



Amazon HealthLake

Making sense of health data

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The AWS ML stack

Broadest and most complete set of machine learning capabilities

AI SERVICES

Vision

Rekognition

Chatbots

Lex

Business tools

Personalize Forecast
Fraud Detector
Lookout for Metrics

Search

Kendra

Healthcare

HealthLake
Comprehend Medical
Transcribe Medical

Speech

Polly
Transcribe

Text

Comprehend
Translate
Textract

Contact centers

Contact Lens
Connect Voice ID

Code + DevOps

CodeGuru
DevOps Guru

Industrial

Panorama Appliance and SDK,
Monitron, Lookout for
Equipment, Lookout for Vision

AMAZON SAGEMAKER

Label data

Data collection prep

Store features

Detect bias and explain predictions

Visualize in notebooks

Pick algorithm

Train models faster

Tune parameters

Deploy in production

Manage & monitor

Manage edge devices

SAGEMAKER STUDIO IDE

CI/CD

ML FRAMEWORKS & INFRASTRUCTURE

TensorFlow, PyTorch,
Apache MXNet

Deep learning
AMIs & containers

GPUs

Inferentia

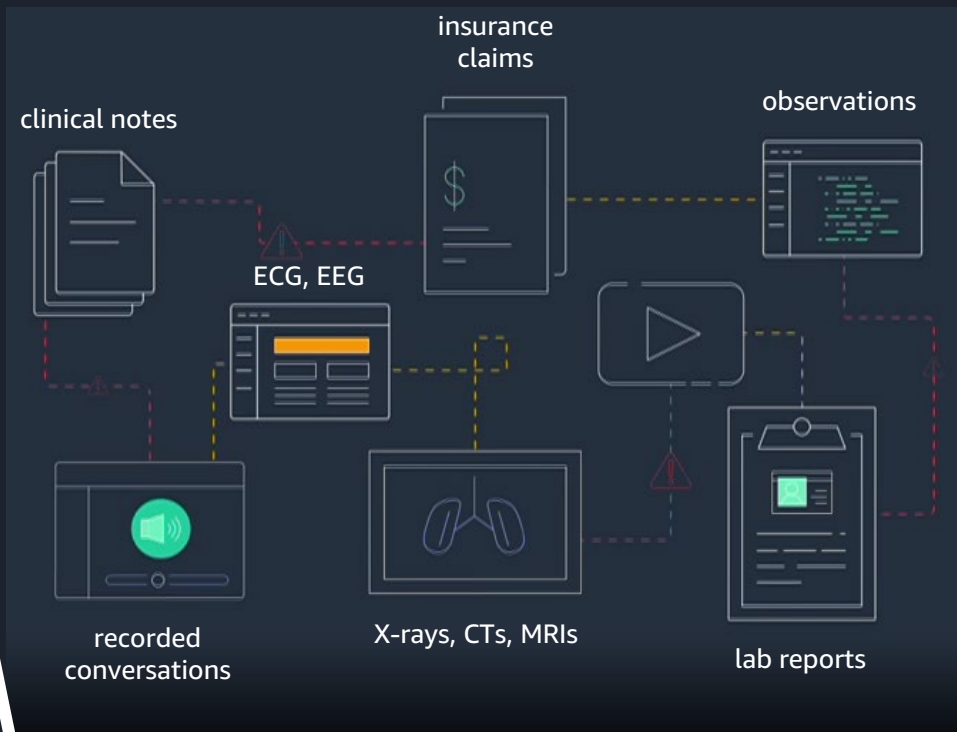
Elastic inference

FPGA

Digital transformation in healthcare

**<30
data points**

Today's clinical models



**200K-300K
data points**

Future ML models

Amazon HealthLake

A HIPAA-eligible service that enables healthcare providers, health insurance companies, and pharmaceutical companies to securely store, transform, query, and analyze health data at petabyte scale



IMPORT

Quickly and easily import medical records including clinical notes, lab reports, and more



STORE

Stored in the AWS Cloud in a secure, compliant, and auditable way



TRANSFORM

Tag and index unstructured data using specialized ML models



QUERY & SEARCH

Powerful query and search capabilities to ask questions of the data



ANALYZE

Understand relationships in the data with integrated analytics and ML capabilities



Making sense of health data

See how you can benefit from Amazon HealthLake



Easily extract meaning from health data

Built-in natural language processing (NLP) to automatically extract meaning from unstructured data such as prescriptions, procedures, and diagnoses in minutes. You can then easily search and query the data.



