

Hospital Management System for The Mayo Clinic

MAYO CLINIC



PGP BA COURSE COHORT 1

Project By:

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Overview and Summary

The Mayo Clinic is an American nonprofit academic medical center currently based in three major locations, Rochester, Minnesota; Jacksonville, Florida; and Scottsdale, Arizona focused on integrated patient care, education, and research. Mayo Clinic holds the number 1 rank among hospitals in the United States.

It was opened on the 30th of September 1889. Over the years it grew in size and facilities. It increased the size of its premises and also the number of doctors it employs. The vast number of patients it treated made management of such a huge hospital an arduous task. The paperwork and storing of all patients' records was becoming unmanageable. It was then the management of the hospital decided to invest money in a hospital management software. The Hospital Management System is designed to manage all hospital operations.

The 1980s initiated transformative changes that set the course for the modern Mayo Clinic. As an early adopter of the Internet, Mayo Clinic has been recognized for its online communications to patients.

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Project Tasks

No.	Project Tasks	BA Knowledge Area Used	Supporting Tasks/Techniques Used
1	Identifying stakeholders – Create a list of stakeholders (as taught in Business Analysis Planning and Monitoring Knowledge Area)	BA Knowledge Area – Business Analysis Planning & Monitoring Task - Plan Stakeholder Engagement	Stakeholder List, Map, Persona – Onion Diagram
2	Describe the proposed system's workflow	Knowledge Area: Strategy Analysis Task - Define Future state for future process/To-Be	Process modelling (Swimlane diagram)
3	Write the in-scope and out-of-scope items for this software		
4	As a Business Analyst working on this project, find out the scope of the hospital management system. To find the scope you can use Use Case diagram (UML) or Context diagram	Knowledge Area: Strategy Analysis Task: Define change strategy	Scope Modelling – Context diagram
5	Write down the main features that need to be developed		
6	Draw an ER diagram of the system	Knowledge Area: Elicitation and Collaboration Task: Conduct Elicitation	Data Modelling - Crow Foot Diagram
7	Draw a data flow diagram for HMS	Knowledge Area: Requirement Analysis and Design Definition Task: Define design options	Data Flow Diagram
8	Write out the Functional and Nonfunctional Requirements for this software		
9	Draw a flowchart for the patients' admission process (using flowcharts). You can use any of the popular tools in the market like Microsoft Visio, Lucid Chart, Creately, Pidoco, or Balsamiq	Knowledge Area – Requirement Analysis and Design Definition Task – Specify and Model Requirement	Process Modelling - Flow Chart
10	Draw wireframes or mock screens for any 2 of the features namely home page and patient registration	Knowledge Area: Requirement Analysis and Design Definition Task: Define design options	Prototyping

screen. Students can draw wireframes for any other feature as deemed fit by them. (Use the technique prototyping or wire framing that is taught in the training). You can use any of the wireframing tools like Microsoft PowerPoint, Microsoft Word, Balsamiq, Sketch, Adobe XD, Adobe Illustrator, Figma, UXPin, InVision Studio, InVision Freehand, or Moqups

BA Approach

Agile Methodology is used to develop online system for Library Management. Because,

- It is a rapid way of development of software, so client satisfaction is high.
- Client satisfaction is emphasized that means interaction with client is high so less chance of product failure.
- There is a good communication between developers and clients.
- It is very flexible that even late changes in requirements are adopted without any problems.

1.1 Business Analysis Core Concept Model (BACCM)

Need	<ul style="list-style-type: none"> As the clinic size and facilities were increasing, managing such volume with paperwork was a difficult task. The need is to have an hospital management software that can help the clinic to manage all the hospital operations.
Change	<ul style="list-style-type: none"> The change is to move all the paperwork and manual work to a system that can record and manage all the data digitally and reduce the staff load. The new system will help in reducing the hospital operating cost and saving patients' time with online record management and patient communication.
Solution	<ul style="list-style-type: none"> The solution is to develop an hospital management system that can facilitate patient registration, patient appointments and reminders, bed occupancy details, billing info, lab tests and reports, staff management and insurance. The data will be stored on cloud and thus eliminating the need of paperwork and manual efforts
Context	<ul style="list-style-type: none"> The context leading to change is that due to the increase in hospital size and facilities, the patients data has also increased. The current system is not efficient to store and manage such huge data.
Value	<p>The value add with new system are:</p> <ul style="list-style-type: none"> Reduced operating costs of the hospital Reports provided to senior management for better decision-making Saves patients' time Keeps patients' medical records secure and stored in cloud Keeps track of empty and filled beds in the hospital Easy access to patient data Reduced documentation in the hospital
Stakeholder	<p>External stakeholders:</p> <ul style="list-style-type: none"> Supplier Project Manager Implementation SME Operational IT team Testers <p>Internal stakeholders:</p> <ul style="list-style-type: none"> Hospital staff and managers Doctors and nurses Patients Medical team Labs attendants Business Analyst

