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Health Level 7, Fast Healthcare Information Resources; Electronic Medical Record

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Introduction

The Health Level 7, Fast Healthcare Information Resources; Electronic Medical Record software has been developed based on the published FHIR Resources at <https://build.fhir.org/ig/HL7/fhir-ipa/>. The product comes with experience dating back to 2002, when one of the directors was first employed in the healthcare sector's Information Technology department working on similar EMR software.

About the Project

As a patient your medical data is collected on many systems, and at different national and international locations. The IPA specification is designed to help patients access their data regardless of the system on which it was captured or the location of the patient. This is particularly useful in several scenarios such as;

- when you are travelling out of your home country and need your medical data while away
- when you are unconscious and cannot provide your medical history
- when you are at a local health facility using a different system than that of your regular facility

The system's main purpose is to be able to consolidate and share a person's health data. This is achieved by the system being implemented in FHIR IPA standards. These allow for compatible FHIR systems to exchange data with the system.

IPA is not meant to be a complete Electronic Medical Record system, instead it captures the most crucial elements of the EMR and pulls or pushes the required data from/to other systems in a standard format.

System Overview

ADMINISTRATION

The Administration module contains;

- User Management
- Update Procedure CPT Codes by uploading them from a CSV file
- Update ICD10 or other codes according to the ICD10-MIT file format

[International Patient Access \(IPA\)](#)

Facility UsersUpdate ProceduresUpdate ICD10

Logout

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RECEPTION

The receptionist view has limited functionality available but allows the job function to be executed in an easy manner and processes flow onto other departments and back seamlessly. One of the main functions is to manage the actual Patient records here, and the IPA specification provided a comprehensive set of resources for that. In this section we shall focus on only the Appointments as the other functions are covered in a more detailed section later.

INTERNATIONAL PATIENT ACCESS RECORD

Search patient@machuzu.com

Search

Create

Refresh

AppointmentsEncountersVitalsImmunisationDocument ReferenceFinancial

UIDc759701-318f-4405-b3f5-9a7718f3d044ACTIVEtrueEMAILpatient@machuzu.comGENDERFemaleBIRTH DATE2024-05-12 00:00:00

VITALS

BP12Temp76Pulse45Resp45Weight4Height3SpO296BMI45BSA54

ROUTINE

ID	Use	Type	System	Value	Period From	Period To	Assigner
5	visual	Driver's license number (DL)		8208316100040	2024-05-19 00:00:00	2024-05-19 00:00:00	
7	temp	Breed Registry Number (BRN)		void			
8	visual	Driver's license number (DL)		quoted	2024-05-19 00:00:00		

Create

View

Edit

Delete

New Assigner

MANAGING ORGANISATION

HUMAN NAME

TELECOM

ADDRESS

CONTACT PEOPLE

GENERAL PRACTITIONER

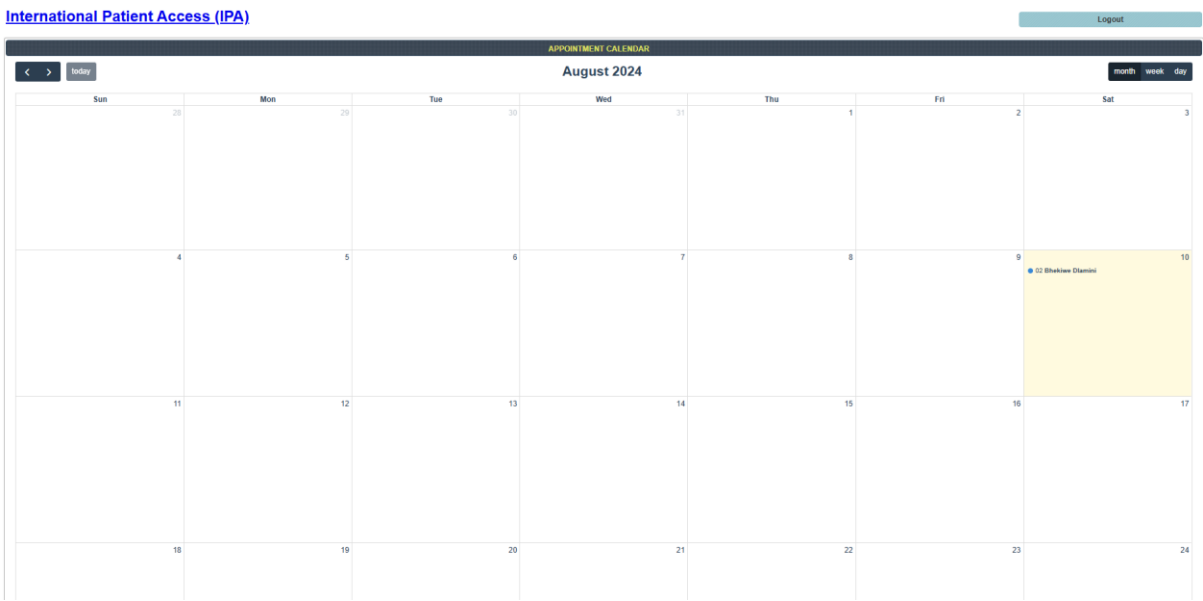
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Appointments

