A Project Report

on

OXYGEN SUPPLY MANAGEMENT SYSTEM USING IOT

Submitted in partial fulfillment of the

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Bachelor of Technology in Computer Science and Engineering

Under the Supervision of
Dr. Ajay Shanker Singh

Professor

Department of Computer Science and Engineering
Submitted By

Ankit Kumar -18SCSE1010602

SCHOOL OF COMPUTING SCIENCE AND ENGINEERING

DEPARTMENTOFCOMPUTERSCIENCEANDENGINEERING

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SCHOOLOFCOMPUTINGSCIENCEANDE NGINEERING
GALGOTIASUNIVERSITY, GREATERNOIDA

CANDIDATE'S DECLARATION

I/We hereby certify that the work which is being presented in the project, entitled **"OXYGEN SUPPLY MANAGEMENT SYSTEM"** in partial fulfillment of the requirements for the award of the **BACHELOR OF TECHNOLOGY IN COMPUTER SCIENCE AND ENGINEERING** Submitted in the **School of Computing Science and Engineering** of Galgotias University, Greater Noida, is an original work carried out during the period of **JULY-2021 to DECEMBER-2021**, under the supervision of **Dr. Ajay Shanker Singh, Professor**, **Department of Computer Science and Engineering** of School of Computing Science and Engineering , Galgotias University, Greater Noida.

Ankit Kumar-18SCSE1010602

This is to certify that the above statement made by the candidates is correct to the best of my knowledge.

Supervisor (Dr. Ajay Shanker Singh, Professor)

CERTIFICATE

The Final Thesis/Project/ Dissertation Viva-Voce examination of **Ankit Kumar-18SCSE1010602** has been held on_____and his/her work is recommended for the award of **BACHELOR OF TECHNOLOGY IN COMPUTERSCIENCEANDENGINEERING**.

Signature of Examiner(s) **Signature of Supervisor(s)**

Signature of Project Coordinator **Signature of Dean**

Date:

Place:

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ABSTRACT

Oxygen, it’s spreaded all around us in the air that we breathe, it is something without which we can’t even live. In this duration of covid-19 pandemic the requirement of having oxygen is increased and in our country, there is enough oxygen but the main problem is to transport it to the hospitals on time, and it is because of communication gap between suppliers and hospitals, so we are planning to implement an idea that will work to reduce this gap using real-time tracking as we can monitor the movement of oxygen tankers, by gathering the requirements of oxygen at various locations, checking the availability of oxygen in inventory and by delivering it to someone who is in emergency, as soon as possible. To implement it successfully, we are using pressure sensor which publishes the value of oxygen remaining from location to MQTT broker, ESP32 Wi-Fi module, MEMS pressure sensor which enables the combination of accurate sensors powerful processing and wireless communication for example, Wi-Fi or Bluetooth, IFTTT and MQTT protocols.

Improving quality of life is one among the most benefits of integrating new innovations into medicine. Medical technologies such as less-invasive surgeries, proper monitoring systems, and better scanning equipment allow patients to recover soon and enjoy a healthy life. For good patient care in hospitals, assessment and management of patient’s fluid and oxygen need is that the

most fundamental thing required. The patient history will also be helpful if stored in the hospital's database. All most altogether hospital, an assist/nurse is liable for monitoring the saline fluid level and oxygen level continuously. But unfortunately during most of the time, the observer may forget to change the saline bottle at correct time due to their busy schedule. This may leads to several problems to the patients such as backflow Of blood, blood loss, drop oxygen level The design and implementation of patient IV fluid and oxygen flow controlling method employs liquid flow sensor, pressure sensor and pulse detector sensor The micro-controller (Node MCU) are presented here which has the ability to assist the health care provider to control the saline circulation rate and oxygen level by implementing wrist watch using IoT (Wi-Fi module) . The node microcontroller platform has been used as controlling unit for providing necessary control along with Wi-Fi module and wrist watch to monitor and control. To store data related to patients, API is used which displays their history or present details in a web page of the hospitals.