Requirement Classification Schema: -

1. Business Requirements – A hospital management system to manage operations, store records, and generate reports.

2. Stakeholder Requirement –

- Reduce operating costs.
- Provide reports to senior management.
- Track of availability of beds.
- Reduce paper-based documentation.
- Online appointment and registration for patients.
- Store and secure patient's data.

3. Solution Requirements –

Functional Requirements	Non-Functional Requirements
Database: MySQL Database to be used since it is open source and free.	Availability: The system shall be available all the time.
Operating System: Shall be Windows 2016	Usability: The screens should be self-explanatory and very user friendly.
Web-Based: The system shall be a web-based application	Response Time: The system shall give responses in 1 second
Capacity: The System must support 500 people using it at a time	
Errors: The system shall keep a log of all the errors	
Availability: The system shall be available all the time	

4. Transition requirements: The users of the system should be trained enough to use it efficiently. As there will be reduced or no paperwork involved in the processes so everyone from patient to doctors or staff to lab attendants should have access to portable electronic devices (mobile, tablets, or laptops) and internet connection.

Identifying stakeholders - Create a list of stakeholders

RACI Matrix is used for identifying the responsibility of each stakeholder involved in the process :

- **Responsible (R):** the persons who will be performing the work on the task
- **Accountable (A):** the person who is ultimately held accountable for successful completion of the task and is the decision maker
- **Consulted (C):** the stakeholder or stakeholder group who will be asked to provide an opinion or information about the task
- **Informed (I):** a stakeholder or stakeholder group that is kept up to date on the task and notified of its outcome.

Stakeholders	Responsible (R)	Accountable (A)	Consulted (C)	Informed (I)
Supplier	R			
Project Manager		A		
Implementation SME			C	
Operational IT team			C	
Testers	R			
Hospital staff and managers	R			
Doctors and nurses	R			
Patients				I
Medical team			C	I
Labs attendants	R			I
Business Analyst	R			

Proposed System Workflow

Process workflow diagram has been used to explain the system workflow of the proposed Hospital Management System. Workflow Process refers to a series of activities or tasks that need to be completed sequentially or in parallel to achieve a business outcome.