Analyze data and make predictions

Build machine learning models with Amazon SageMaker and apply Amazon QuickSight analytics to analyze and understand relationships, identify trends, and make predictions with health data.



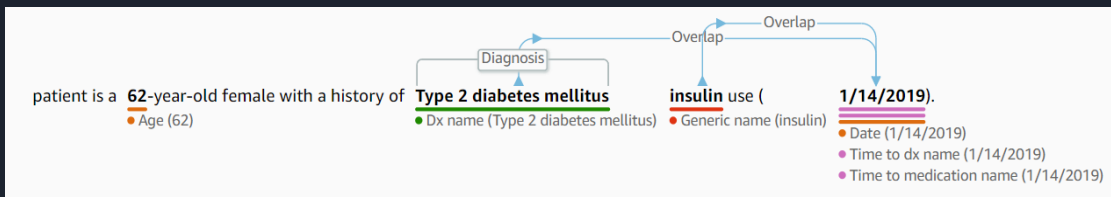
Support interoperability standards

Create a complete view of each patient's medical history and structure it in the Fast Healthcare Interoperability Resources (FHIR) standard format to facilitate the exchange of information across multiple applications

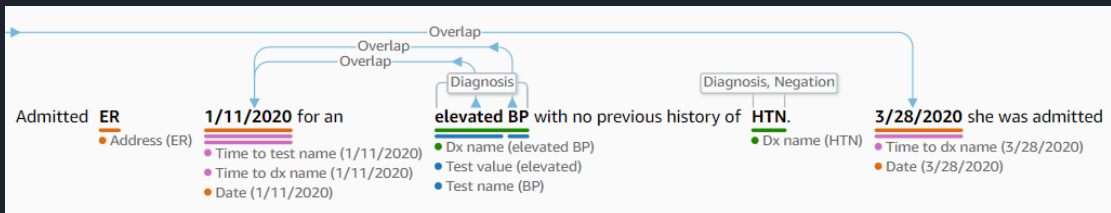
Extract meaning from health data

patient is a 62-year-old female with a history of Type 2 diabetes mellitus with insulin use (1/14/2019). Admitted ER 1/11/2020 for an elevated BP with no previous history of HTN. 3/28/2020 she was admitted for hypothyroidism and prescribed metformin 1000 mg take daily by mouth in evening. Follow up clinic visit (9/20/2020) with A1C results of...

Medical conditions



Abbreviations, and time stamps



```
{
  "Id": 22,
  "BeginOffset": 93,
  "EndOffset": 102,
  "Score": 0.9999784231185913,
  "Text": "1/14/2019",
  "Category": "TIME_EXPRESSION",
  "Type": "TIME_TO_DX_NAME",
  "Traits": [],
  "Attributes": [
    {
      "Type": "DX_NAME",
      "Score": 0.9177364706993103,
      "RelationshipScore": 0.5882568955421448,
      "RelationshipType": "OVERLAP",
      "Id": 8,
      "BeginOffset": 47,
      "EndOffset": 71,
      "Text": "type 2 diabetes mellitus",
      "Category": "MEDICAL_CONDITION",
      "Traits": [
        {
          "Name": "DIAGNOSIS",
          "Score": 0.9727892875671387
        }
      ]
    }
  ]
}
```

Assign medical codes to text

"METFORMIN 1,000 mg tablet E 1 AND 1/2 TABLETS BY MOUTH IN THE MORNING..."