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Acronyms

LMO	Liquid medical oxygen
HTML	Hypertext markup language
IOT	Internet of things
css	Cascading style sheets

CHAPTER-1

Introduction

1.1 PURPOSE:

The most baleful problem is that, despite having enough oxygen, it's quite difficult to transport it on time to the needy one's or to the hospitals due to lack of proper communication between the hospitals and oxygen supplier plants. Various new methods and tools are used here in our project, to track the movement of oxygen cylinders and supply it to those who are in need. India faced a significant liquid medical oxygen (LMO) shortage when there was a sudden onslaught of Covid-19 crisis and most infected patients needed LMO support. Requests for oxygen cylinders flooded the social media. Government organizations, NGOs, and private sector quickly jumped to arrange LMO for the distressed victims. The Oxygen System Planning Tool informs healthcare decision-makers to procure the appropriate quantity and types of oxygen equipment, in a flexible, excel-based format. The tool offers a variety of support to health officials, procurement specialists and oxygen technology stakeholders seeking oxygen infrastructure recommendations and current oxygen demand estimation

1.2 OBJECTIVE:

i. To inform on the sudden demand for medical oxygen gas that arose during the pandemic situation.
ii. To understand the coordination of various stakeholders, like as the Governments, oxygen suppliers, and hospitals during the sudden situation

iii. Estimate oxygen demand at individual health facilities and aggregate this to map oxygen demand geographically and at various levels of the health system

iv. Provide health facility-level recommendations for appropriate oxygen source options based on facility characteristics, including proximity to known oxygen plants

v. Automate the calculation of distances between health facilities and oxygen plants to inform oxygen source options

vi. Estimate capital and operating costs for oxygen at each health facility, as well as aggregate costs for different administrative levels or nationally. Where available, indicative pricing for oxygen therapy products from the UNICEF Supply Catalogue is used.

vii. Generate equipment lists for each health facility

Viii Aid in planning placement of new PSA oxygen plants.

Chapter-2 Literature Survey

2.1PROJECT PERSPECTIVE

Oxygen, it is an important drug, and only few vendors in India are allowed to produce it. The process of oxygen production concentration with few manufacturers has resulted in cost escalations and an irrational supply of this. To have a fair market play, State Governments should encourage investment in the sector. Populous states such as Uttar Pradesh, for example, can set up oxygen units – one each in Western, Central, and the Eastern Uttar Pradesh. Other states can use the surplus capacity from these units.

Competence in oxygen manufacture and supply expertise makes an vast difference. Hence, existing medical oxygen suppliers having safe and timely supply practices should be encouraged.

Evaluation as Supply system: Most of the district-level hospitals do not have piped medical gas systems. Despite their heavy consumption, many district hospitals, even larger cities, have a single cylinder. They need evaluation for uninterrupted oxygen supply system is necessary at all district-level hospitals. Such an evaluation should be done at least every

five years or at an interval as decided by the health department to address demand and technology changes. Establishing Oxygen demand analysis and procurement system: Each district hospital should have a system of assessing/forecasting Oxygen gas requirements. Such an assessment should include monthly or seasonal variations in oxygen consumption. A review should also include the medical gas supplier's performance, and the district hospital should use such information for the procurement of medical gas. Oxygen monitoring system: Most district hospitals are ill-equipped to monitor uninterrupted oxygen supply resulting in unwanted casualties at the critical care areas. An effective alarm system-based monitoring system is necessary to supervise the oxygen supply in different hospital areas, especially in critical care areas, to address oxygen supply shortages, and that’s why we are using internet of things (IOT) here.

2.2. OVERVIEW OF PROPOSED SYSTEM

After examining a few paper supported the development of the automated saline monitoring system, it had been seen that a lot of complex circuit and modules were used which increase the value of producing. In some system GSM (Global system for mobile communication) system, Bluetooth module and keypad were used to monitor the system. In all the previous

system it had been seen that there's no automatic control of flow. The proposed system of this paper is to detect, indicate and control the flow rate of IV fluid and oxygen label accurately and give the signal to the doctor or nurse so that the amount of flow can be controlled using a wrist watch which is equipped with node MC for transfer of signals. Usage of pulse sensor decides the amount of flow of saline and oxygen flow. The diagram of proposed system is shown in figure 1.If there is any abnormal situation like overflow or saline bottle empty that will be indicated with the help of buzzer in the wrist watch. Sensors will be developed to determine the rate. Once pulse is detected the device will continuously check the flow rate and maintain a normal condition. A flow sensor will detect the water drop accurately. Errors reading are often determined by signal conditioning circuit and can be removed by an isolator circuit.

2.3 SIMULATIO OUTPUT USING PROTEUS SOFTWARE

Depicts the Simulation output using prote us software of a oxygen and IV control system that consists of the flow sensor, pressure sensor, pulse rate sensor and LCD display. The system has been proposed using Node microcontroller platform contains General-purpose input/output (GPIO) is a pin on an IC (Integrated Circuit). It is often either input pin or output pin, whose behavior are often controlled at the run time Node MCU Development kit provides access to those GPIOs of ESP8266. The only thing to require care is that Node MCU Dev kit pins are numbered differently.