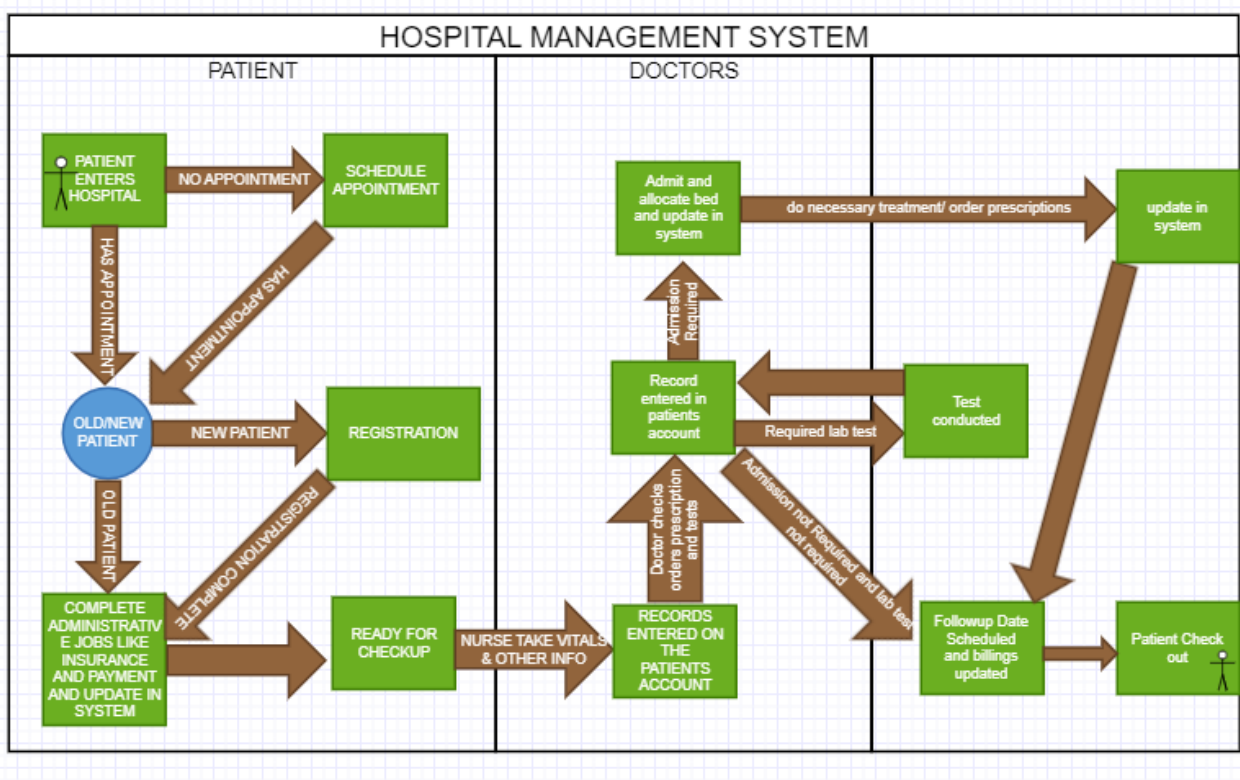


Fig: Process Flow Diagram

in-scope and out-of-scope requirements

In-scope requirements	Out-of-scope requirements
Appointment scheduling	Emergency department (ICU, Ventilators, Oxygen beds etc.)
Appointment reminders	Hospital payroll management
Patient registration	Visitor log
Add / delete / update/ maintain patient's record	Medical staffs details
Order medical prescription	
Order lab tests and lab test results	
Patient admission	
Bed occupancy management	
Staff (nurses and ward boys) management	
Report generation	
Billing and Insurance	