RxNorm

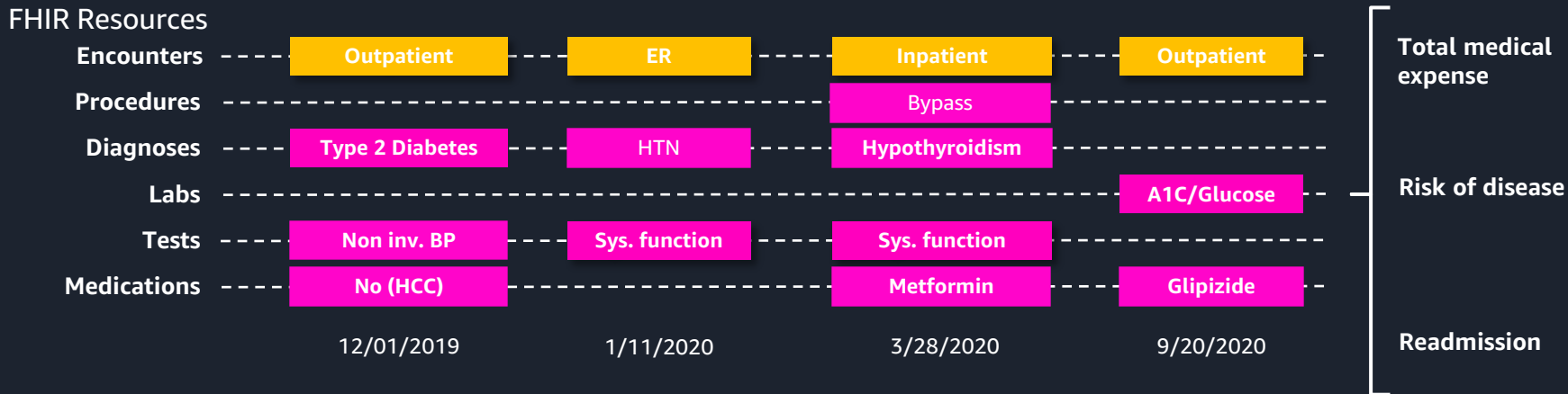
metFORMIN		GLUCOPHAGE	
Top inferred concepts		Top inferred concepts	
861004	Metformin hydrochloride 1000 MG Oral Tablet 0.9904 score	151827	Glucophage 0.9542 score
1243020	Linagliptin 2.5 MG / Metformin hydrochloride 1000 MG Oral Tablet 0.8243 score	861006	Metformin hydrochloride 1000 MG Oral Tablet [Glucophage] 0.6886 score
1807894	Osmotic 24 HR Metformin hydrochloride 1000 MG Extended Release Oral Tablet 0.7614 score	861008	Metformin hydrochloride 500 MG Oral Tablet [Glucophage] 0.6843 score
1807888	Modified 24 HR Metformin hydrochloride 1000 MG Extended Release Oral Tablet 0.7532 score	860977	24 HR Metformin hydrochloride 500 MG Extended Release Oral Tablet [Glucophage] 0.4097 score
861007	Metformin hydrochloride 500 MG Oral Tablet 0.7297 score	861012	Metformin hydrochloride 850 MG Oral Tablet [Glucophage] 0.3626 score

"Type 2 diabetes mellitus with hyperglycemia, without long-term current use of insulin (HCC)..."

ICD-10

Type 2 diabetes mellitus	
Top inferred concepts	
E11.65	Type 2 diabetes mellitus with hyperglycemia Score: 0.7905
E11.9	Type 2 diabetes mellitus without complications Score: 0.7638
E11.22	Type 2 diabetes mellitus with diabetic chronic kidney disease Score: 0.7353
E11.42	Type 2 diabetes mellitus with diabetic polyneuropathy Score: 0.7144
E11.621	Type 2 diabetes mellitus with foot ulcer Score: 0.6959

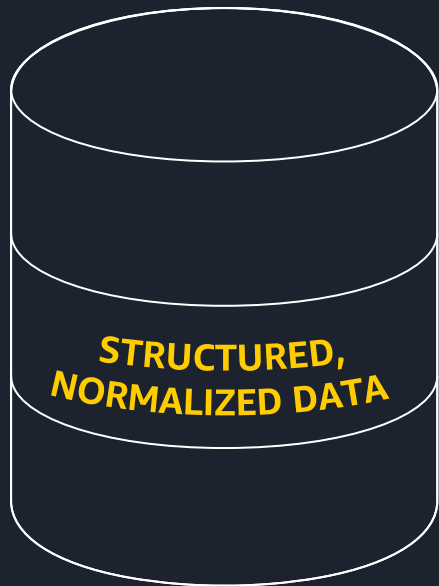
Present a chronological view of medical events



DERIVE TRENDS

Having a complete view of your newly structured data leads to better clinical decisions

