# Title of the Invention

Healthcare ATM (Any Time Medical care)

## Abstract

The Healthcare ATM (Any Time Medical Care) is a process of connecting a patient to a physician for diagnosis followed by prescription of drugs by the remotely located physician and auto dispensing of the prescribed free generic drugs at the location of the patient which is a Government Health Centre. The Healthcare ATM (Any Time Medical Care) would enable a patient to consult and to conveniently receive prescription medicines and over the counter drugs from medicine vending machine. The Healthcare ATM (Any Time Medical Care) model includes a multi-parameter monitor, remote dispenser, a communication network and an intelligent device in-built into the drug vending machine. The communication network system coordinates communication between the doctor, the patient and the Healthcare ATM (Any Time Medical Care) or remote dispenser.

## Field of Invention

The present invention relates to vending machines and more particularly to a process of drug dispensing through vending machine and a method of remote signalling the vending machine for drug dispensing via an intelligent device and inventory control through telemetry. The invention is of substantial value to deliver medical consultation and medicines in remote settings by utilising existing healthcare infrastructure. The "Healthcare ATM (Any Time Medical Care)" model aims to bridge the gap between demand of healthcare services and short supply for doctor/trained medical professionals in rural area by creating a virtual healthcare delivery system along with free generic essential medicines.

## Background of the Invention

There are two fundamental barriers to timely and quality healthcare access in India at an operational level. All other issues emerge out of these two issues:

1. **Shortage of trained human resource to deliver healthcare, primarily in rural areas:** India has substantially upgraded and increased healthcare infrastructure. However, despite all efforts there exists shortage of trained medical and paramedical staff at peripheral level. India currently has 0.51 doctors per 1000 population which is way less than the ratio recommended by World Health Organization (WHO) i.e. 1:1000. Furthermore Rural India has only 0.63 doctors (Allopathic + AYUSH) per 10,000 populations as compared to 16.98 in urban region[1]. As per High Level Expert

Group (HLEG) recommendations, even with additional availability of 3,10,000 doctors by the year 2022 the doctor population ratio could at best be 0.69:1000. At this rate of growth the envisaged target of 1 doctor per 1,000 populations is likely to be achieved not before 2027.

2. **Expenses made directly by the recipient at the point of health service delivery, including the major share which goes towards purchase of drugs**: Research has proven that about 80% of all out-of-pocket expenditure in healthcare in India, happens on Drugs and 70%-80% happens in an OPD setting". Since "prescription" follows "medical consultation", when medical consultation is suffering from perennial draught, how prescription can be advocated or regulated? Provision of medical consultation should ideally precede provision of medicines. The role technology can play is wider than book keeping software for drug inventory management and includes potential role in supply and facilitation in dispensation of drugs. Once supply is ensured, following consultation and rational prescription, the out of pocket expenditure could be greatly reduced for patients.

Currently, although there exist technology for transmission of patient health parameters to remote locations; and exist vending technologies for vending of general products; an appropriate combination of these has not been explored for patients consultation and drug dispensing. In this aspect, this innovation is unique and addresses unresolved issues.

## Object of Invention

- The principal object of the invention is to develop a model network of services using existing healthcare infrastructure clubbed with Healthcare ATM ( Any Time Medical care) to deliver medical consultation and medicines in  remote settings
- Healthcare ATM (Any Time Medical care) can be of utmost use in reducing the rates of medication errors and keeping proper track of the dispensed medicines.
- Another object of the invention is, unlike manual method where the pharmacist accepts the paper order, Healthcare ATM (Any Time Medical care) offer an automated method where Physician's prescription is remotely sent via a communication network to the ANM/MPHW (Auxiliary Nurse Midwife/Multipurpose Public Health Worker) at the remote centre and the order is automatically available to be processed.

- Healthcare ATM (Any Time Medical care) enables the prescribed medicines to be dispensed via an interface with the communication network and medical practitioner. This ensures that the right patient gets the right drug with the prescribed dose at the right time.
- Healthcare ATM (Any Time Medical care) have a stock of medications in the dispensing unit, allowing the ANM/MPHW (Auxiliary Nurse Midwife/Multipurpose Public Health Worker) to access the patient's profile and get the prescribed medication dispensed.
- Healthcare ATM (Any Time Medical care) as an efficient technology would help to fill the shortage of trained medical and paramedical staff which is always a problem at the sub-centres and Urban Health Kiosks.
- A further object of the invention is automatic creation of a database of detailed health profile and disease patterns for rural population which can be used to provide evidence for decision making at policy level.
- Reducing load of routine OPDs (Out Patient Department) at first referral units, CHCs (Community Healthcare) and DHs (District Hospital) and subsequently on secondary and tertiary care through expanding primary diagnosis and treatment at lower level of the health system.