CHAPTER-3 SYSTEM REQUIREMENTS

Hardware Interface:

Device : Laptop, Smart Phones or Desktop

Computer Processor : CORE i3 (3rd Gen minimum) and above

RAM : 4GB(minimum) and above

Hard disk : 100 GB (minimum) and above

Software Requirements:

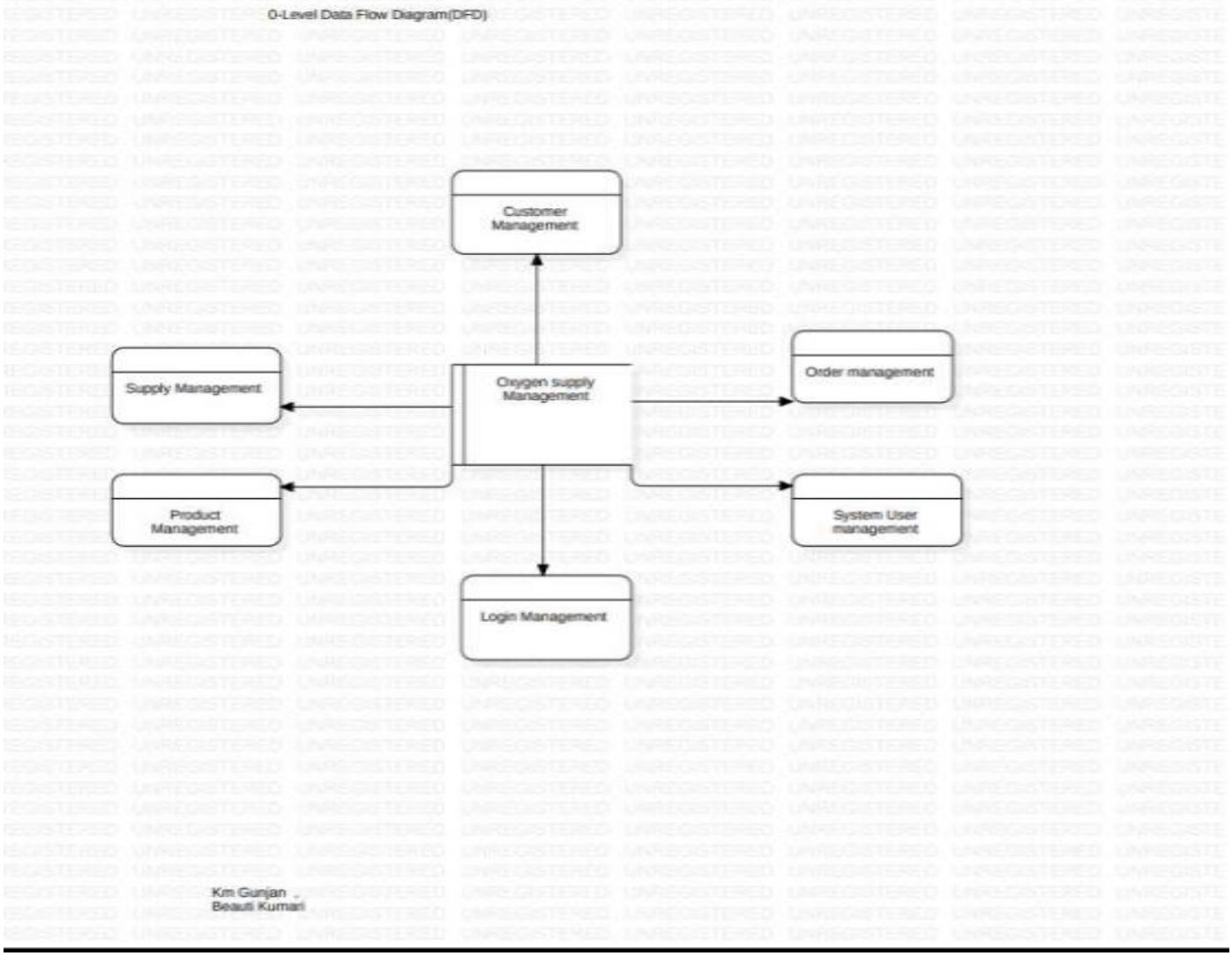
Operating System: Windows, Linux – Ubuntu