Analyze data and make predictions



Amazon SageMaker



Amazon QuickSight



3rd party applications

IDENTIFY TRENDS

Easily search and query the data
Develop interactive dashboards

MAKE PREDICTIONS

Create predictive models, like predicting
Sepsis in a hospital ICU

SHARE DATA SECURELY

Healthcare providers and patients alike
can easily share and access their data

Support interoperability



Connector partners to help you get started



One click access to partners from the Amazon HealthLake console

How it works



Structured & unstructured data in FHIR format*

* Use an Amazon HealthLake connector partner to convert data to FHIR



Create API

Update API

Delete API

Amazon HealthLake

Structure

Tag and Index

FHIR v4 resource definitions

Medical NLP

Search and Query

Search API

Read API

Export API



Amazon SageMaker



Amazon QuickSight



3rd party applications

Top 3 Amazon HealthLake Use cases



Population health management

Analyze population health trends, outcomes, and costs to identify the most appropriate intervention for a patient population with pre-trained ML algorithms.



Improving quality of care

Close gaps in care, improve quality, and reduce cost by bringing together a complete view of a patient's medical history.



Optimize hospital efficiency

Informed by thousands of data points, machine learning models help hospitals improve efficiency and reduce hospital waste.

Care insights at a population-level



CHALLENGE

In the wake of COVID-19, the Chicago Department of Public Health (CDPH) needed a way to bring together desperate data across the city's hospitals in order to better understand COVID care status and hospital capacity.

SOLUTION

Rush University Medical Center created a data analytics hub, pulling together data from across 17 of Chicago's hospitals using Amazon HealthLake to store the data in FHIR format in order to create a dashboard of key population health metrics and to perform queries and analysis on top of the structured data.

BENEFIT

The Chicago Department of Public Health (CDPH) now has greater visibility in to patient admissions, discharges and transfers, electronic lab reporting, hospital capacity, and clinical care documents of COVID-19 patients receiving care in and across Chicago hospitals.

Get Insights and Drive Healthcare Decisions Faster



Rush University Medical Center

Rush University Medical Center is a nationally ranked academic medical center located in the Illinois Medical District neighborhood of Chicago, Illinois

“Amazon HealthLake was an integral part of both our COVID-19 response and our efforts to address health inequities. It has enabled us to quickly store disparate data from multiple data sources in FHIR format in order to gain critical insights in to the care of COVID-19 patients. We have also used HealthLake’s integrated natural language processing extracted information such as medication, diagnosis, and previous conditions from doctors’ clinical notes and enriched patient records to examine barriers to health care access, providing our researchers additional data points for analytics. With the HealthLake API, we created a mobile app to provide insights into care gaps across the West Side of Chicago. Amazon HealthLake enables us to accelerate insights and drive decisions faster to better serve the Chicago community.”

Bala Hota, MD, Vice President, Chief Analytics Officer, Rush University Medical Center

Get deeper insights to improve patient care



Cortica

Cortica is a leading provider of advanced neurological therapies for children with autism and other developmental differences. We offer in-home, in-clinic, and telehealth services that empower families to achieve long-lasting, transformative results.

“At Cortica, we’re on a mission to revolutionize healthcare for children with autism and other developmental differences. In a matter of weeks rather than months, Amazon HealthLake empowered us to create a centralized platform that securely stores patients’ medical history, medication history, behavioral assessments, and lab reports. This platform gives our clinical team deeper insight into the care progression of our patients. Using predefined notebooks in Amazon SageMaker with data from Amazon HealthLake, we can apply machine learning models to track and prognosticate each patient’s progression toward their goals in ways not otherwise possible. Through this technology, we can also share HIPAA-compliant data with our patients, researchers, and healthcare partners in an interoperable manner, furthering important research into autism treatment.”

Ernesto DiMarino, Head of Enterprise Applications and Data, Cortica

Gain insights to guide personalized treatment



CureMatch

CureMatch, Inc. is a San Diego-based digital health company focused on personalized medicine and combination therapy in oncology. CureMatch's Decision Support System guides oncologists in the selection of cancer drugs that are customized for individual patients based on their molecular tumor profile by providing actionable intelligence towards advanced cancer treatment options.

“With the use of the HealthShare Message Transformation Service by InterSystems and Amazon HealthLake, we will be able to access and transform molecular profile data from the EHR into FHIR to run advanced analytics and algorithms, providing clinical decision support and guidance on treatments to improve patient outcomes.”