Knowing that approximately 30% of the prescriptions written by a prescriber go unfilled, this technology may allow us to begin to address some of these issues by providing another convenient option to have prescriptions filled. (www.drugstorenews.com)

## Summary of the Invention

The present discussion includes a number of different methods and apparatus useful in, among other things, to deliver medical consultation and dispensing of medications after prescription in remote settings.

It is therefore an object of the present invention to:-

- Bride the huge gap between demand of healthcare services and short supply for doctor/trained medical professionals in rural areas.
- Efficient utilization of existing basic health care resources/professionals by taking away a major chunk of OPD based load from referral units.
- Rational use of medicines as a result of formal prescription, monitoring and audit.
- Provide cost-effective (Provision of generic medicine and rational use) and cost-beneficial (Reduce expenditure on transport etc.) solutions to the vulnerable and rural populations.
- Promote use and availability of generic medicine (free of charge) in rural and vulnerable population, which would reduce out of pocket expenses significantly.
- Regular monitoring of blood glucose, NIBP, etc., would help in early identification of diabetes and cardio-vascular cases and stroke susceptible patient.

# Detailed Description of the Preferred Embodiment

The following detailed description, which references and incorporates the figures, describes and illustrates one or more specific embodiments of the invention. These embodiments, offered not to limit but only to exemplify and teach the invention, are shown and described in sufficient detail to enable those skilled in the art to practice the invention. Thus, where appropriate to avoid obscuring the invention, the description may omit certain information known to those of skill in the art.

The Healthcare ATM (Any Time Medical care) provides free of cost, safe, convenient and immediate medical consultation as well as prescription and over the counter drug services to patient in primary health care settings and also in emergency situations. The system can be used virtually in any location, such as a remote PHC (Primary Healthcare Center) in a village where there is no doctor, a bus station etc. Some embodiments can deliver virtually any dispensable or vendible product.

The system provides several advantages including, but not limited to, conveying of preliminary health indicators to medical expert via a communication network, registration of patients details at medical call center, generation of prescription. The system includes dispensing of adequate drug to the patient and the command is sent directly by the doctor to the drug dispenser through an intelligent device, transfer of information to and from a central server database regarding available product information, restocking, prescription filled and other miscellaneous two way information transfer between a patient and a central control via a communication network.

## System Architecture

Fig. 1 is a schematic diagram of high level system architecture embodiments of the invention. The system **1000** is a distributed network comprising of a central server **2000**, call center **3000**, a healthcare facility **4000** with a Healthcare ATM (Any Time Medical care) or remote dispenser **4100** and an intelligent device **4200,** a communication network **4500** and a panel of medical experts**5000,**. A person who visits the healthcare facility **4000** receives the prescribed medicines from the remote dispenser **4100**. The call center**3000** can also be in communication with the panel of doctors**5000** or with a patient via a phone or other communication means **4500** at remote dispenser **4100**.

## Central Server

Central server **2000** captures all data that is created by various other components of the system. It also prepares, sends, receives and retains inventory data for all remote dispensers **4100**.

## Patient Visit and Prescription Process- overview

Fig. 2 depicts the basic process by which a patient is registered, monitored, receives a prescription and has that prescription filled by Healthcare ATM (Any Time Medical care) or

remote dispenser **4100**. Patient registration and recording patient's primary health indicators is done by an ANM/MPHW (Auxiliary Nurse Midwife/Multipurpose Public Health Worker) and conveyed via the central server **2000** to the call center **3000** and further to the panel of medical experts **5000**. ANM/MPHW (Auxiliary Nurse Midwife/Multipurpose Public Health Worker) will be trained to use devices used for recording vital statistics of patient like BP, Temperature, Blood Glucose, etc. Panel of Medical Expert **5000** (doctors) on evaluating condition/symptoms of the patient would arrive at a conclusion based on provisional diagnosis and decide whether the patient is to be provided drugs through Healthcare ATM (Any Time Medical care) or to be referred to CHC (Community Health Care) or District Hospital. In case of an emergency the patient would be provided an ambulance **4700** transport service to the nearest CHC (Community Health Care) or District Hospital. The diagnosis will then be conveyed to ANM/MPHW (Auxiliary Nurse Midwife/Multipurpose Public Health Worker) via communication network **4500**. If required, the physician in the medical call center **5000** could speak to patient directly as well as send SMS using the sub-center cell phone. The prescription would be generated and uploaded on central server **2000**.

