: 09/30/2015

Use – Case Name	Claim Status Notification	Use Case Type Business Requirement
Use Case – ID:	CPS_1.0	
Priority	High	
Source	Requirement_CPS_R1.0	
Primary Business Actor	IT Admin	
Other Participating Actor	Employee/ Patient, Hospitals/ Clinics/ Doctors/ Physicians and Employer	
Other interested stakeholders	None	
Description	This use case describes the event that would happen when the claim filled by the patient has been processed. Once the processing of the claim is complete the status of the claim will be sent to employee/patient, employers, hospitals/clinics/doctors/physicians as alerts and notifications.	
Precondition	Patient is registered in the health plan by the employer and has been verified as an enrolled user.	
Trigger	This event is triggered when the claim has been processed by the claim processing system.	
Typical Course Event	Actor Action	System Action/Response
	Step1: IT Admin logs into the system with his user credentials and click on the 'View all claims' button.	Step2: All the claims that have been processed by the system are displayed to the user.
	Step3: The admin selects the send notification option.	Step4: If the claim status of the processed claim is approved, notifications are sent to the the parties involved in the claim and their systems are updated.
	Step5: The 'Claims sent successfully' screen is displayed to the user.	Step6: Message sent value is saved as successfully sent in the database.
	Step7: The Employee/ Patient logs into his account with his credentials.	Step8: The claim status is updated in the view displayed to the Employee/ Patient along with the claim details and the generated bill.
	Step9: The hospital/clinic/doctor/physician logs into their account with their credentials.	Step10: The claim status, patient health details, bill generated, updated ICD code details are sent to the hospital/clinic/doctor/physician.
	Step11: The employer team logs into their account to check for their employee Claim status.	Step12: The employer is able to view all employee claim details.

Alternate Courses	<p><u>Alt Step 4:</u> If the claim status is Rejected, notifications are sent to the parties involved in the claim along with the reason of why the claim was rejected.</p> <p><u>Alt Step 4:</u> If the email sent does not reach the receiver or if the email system is down, save the value as 'Email Sending Failed' in the database, which will help the IT admin to look into the issue.</p> <p><u>Alt Step 8,10,12:</u> If there is an error in the calculation of the bill, the user will be displayed an email address that they can use to report problems.</p>
Conclusion	This use case concludes when the Employee/ Patient, Hospitals/ Clinics/ Doctors/ Physicians and Employer receives the alert messages successfully.
Post Condition	Once the alert messages are either sent successfully or face problems while sending, the status of the alert message is saved in a database, that can be used by the IT Admin to keep a check on the communication between the claim processing system and the other parties.
Business Rule	<ul style="list-style-type: none"> - The system allows the admin to log into the system - The system has access to all the details of the patient whose claims were submitted. - The system has email addresses of the Employee/ Patient, Hospitals/ Clinics/ Doctors/ Physicians and Employer stored in the database. - The IT Admin, can view the status of the notification. - The system notifications are sent using a trigger which runs periodically after a fixed duration of time. - The trigger checks for those claims that have status as updated, and mails are sent regarding those claims. - If the email address is incorrect, the admin will contact the hospital, employer or employee for updating the email address. - All the users that are registered, can view the claim details on the portal by logging in with their login credentials.
Implementation Constraints and Specifications	<ul style="list-style-type: none"> - The contact details may be updated due to which the notifications might not reach the concerned party. - The email trigger job may not work efficiently due to environment issues.
Assumptions	<ul style="list-style-type: none"> - All the parties involved are registered with the system. - The hospital/clinic/physicians/doctors must have prior knowledge on handling of the system. - The users should give a mandatory email address at the time of registration to receive live status updates. - The application would be a desktop application and would also be supported on limited smartphone devices.
Open Issues	<ul style="list-style-type: none"> - The system users need to be trained or provided with a user manual to be able to operate the system. - Users would require a desktop to gain access to the application.

USER INTERFACE: (For Claim Status Update and Notification)

(NOTE: Assuming that the users are already logged into the system and have valid user credentials)

- All the claims that have been processed are updated with the ClaimProcessStatus flag as Y
Claims that are yet to be processed have the ClaimProcessStatus as N

ClaimID ▲	ClaimeeName ▼	ClaimApprovalStatus	ClaimProcessStatus ▼
125400	Giacomo Guilizzoni	Approved	Y
125401	Marco Botton	Rejected	Y
125402	Mariah MacLachlan	Approved	Y
125403	Valerie Liberty	Pending	N

- Admin, selects the Send Notification option.
(Please Note: Triggers run after fixed intervals of time and can replace manual button click)

The screenshot shows the Health Care Ltd System interface. At the top, there is a navigation bar with icons for back, forward, and search, and the URL http://tools.healthcare.com/hcc/home. Below the navigation bar is the main header "Health Care Ltd System" with a green plus sign icon. The header includes a search bar and navigation links: HOME, NOTIFY (which is highlighted in white), SUBMIT A REQUEST, and CHECK YOUR EXISTING REQUESTS.