Context Diagram

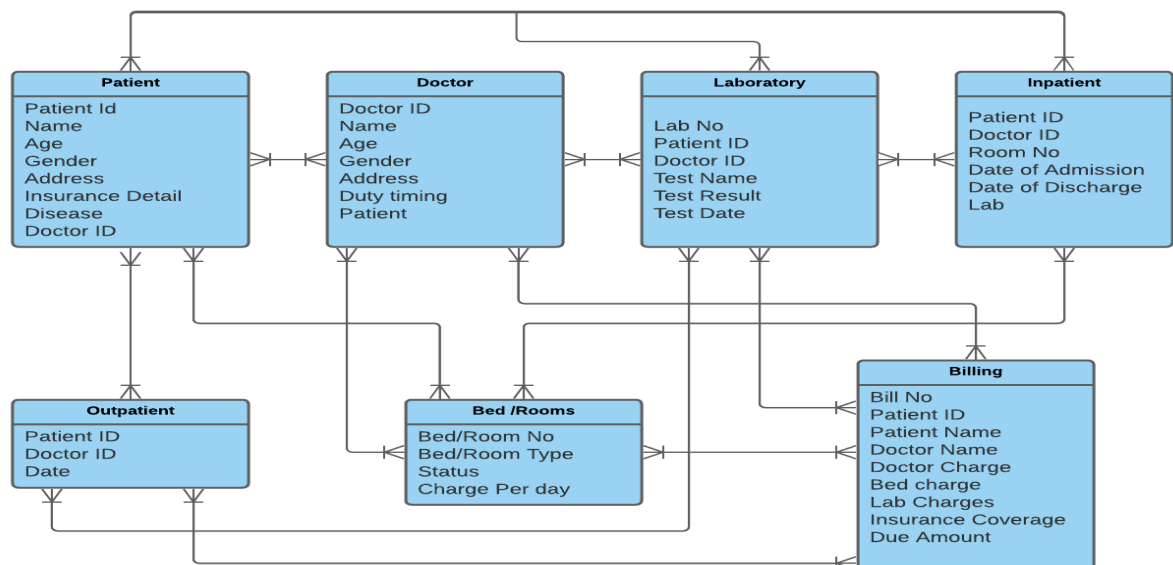


Hospital Features

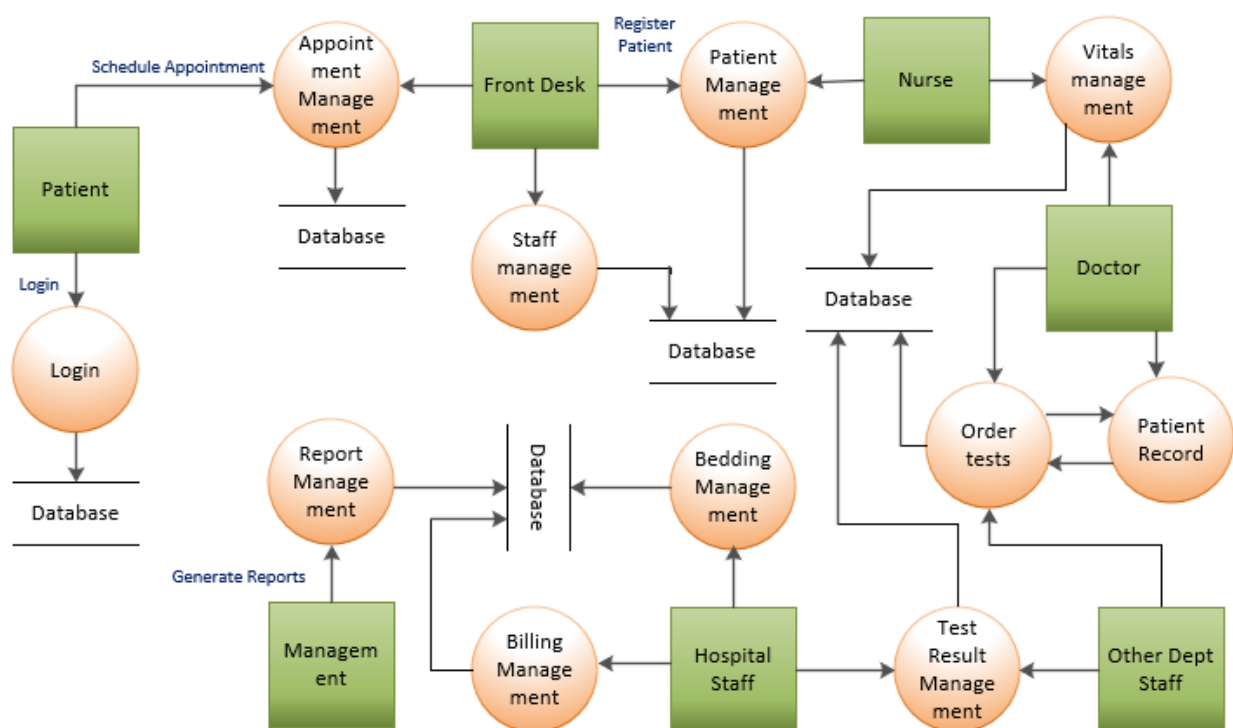
- Patient registration and login
- Slots availability and doctor appointment booking
- Appointment reminders via email or SMS
- Schedule / reschedule / Cancel doctor's appointment
- Patient ID generation by the registration staff
- Store patient's medical record into the system
- Doctor's medical and lab prescription
- Lab reports generation
- Staff allocation
- Free and allocated bed details
- Billing generation
- Patient Account Setting/Login
- Add/Update/Remove patient
- Maintain Insurance Details
- Mange/Maintain Doctor's profile
- Maintain Patient Records
- Manage Tests details
- Reports
- Instructions for next staff

Entity Relationship (ER) Diagram

An entity relationship diagram (ERD) shows the relationships of entity sets stored in a database.