Appointments are created while capturing a comprehensive set of indicators.

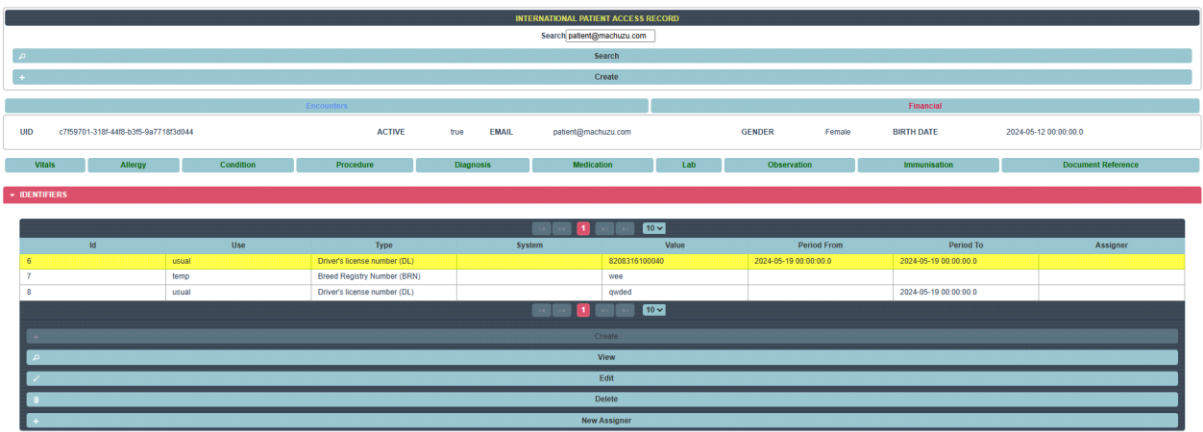
APPOINTMENT DETAILS	
Patient Email Address	patient@machuzu.com ▼
Title *	Bhekiwe Dlamini
From:	10/08/2024 00:00
To:	10/08/2024 01:00
All Day (see #1164):	<input type="checkbox"/>
Status *	planned ▼
Class *	observation encounter ▼
Type	Outpatient Kenacort injection ▼
Service Type	Planned Activity Groups ▼
Priority	timing critical ▼
Reason	Alcohol user ▼
Diagnosis Use	Chief complaint ▼
Diagnosis Rank	0
Admission Source	Select ▼
ReAdmission	Select ▼
Diet Preference	Select ▼
Special Courtesy	normal courtesy ▼
Special Arrangement	Wheelchair ▼
Discharge Disposition	Home ▼
Reset	Save

Once created, an Appointment appears on the Schedule as shown below, and is now accessible by nurses or doctors during consultation, procedures etc.



NURSE VIEW

After a patient is registered at Reception, they can be searched and their encountered started by a Nurse; who has access to all medical data and functions, unless specifically requested for limitations.



The Vitals, Allergies/Reactions and Immunisations are captured by the Nurse.