Philippe Faurie, Vice President of Professional Services at CureMatch

Improve hospital operational efficiency

The logo for MEDHOST, featuring the word "MEDHOST" in a bold, blue, sans-serif font. The letter "O" is replaced by a solid blue circle. A registered trademark symbol (®) is located to the upper right of the text.

MEDHOST

MEDHOST provides market-leading enterprise, departmental and healthcare engagement solutions to more than 1,000 healthcare facilities. Its integrated product portfolio includes intuitive, cloud-based clinical, financial and operational solutions, including YourCare Everywhere, a robust health and wellness consumer engagement platform. .

“The vast majority of MEDHOST’s more than 1000 healthcare facility customers want to develop solutions to standardize patient data in FHIR format and build dashboards and advanced analytics to improve patient care, but that is difficult and time consuming today. With Amazon HealthLake we can meet our customers’ needs by creating a compliant FHIR data store in just days rather than weeks with integrated natural language processing and analytics to improve hospital operational efficiency and provide better patient care.”

Pandian Velayutham – Sr. Director Of Engineering at MEDHOST

Drive precision medicine



Konica Minolta Precision Medicine (KMPPM)

Konica Minolta Precision Medicine (KMPPM) is a life science company dedicated to the advancement of precision medicine to more accurately predict, detect, treat and ultimately cure disease

"We are building a multi-modal platform at KMPPM to handle a significant amount of health data inclusive of pathology, imaging, and genetic information. Amazon HealthLake will allow us to unlock the real power of this multi-modal approach to find novel associations and signals in our data. It will provide our expert team of data scientists and developers the ability to integrate, label, and structure this data faster and discover insights that our clinicians and pharmaceutical partners require to truly drive precision medicine."

Kiyotaka Fujii, President, Global Healthcare, Konica Minolta & Chairman, Ambry Genetic

Support population health initiatives



Cerner

Cerner Corporation, a global healthcare technology company, is focused on using data to help solve issues at the speed of innovation - evolving healthcare to enhance clinical and operational outcomes, help resolve clinician burnout, and improve health equity.

"At Cerner we are committed to transforming the future of healthcare through cloud delivery, machine learning, and AI. Working alongside AWS, we are in a position to accelerate innovation in healthcare. That starts with data. We are excited about the launch of Amazon HealthLake and its potential to quickly ingest patient data from various diverse sources and transform the data to perform advanced analytics to unlock new insights and serve many of our initiatives across population health."

Ryan Hamilton, SVP & Chief Architect, Cerner

Improve health outcomes



Orion Health

Orion Health is a global, award-winning provider of health information technology, advancing population health and precision medicine solutions for the delivery of care across the entire health ecosystem.

“At Orion Health, we believe that there is significant untapped potential to transform the healthcare sector by improving how technology is used and providing insights into the data being generated

Data is frequently messy and incomplete, which is costly and time consuming to clean up. We are excited to work alongside AWS to use Amazon HealthLake deliver new ways for patients to interact with the healthcare system, supporting initiatives such as the 21st Century Cures Act designed to make healthcare more accessible and affordable, and Digital Front Door, which aims to improve health outcomes by helping patients receive the perfect care for them from the comfort of their home.”

Anne O'Hanlon, Product Director, Orion Health

Purpose-built and HIPAA-eligible services

AI and ML services for healthcare and life sciences use cases



Amazon HealthLake

Store, transform, query, and analyze health data in minutes



Amazon Comprehend Medical

Understand medical context with advanced text analytics



Amazon Transcribe Medical

Automatically convert medical speech to text



Amazon Textract

Easily extract text and data from virtually any medical document



Amazon Rekognition

Automate medical image and video analysis

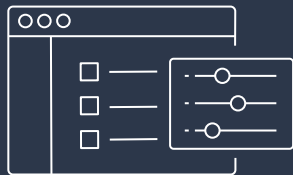
Getting started: Next steps



PRODUCT INFO

Overview, features, partners and pricing

www.aws.amazon.com/healthlake/



DOCUMENTATION

Developer guide and API reference

<https://docs.aws.amazon.com/healthlake/>



RESOURCES

Documentation, webinars and blog resources

www.aws.amazon.com/healthlake/resources/



WORKSHOP

Self-paced resource on importing, exporting and building dashboards

<https://amazon-healthlake.workshop.aws/>

Thank you