The main content area is titled "Notify Users". It features a search bar with a magnifying glass icon. To the right of the search bar is a button labeled "Notify All". Below the search bar, there are two sections: "Overview" (highlighted in green) and "Recent".

The "Overview" section displays two items:

- A card for claim 125400, claikee Giacomo Guilizzoni, with a "Notify" button to its right.
- A card for claim 125401, claikee Marco Botton, with a "Notify" button to its right.

- If the claim status of the processed claim is approved, notifications are sent to the the parties involved in the claim. Message sent value is saved as successfully sent in the database.

ClaimID ▲	ClaimeeName ▼	ClaimReferenceNo	EmailNotificationStatus▼
125400	Giacomo Guilizzoni	133241214	Y
125401	Marco Botton	243242356	Y
125402	Mariah MacLachlan	493487382	N
125403	Valerie Liberty	142734949	N

- The claim status, patient health details, bill generated etc. are updated in the view displayed to the:
 1. Employee/ Patient
 2. Hospital/clinic/doctor/pharmacy
 3. Employer, providing him information about the amount and the bill of the claim.

(Assuming that all individuals have access to the portal.)

The screenshot shows a user interface for managing financial transactions. At the top, there is a navigation bar with tabs: My Account, My Claims, My Health, My Bills, Services, FAQs, and a yellow-highlighted 'buttons' tab. Below the navigation bar, there are five sub-tabs: Overview, Manage, Claim, History, and MyProfile. The 'History' tab is currently selected, indicated by an orange background.

On the left, a 'Balance' section displays '\$99.95 USD'. To the right of the balance are three buttons: 'Recent activity' (blue), 'All activity' (grey), and 'Find transaction' (blue). Further right is a 'View demo' button with a camera icon.

Below the balance, there is a date range selector with two radio buttons ('Select' and 'All'), two date input fields ('4/17/2015' and '5/17/2016'), and a 'Show' button. Below the date range are filter options: 'All activity', 'Payments received', 'Payments sent', and 'More filters'. To the right of these filters is a dropdown menu labeled 'In All currencies'.

The main content area displays a table titled 'All activity - Jan 1, 2011 to May 17, 2011'. The table has columns: Date, ICD Code, Name, Claim Status, Details, Gross, Fee, and Net amount. The data in the table is as follows:

Date	ICD Code	Name	Claim Status	Details	Gross	Fee	Net amount
1/1/2016	N2N34HH	John Smith	Approved	XYZ Hospital	\$1200.00	\$20.00	\$1220.00
12/2/2015	H24GB5N	Jill Lauren	Approved	Aplha Clinic	\$1130.00	\$70.00	\$1200.00
11/29/2015	NE34HG3	Joshua Billings	Rejected	Dr Watson	\$1200.00	\$100.00	\$1300.00

At the top right of the table are 'Print' and 'Download' buttons.

- Employee/ Patient will also receive updates through text and emails as well.

Conclusion

The system deals with more precise codes providing potential benefits like fewer rejected claims, improved benchmarking data, improved quality and care management, and improved public health reporting. ICD-10 will advance healthcare in many ways, with benefits accruing across five major categories.

1. **Quality Measurement:** ICD-10-CM and -PCS offer greater detail and increased ability to accommodate new technologies and procedures. The codes have the potential to provide better data for evaluating and improving the quality of patient care. For example, data captured by the code sets could be used in more meaningful ways to better understand complications, design clinically robust algorithms, and track care outcomes.
2. **Public Health:** ICD-10-CM is more effective at capturing public health diseases than ICD-9-CM. It is more specific and fully captures more of the nationally reportable public health diseases, diseases related to the top ten causes of mortality, and diseases related to terrorism
3. **Research:** External cause of injury codes are also much more detailed in ICD-10-CM than in ICD-9-CM. This coding provides a framework for systematically collecting population-based information needed to fully describe and document how and where injuries occur. The codes are important for injury surveillance and for designing, implementing, and monitoring injury prevention and control programs.
4. **Organizational Monitoring and Performance:** ICD-10's increased specificity offers payers and providers the potential for considerable cost savings through more accurate trend and cost analysis. Greater detail can improve payers' abilities to forecast healthcare needs and trend and analyze costs. It will improve payers' and providers' ability to monitor service and resource utilization, analyze healthcare costs, monitor outcomes, and measure performance.
5. **Reimbursement:** The increased specificity of the codes will make it easier to compare reported codes with clinical documentation, check for consistency between diagnosis and procedure codes, and check for illogical combinations of diagnoses. The use of ICD-10-CM and -PCS thus may also help reduce opportunities for fraud and improve fraud detection capabilities. Fewer gray areas in coding will make it more difficult for dishonest providers to hide behind ambiguities in code descriptions or rules.

Thus, the ICD-10 compliant Claim Processing System that is designed is highly beneficial.