Vitals captured include BP, Temp, Pulse, Respiratory, Weight, Height, Spo2, BMI and BSA.

The Allergy management screen is shown below;

Allergies

IDENTIFIER

ID

6

USE

usual

VALUE

E208318100040

TYPE

Driver's license number (DL)

ALLERGIES

1

15

Description	Clinical Status	Verification Status	Type	Category	Criticality	Code	Onset Date	Age	Period From	Period To	Onset Range	Onset String	Recorded Date	Last Occurrence
Asthma	<input type="checkbox"/>	confirmed	allergy	environment	low		2024-08-01 00:00:00.0	2	2024-08-01 00:00:00.0	2024-08-02 00:00:00.0	2			

Create

View

Edit

Delete

REACTIONS

10

Substance	Manifestation	Description	Onset	Severity	Route	Note
No records found						

Create

View

Edit

Delete

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The Create New Immunisation screen is shown below;

CREATE IMMUNISATION

Status

completed

Status Reason

medical precaution

Vaccine Code

Adenovirus types 4 and 7

Occurrence Date

2024/08/10

Occurrence String

Recorded

2024/08/10

Primary Source

☒

Report Origin

Parent/Guardian/Patient Recall

Lot Number

34

Expiration Date

2024/08/31

Site

Right arm

Route

Injection, subcutaneous

Dose Quantity

40

Note

Reason Code

Travel vaccinations

Subpotent

☒

Subpotent Reason

Select

Program Eligibility

Select

Funding Source

Public

Reaction Date

Reaction Detail

Reaction Reported

☐

Save

Cancel

DOCTOR VIEW

In addition to functions that the Nurse performs, the Doctor works with additional modules.

The Create Condition screen is shown below;

CREATE CONDITION

Clinical Status *	Active
Verification Status *	Unconfirmed
Category *	Encounter Diagnosis
Severity *	Severe
Code *	Anxiety disorder of childhood OR adolescenc
Body Site *	Posterior carpal region
Onset Date	2024/08/10
Onset Age	0
Onset From	2024/08/01
Onset To	2024/08/17
Onset Range	
Onset String	
Abatement Date	
Abatement Age	0
Abatement From	
Abatement To	
Abatement Range	
Abatement String	
Recorded Date	2024/08/10
Note	

Save

Cancel

Each Condition can have Evidence associated with it as in the screen below;

CREATE EVIDENCE

Code *	Posterior carpal region
Note	Not too bad

Save

Cancel

The Create Procedure screen is shown below;

CREATE PROCEDURE	
Performed Period From	2024/08/10
Performed Period To	2024/08/10
Description	Demo Procedure
Performed Age	1
Performed Range	1-50
Reason Code	Percutaneous implantation of neurostimulator electrodes into neuromuscular componer
Body Site	Posterior carpal region
Procedure Status	In Progress
Status Reason	In Progress
Category	Diagnostic procedure
Code	Hand microscope examination of skin
Outcome	Successful
Complication	Decreased hair growth
Follow Up	Change of dressing
Note	
Save	
Cancel	

The Diagnosis screen is shown below. In the system and IPA, a Diagnosis is a type of Observation.

CREATE OBSERVATION	
Status	Registered
Diagnosis	Cysticercosis of central nervous system
Effective Date	08/10/2024
Issued	08/10/2024
Interpretation	Significant change up
Body Site	Posterior carpal region
Method	Acquisition technique
Note	
Save	
Cancel	

The Medication Administration module provides a comprehensive way to record medication administration. The following steps occur during medication administration.

General information is captured as in the screen below;

MEDICATION ADMINISTRATION

Status *	In Progress
Status Reason *	In Progress
Category *	Outpatient
Title	Demo Med Admin
Description	Good Med
Period From	2024/08/10
periodTo	2024/08/31
Reason Code *	Given As Ordered
Note	

Save

Cancel

After saving the previous screen, the following screen is displayed. This screen captures the actual medication administered.