Platform: Jupyter, Spyder, Google Collab, Anaconda prompt, Virtual Box

Languages: Python

Web browsers: Chrome, Firefox

Data Flow Diagram:



BLOCK DIAGRAM OF PROPOSED SYSTEM

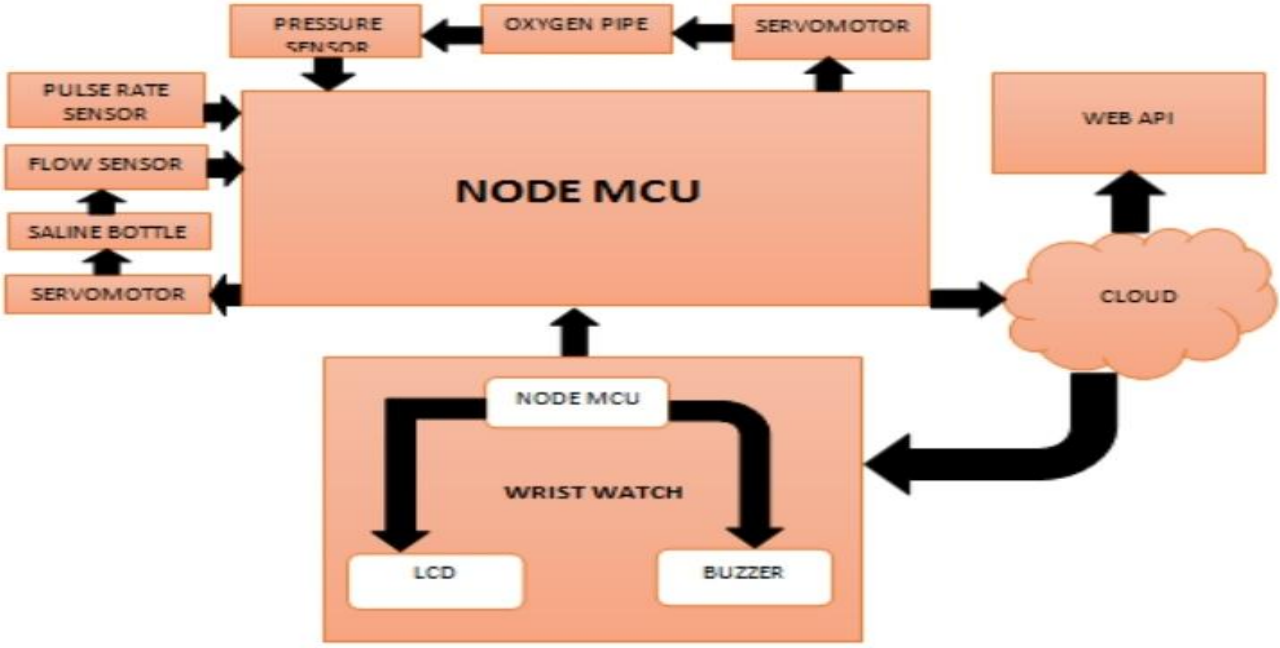


Fig 1.blockdiagram of proposed system

PROGRAMMING FLOW DIAGRAM

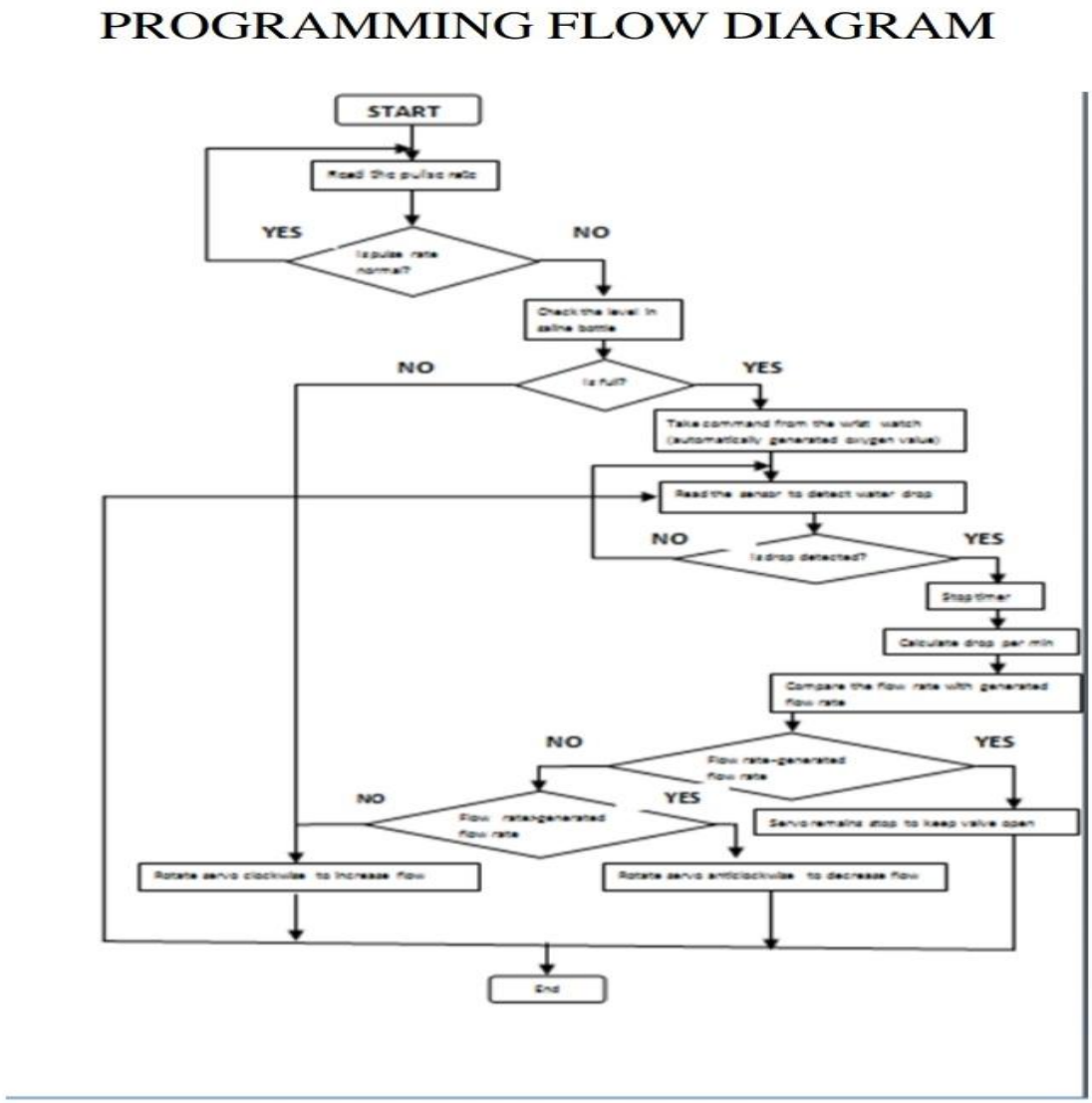
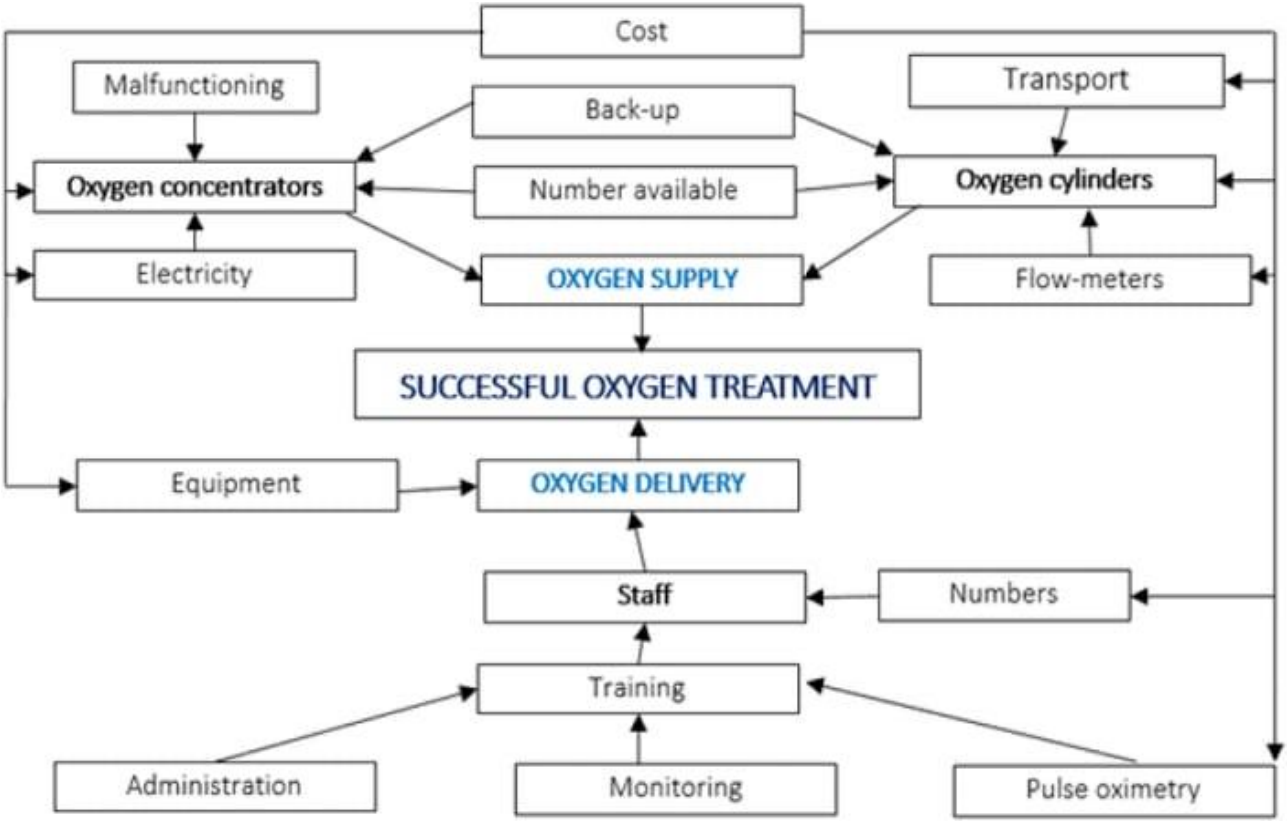