Flow Diagram

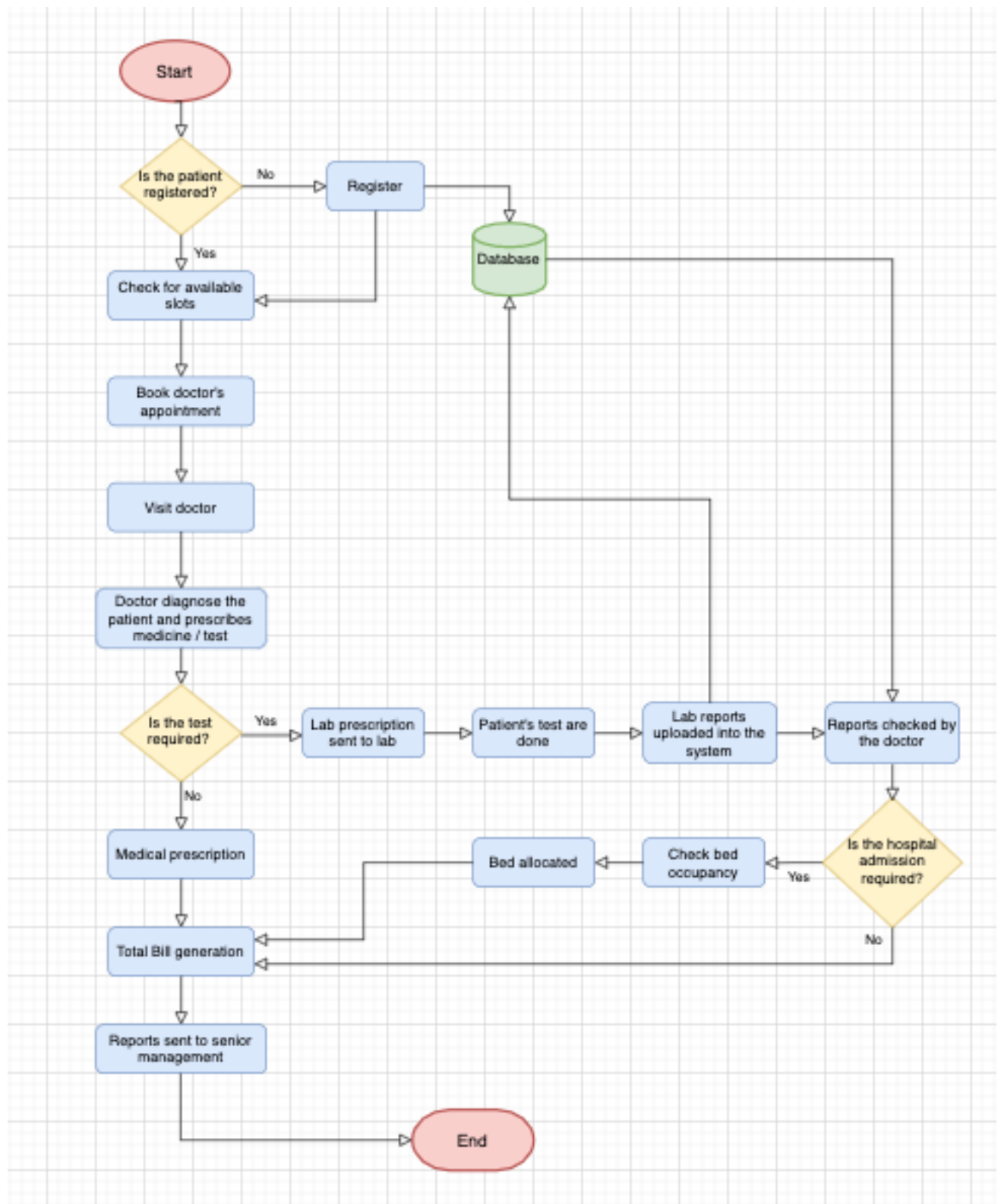


Functional and Non - functional Requirements

- Functional requirements: The hospital management system have the following functional requirements:
 - Patient registration screen
 - Appointment booking and reminder
 - Patient's record storage and retrieval
 - Doctor's medical prescription page
 - Lab reports results page
 - Bed occupancy details
 - Staff management
 - Report generation
 - Medical expenses and billing calculation
 - Insurance information

- Non - functional requirements: The hospital management system has the following non - functional requirements:
 - **MySQL Database** to be used since it is open source and free.
 - **Operating System**: Shall be Windows 2016
 - **Web-Based**: The system shall be a web-based application
 - **Response Time**: The system shall give responses in 1 second
 - **Capacity**: The System must support 500 people using it at a time
 - **Errors**: The system shall keep a log of all the errors
 - **Availability**: The system shall be available all the time
 - **Usability**: The screens should be self-explanatory and very user friendly. Management would not want employees not ordering from the system as they cannot understand the screens and data fields on screen. The users should not find the system cumbersome.

Flowchart for the patients' process




for Mayo Clinic


The screenshot shows the Mayo Clinic website with a blue header and a navigation bar. A prominent blue banner at the top reads "Covid 19 Updates Click here". Below this, a section titled "What you need to know to help you and your family stay healthy" provides key advice: "Stay home when you are sick.", "Cough and sneeze into your sleeve or a tissue. Dispose of tissue immediately and wash your hands.", "Wash your hands thoroughly with soap and water often", and "Keep surfaces clean and disinfect." Each piece of advice is accompanied by a relevant icon. At the bottom of this section, a blue box asks "Concerned You May Have COVID-19?" and offers a "Use Coronavirus Self Assessment Tool" button. The footer contains four columns of links: Visitors, Connect, Learn More, and Research & Education, along with copyright information and a "Give feedback" button.


COVID 19 Updates Click here


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What you need to know to help you and your family stay healthy

 Stay home when you are sick.

Cough and sneeze into your sleeve or a tissue. Dispose of tissue immediately and wash your hands. 

 Wash your hands thoroughly with soap and water often

Keep surfaces clean and disinfected. 

Concerned You May Have COVID-19?
Find out your risk with this online screening tool [Use Coronavirus Self Assessment Tool](#)

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Thanks.....