CREATE MEDICATION

Code	Codeine phosphate
Status	active
Form	tablets
Amount	3
Batch Lot Number	23423423
Batch Expiration Date *	2024/08/10

Save

Cancel

Medication Dosages are then captured as in the below two screens that are captured respectively;

CREATE DOSAGE

Sequence	1
Text	
Additional Instruction	Half to one hour before food
As Needed	<input checked="" type="checkbox"/>
Site	
Route	
Method	
Max Dose Per Period Numerator	
Max Dose Per Period Denominator	
Max Dose Per Lifetime	

Save

Cancel

CREATE DOSE AND RATE

Type	Calculated
Dose Range Low	1
Dose Range High	10
Dose Quantity	2
Rate Ratio Numerator	1
Rate Ratio Denominator	20
Rate Range Low	20
Rate Range High	30
Rate Range Qty	21

Save

Cancel

The Create Lab screen is shown below;

CREATE LAB

Date2024/08/19

<div>HEMATOLOGY</div> <div><div>Blood Group and Rh</div><div>FBC</div><div>Malaria</div><div><input checked="" type="checkbox"/> Coombs Test</div><div>ESR</div><div>D Dimer</div><div>PT/INR</div><div>Hemoglobin</div><div>CD4</div><div>CD4/CD8/CD3</div></div>	<div>CHEMISTRY PROFILES</div> <div><div>Liquid Profile</div><div>LFT</div><div>KFT</div><div><input checked="" type="checkbox"/> Cardiac Profile</div><div>ART Profile</div><div>UECA Profile</div><div>CSF Analysis</div></div>	<div>ENDOCRINOLOGY</div> <div><div>BHCG</div><div>T4</div><div>TSH</div><div>Cortisol</div><div>HBsAg</div><div>Urine</div><div>Blood</div><div><input checked="" type="checkbox"/></div></div>	<div>SEROLOGY</div> <div><div>Syphilis RPR</div><div>Crag LFA</div><div>HIV 12</div><div>RDT</div><div>PCR</div><div>Viral Load</div></div>
<div>SPECIFIC CHEMISTRIES</div> <div><div>Ceruloplasmin</div><div>ALT</div><div>AST</div><div>Albumin</div><div>ALP</div><div>Ammonia</div><div>Amylase</div><div>Bilirubin</div><div>Direct</div><div>Total</div><div>Calcium</div><div>CO2</div><div>Phosphorus</div><div>Cholesterol</div><div>Cholinesterase</div><div>Haptoglobin</div><div>Creatinine</div><div>Creatinine Kinase</div><div>GGT</div><div>Glucose</div><div>HDL Cholesterol</div><div>LDL Cholesterol</div><div>Lipase</div><div>Total Iron Binding Capacity</div><div>Iron</div><div>LDH</div><div>Chloride</div><div>Potassium</div><div>Sodium</div><div>Magnesium</div><div>Urine Biochemistry</div><div>Drug Abuse Toxicology</div><div>Total Protein</div><div>PSA</div><div>Uric Acid</div><div>TotlgE</div><div>Aldolase</div><div>Triglycerides</div><div>HbA1c</div><div>CKMB</div><div>Lactate</div><div>Myoglobin</div><div>TroponinI</div><div>ProBNP</div><div>Ferritin</div></div>	<div>TUMOR MARKERS</div> <div><div>CA125</div><div>CA153</div><div>CA199</div></div>	<div>MICROBIOLOGY</div> <div><div>Culture Sense</div><div>Blood Culture</div><div>AFB Microscopy</div><div><input checked="" type="checkbox"/></div><div>Urine Microscopy</div></div>	<div>MOLECULAR (GENOMICS)</div> <div><div>DNA Paternity Test</div><div>DNA Kinship Test</div><div><input checked="" type="checkbox"/></div><div>DNA Siblingship Test</div><div>HIV Drug Resistance Test</div></div>
<div>ULTRASOUND</div> <div><div>Abdomen</div><div>Pelvis</div><div>Renal</div><div><input checked="" type="checkbox"/></div><div>Testicular</div><div>Thyroid</div><div>Vascular</div><div>Obstetrics</div><div>Lung</div><div>Musculoskeletal</div><div><input checked="" type="checkbox"/></div><div>Breast</div><div>Cerebrovascular</div></div>	<div>SPECIFIC PROTEINS</div> <div><div>CRP</div><div><input checked="" type="checkbox"/></div><div>Rheumatoid Factor</div></div>	<div>PHARMACOLOGY</div> <div><div>Carbamazepine</div><div>Digoxin</div><div><input checked="" type="checkbox"/></div><div>Phenobarbital</div><div>Amikacin</div><div>Vancomycin</div><div>Gentamicin</div><div>Phenytoin</div><div>Theophylline</div></div>	