## Patient Registration Process

Fig. 3 depicts the patient's registration process in detail. The patient provides basic information to the registration clerk. Such data would typically include mandatory information (name, gender, date of birth, mailing address and telephone number) and optional information like (known allergy etc). Immediately the captured information is transferred to central server **2000** and subsequently to the specific computer in use by the specific prescriber assigned to the patient.

## Vital Statics Recording Process

Fig. 4 depicts the instrument available at the healthcare facility in detail like weighing scale, multiparameter monitor (Temperature, Blood Pressure, Respiration Rate, SPO2), glucometer, non-invasive hemoglobinometer **4400** for recording vital statics of patients. ANM/MPHW (Auxiliary Nurse Midwife/Multipurpose Public Health Worker) will be trained to use devices for recording vital statistics of patient. Immediately the captured information is transferred to central server **2000** and subsequently to the specific computer in use by the specific prescriber assigned to the patient.

## Medical Consultation Process

Fig. 5 depicts the medical consultation process of the patient by the panel of Medical Expert (doctors) **5000** in detail. The medical consultation is initiated on receipt of patient vitals by the panel of Medical Expert (doctors) **5000**. Panel of Medical Expert (doctors) **5000** on evaluating condition/symptoms of the patient would arrive at a conclusion based on provisional diagnosis and decide whether the patient is to be provided drugs through Healthcare ATM (Any Time Medical care) or remote dispenser **4100** or to be referred to CHC (Community Health Care) or District Hospital. The diagnosis will then be conveyed to ANM/MPHW (Auxiliary Nurse Midwife/Multipurpose Public Health Worker) via communication network **4500**. If required, the medical expert in the medical call center **5000** could speak to patient directly as well as send SMS using the sub-center cell phone. Any urgent case requiring CHC/Hospital based care, could be provided with 108 Ambulance **4700** from sub-center to higher referred point- CHC/DH (Community Health Care/ District Hospital).

## Prescription Generation Process

Fig. 6 depicts the prescription generation process. In one example, an automated method where Physician's prescription is remotely sent via a communication network **4500** to the ANM/MPHW (Auxiliary Nurse Midwife/Multipurpose Public Health Worker) at the healthcare facility and the order is automatically available to be processed through the Healthcare ATM (Any Time Medical care) **4100**.

In another example, Healthcare ATM (Any Time Medical care) **4100** have a stock of medications in the dispensing unit, allowing the ANM/MPHW (Auxiliary Nurse Midwife/Multipurpose Public Health Worker) to access the patient's profile and get the prescribed medication dispensed.

## Drug Dispensing Process

Fig. 7 depicts the basic process by which a patient has a prescription filled by Healthcare ATM (Any Time Medical care) or remote dispenser **4100** in detail. In the patient discharge process, the physician gives commands to the remote dispenser **4100** directly via an intelligent device **4200** (remote signalling the remote dispenser to vend specific drugs as prescribed by the physician). These dispensed drugs are collected by ANM/MPHW (Auxiliary Nurse Midwife/Multipurpose Public Health Worker), explained and handed over to the patient. In case if the physician wants to review the patient after 'n' days, the message

can be conveyed to the patient over a call or with the help of ANM/MPHW (Auxiliary Nurse Midwife/Multipurpose Public Health Worker).

**Steps of Whole Process (Registration, Vital Statistics, Medical Consultation, Drug Dispensing)**

The Medical Consultation will not initiate until patient is registered at the Government Healthcare facility **4000** by an ANM/MPHW (Auxiliary Nurse Midwife/Multipurpose Public Health Worker).

In one embodiment, referring generally to Fig. 8 the sequence of events in dispensing a product is as follows:

1) The patient provides basic information to the registration clerk. Such data would typically include mandatory information (name, gender, date of birth, mailing address and telephone number) and optional information like (known allergy etc).

2) ANM/MPHW (Auxiliary Nurse Midwife/Multipurpose Public Health Worker) will record vital statistics of patient like BP, Temperature, Blood Glucose, etc.

3) Immediately the captured information is transferred to central server **2000** and subsequently to the specific computer in use by the specific prescriber assigned to the patient.

4) Panel of Medical Expert (doctors) **5000** on evaluating condition/symptoms of the patient would arrive at a conclusion based on provisional diagnosis and decide whether the patient is to be provided drugs through Healthcare ATM(Any Time Medical care) **4100** or to be referred to CHC( Community Health Care) or District Hospital.

5) The diagnosis will then be conveyed to ANM/MPHW (Auxiliary Nurse Midwife/Multipurpose Public Health Worker) via communication network **4500**.

6) If required, the physician in the medical call center **3000** could speak to patient directly as well as send SMS using the sub-center cell phone.