Fig 5.Flow for IV fluid control

CLASS DIAGRAM



Chapter-5 Results and Discussions Vulnerabilities

In the event the LOX system needed filling but the path to the LOX storage is blocked by wreckage, what are the other options? Many hospitals have lines leading to the outside of the facility at a different location from the LOX system and easily accessible from the street, in order to perform an emergency back-fill . An oxygen tanker truck can attach to these lines and provide gaseous oxygen to the entire system until the LOX is refilled. In a survey of 35 Ohio hospitals, Stoller et al reported that only 63% of the hospitals had an external connector for emergency back-fill of the facility's oxygen system.10 They also demonstrated that hospitals with a reserve liquid supply frequently used the same delivery piping as the main system. In this instance, if the delivery pipe is damaged by construction, the reserve tank is of no value. The absence of such a system negates one of the 2 backup plans, leaving only cylinders to supply the entire facility.

Disaster Assistance

When a disaster or mass casualty event occurs, the belief from the public is that the federal government will help provide assistance to the affected areas if the state and local government's disaster capabilities are overwhelmed. FEMA and the Centers for Disease Control and Prevention are 2 federal agencies that provide assistance and guidelines for planning for a disaster. Neither of these agencies have a plan for management of oxygen supplies, in or out of the hospital setting. FEMA's main responsibility is to coordinate disaster recovery, though it usually requires a few days

to organize the effort. The Centers for Disease Control and Prevention maintains the SNS in areas around the United States, and is designed to respond more quickly.9 The SNS can send their “12-hour push pack” of medications, medical supplies, and equipment to disaster areas within 12 hours of notification of need, but it does not contain oxygen. The SNS does not stockpile oxygen, but instead contracts with private vendors to deliver oxygen when needed. Vendors also have contracts with others who will be requiring oxygen deliveries during this time, which may hamper their ability to meet SNS needs quickly. For these reasons, hospitals must have an adequate backup plan.

Planning

Planning for a disaster in the hospital environment requires a coordinated effort from many different groups. Planning for oxygen needs and the “what ifs” that may occur during a disaster directly affecting a hospital requires the same coordinated effort. The department that is responsible for the LOX system, usually maintenance, as well as the caregivers applying oxygen to those in need, must have a comprehensive plan that addresses the many issues that could arise. Questions such as, What if we cannot get LOX deliveries? How long will our current LOX supply last? What if the LOX system is damaged? How much gaseous oxygen in cylinders do we have available? What size cylinders do we have, and how will they be distributed? What do we do when there are more patients than oxygen outlets? and What is the back-fill plan? are among the important questions that must be addressed during planning for a disaster.

Clearly all of the questions must be answered according to the hospital's current oxygen systems, the size of the facility, the type and magnitude of the disaster, the direct effect on the hospital structure and systems, and the surge size of people seeking treatment.

Chapter-6 Conclusion

Hence, we are here with the solution of eliminating the communication gap between oxygen supplier plants and hospitals or needy one’s, so that it can lead to fulfill the requirement of oxygen on time, especially in this duration of pandemic.

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