Lab Results are captured when available as in the screen below;

ADD RESULT

Date	2024/08/10
Status *	Registered
Code *	R wave duration in lead V2
Category *	Blood Bank
Confirm Test Description	Demo Blood Test
Lab Result	Looks good
Reference	ABC424
Issued	2024/08/10
Conclusion	Good
Conclusion Code *	Lucio phenomenon

Save

Cancel

The Create Observation screen is shown below. If the Observation is not a Diagnosis the ICD10 diagnosis does not need to be selected with note that a Diagnosis specific Observation capture screen is provided.

CREATE OBSERVATION

Status	Preliminary	
Category	Survey	
Diagnosis	WHO_Full_Desc	
Code	R wave duration in lead I	
Effective Date	08/10/2024	
Issued	08/10/2024	
Interpretation	GeneticObservationInterpretation	
Body Site	Coronoid process of mandible	
Method	Provocation technique	
Note	Demo	

Save

Cancel

The Document Management module allows for the uploading and management of any related documents to a Patient or Encounter.

The Financial Management module screen is displayed below;

Accounts

MONITOR

ID6USEusualVALUE8208316100040TYPEDriver's license number (DL)

LIST ACCOUNTS

Id	Status	Billing Status	Type	Name	Service From	Service To	Description
11	open		DN	Demo Account	05/18/2024	05/18/2024	IPA Card Holder

Create

View

Edit

Delete

Charge Selected Item

Generate Invoice

View Invoices

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Here the Health Facility's administration is able to monitor all financial activities and further capture data including Charge Items and Invoices. These are captured based on a selected Account.

Below the Create Charge Item screen is displayed;

CREATE CHARGE ITEM

✕

Definition Uri	<input type="text"/>
Definition Canonical	<input type="text"/>
Status	Billable
Code	Unvorhergesehene Inanspruchnahme
Charge From	2024/08/10
Charge To	2024/08/10
Quantity	5
Body Site	Distal phalanx of third toe
Unit Price	100
Total Price	500
Override Reason	MEDICINE PICKUP ONLY
Entered Date	2024/08/10
Reason	Certain infectious and parasitic disease
Service	Routine Refill of ABCD
Product	Blood Pressure Cuff
Note	<input type="text"/>

Save

Cancel

For an Invoice, the user is requested to confirm generation of the Invoice based on the items linked to the Encounter.

GENERATE INVOICES

✕

Generate a new Invoice for the current Encounter?

Yes

No

General details are then captured are as displayed below;

CREATE INVOICE	
Status	<input type="text" value="Issued"/>
Cancelled Reason	<input type="text"/>
Date	<input type="text" value="08/10/2024"/>
Creation Date	<input type="text" value="08/10/2024"/>
Period From	<input type="text" value="08/01/2024"/>
Period To	<input type="text" value="08/10/2024"/>
Total Price Component	<input type="text" value="1300"/>
Total Net	<input type="text" value="1300"/>
Total Gross	<input type="text" value="1300"/>
Payment Terms	<input type="text" value="Cash"/>
Note	<input type="text" value="None"/>
<input type="button" value="Save"/>	
<input type="button" value="Cancel"/>	

Telemedicine

The system includes a Patient only view on which interactions with Doctors are managed and can be initiated. Messages are sent to Doctor and Patient when required.

Smart Health Card

Patients with EMR's that are within the system can optionally export their EMR to a Smart Health Card. We develop custom secure smart cards, containing the patient's health records.

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