7) The prescription would be generated and uploaded on central server **2000**.

8) The physician gives commands to the remote dispenser **4100** directly via an intelligent device **4200** (remote signalling the remote dispenser to vend specific drugs as prescribed by the physician).

9) These dispensed drugs are collected by ANM/MPHW (Auxiliary Nurse Midwife/Multipurpose Public Health Worker), explained and handed over to the patient.

10) In case if the physician wants to review the patient after 'n' days, the message can be conveyed to the patient over a call or with the help of ANM/MPHW (Auxiliary Nurse Midwife/Multipurpose Public Health Worker).

## Restocking of Products

Restocking activity is initiated by a staff member. This person could be an ANM/MPHW (Auxiliary Nurse Midwife/Multipurpose Public Health Worker) located locally with the remote dispenser **4100** who has proper security authorisation. Restocking involves removing magazines (steel trays that can be slide or tilted easily) that are empty or that have drugs to be condoned (e.g.-expired or superseded products). After restocking manager conveys appropriate data over server interface to central server **2000** so that proper inventory control is maintained. After each restocking the position of each drug in the dispenser is updated in the system.

The embodiments described above are intended only to illustrate and teach one or more ways of practicing or implementing the present invention. The invention is not intended to restrict to any particular form or arrangement, or any specific embodiment, or any specific use, disclosed herein, since the same may be modified in various particulars or relations without departing from the spirit or scope of the claimed invention hereinabove shown and described of which the apparatus or method shown is intended only for illustration and disclosure of an operative embodiment and not to show all of the various form or modifications in which the invention might be embodied or operated.

# Claims

1) A method to overcome shortage of trained human resource to deliver healthcare, primarily in remote areas.

a) Means a healthcare configuration with ANM/MPHW (Auxiliary Nurse Midwife/Multipurpose Public Health Worker) to register an individual for providing free medical consultation.

b) Means a healthcare configuration with ANM/MPHW (Auxiliary Nurse Midwife/Multipurpose Public Health Worker) to record preliminary vital statics like blood pressure, temperature, blood glucose, respiration rate, SPO2 of an individual.

c) Means a central server for a healthcare configuration, call center and panel of medical experts.

d) Means a communication network to coordinate communication between medical expert, individual and remote dispenser.

e) Means a panel of medical experts to evaluate condition/symptoms of the individual.

f) Means a Healthcare ATM (Any Time Medical care) or remote dispenser adapted to dispense medical substances in specific dose and quantity.

g) Means an intelligent device that allows medical practitioner to remote signal the Healthcare ATM (Any Time Medical care) or remote dispenser to dispense prescribed medication.

h) Means an ANM/MPHW (Auxiliary Nurse Midwife/Multipurpose Public Health Worker) to collect the dispensed medication and hand it over to individual as well as explain it too.

i) Means an authorised ANP/MPHW (Auxiliary Nurse Midwife/Multipurpose Public Health Worker) for restocking of the remote dispenser.

2) The healthcare configuration of claim 1 is further including a multi parameter monitor for capturing the vital statics of an individual.

3) The healthcare configuration of claim 1 is further including an ambulance, so that an individual can be transferred to tertiary healthcare facility in case of emergency.

4) A healthcare configuration comprising a remote dispenser adapted to dispense drugs in response to a remote signal sent via an intelligent device by the medical practitioner.

5) A healthcare configuration of claim 4, further including a communication network so that in case if the medical practitioner requires can communicate directly to the individual regarding any anamnesis (medical history).

## Brief Description of Drawings

Fig. 1 is a schematic diagram of high level system architecture according to one embodiment of the present invention.

Fig. 2 is a schematic diagram of patient visit and prescription process overview according to one embodiment of the present invention.

Fig. 3 is a schematic diagram of patient registration process according to one embodiment of the present invention.

Fig. 4 is a schematic diagram of patient's vital statistics recording process according to one embodiment of the present invention.

Fig. 5 is a schematic diagram of a process by which patient is provided medical consultation according to one embodiment of the present invention.

Fig. 6 is a schematic diagram of prescription generation process according to one embodiment of the present invention.

Fig. 7 is a schematic diagram of the drug dispensing process by Healthcare ATM (Any Time Medical care) or remote dispenser according to one embodiment of the present invention.

Fig. 8 is a detailed schematic diagram of the steps involved in the whole process (Registration, Vital Statistics, Medical consultation, Drug Dispensing) according to one embodiment of the present invention.

Fig. 9 is a schematic diagram of a process of restocking of the drugs in the Healthcare ATM (Any Time Medical care) or remote dispenser according to one embodiment of the present invention.