



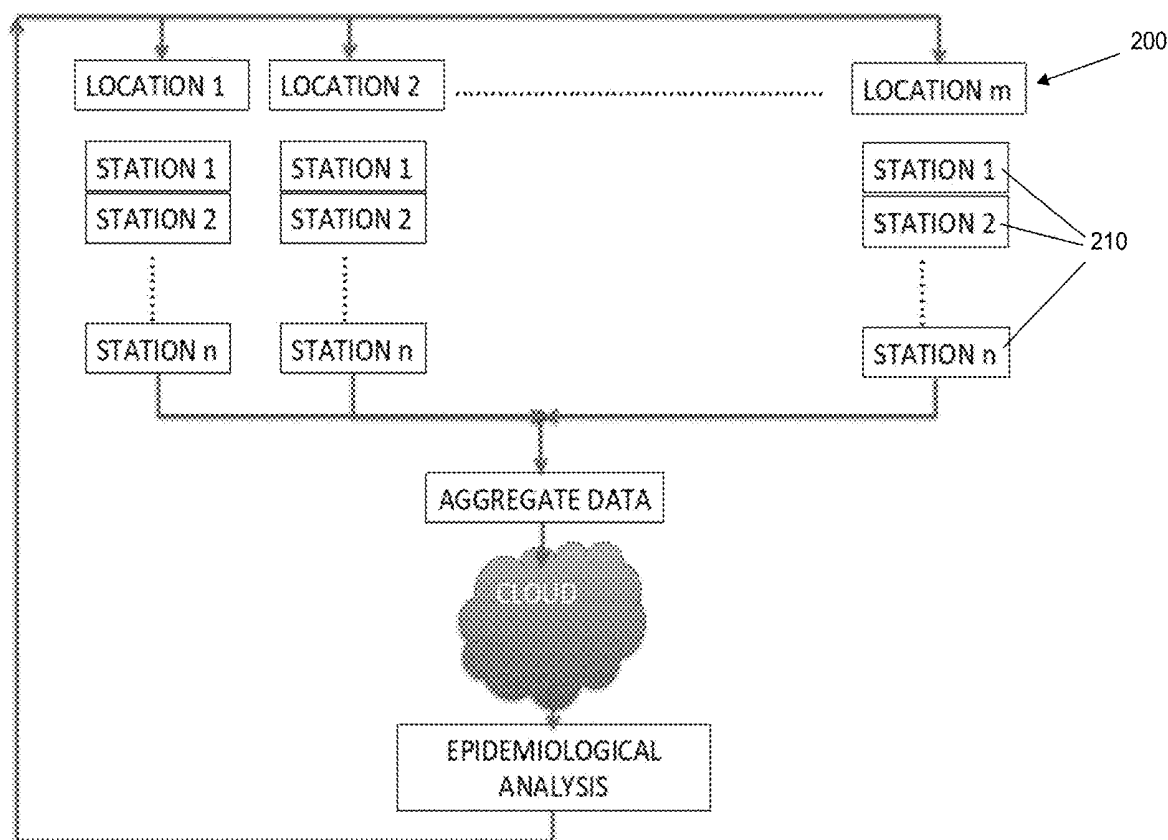
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Akers(10) **Pub. No.: US 2020/0187786 A1**(43) **Pub. Date: Jun. 18, 2020**(54) **MODULAR, PORTABLE AND RAPIDLY
DEPLOYABLE SYSTEM FOR HEALTH
ASSESSMENT**(52) **U.S. Cl.**CPC *A61B 5/02* (2013.01); *A61B 5/7435*
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(57)

ABSTRACT

Disclosed is a modular, portable and rapidly deployable system for health assessment comprising a portable, rapidly deployable structure configured to provide immediate and real-time clinical prevention assessment services, which system allows for rapid assembly and disassembly, immediate deployment to even highly remote locations, and provides basic clinical prevention data and screening for a patient user, along with health education and awareness. In certain configurations, the system comprises modular walls that connect to one another to form the shell of a structure, and a plurality of medical instruments, all of which are configured for self-administration by a medically-untrained user. The user may engage one or more user interface devices that guide the user through the use of each medical instrument and collect the user's clinical data for analysis. Once the desired medical assessment devices have been used and the data collected, the data may be analyzed to provide the user a customized health assessment.



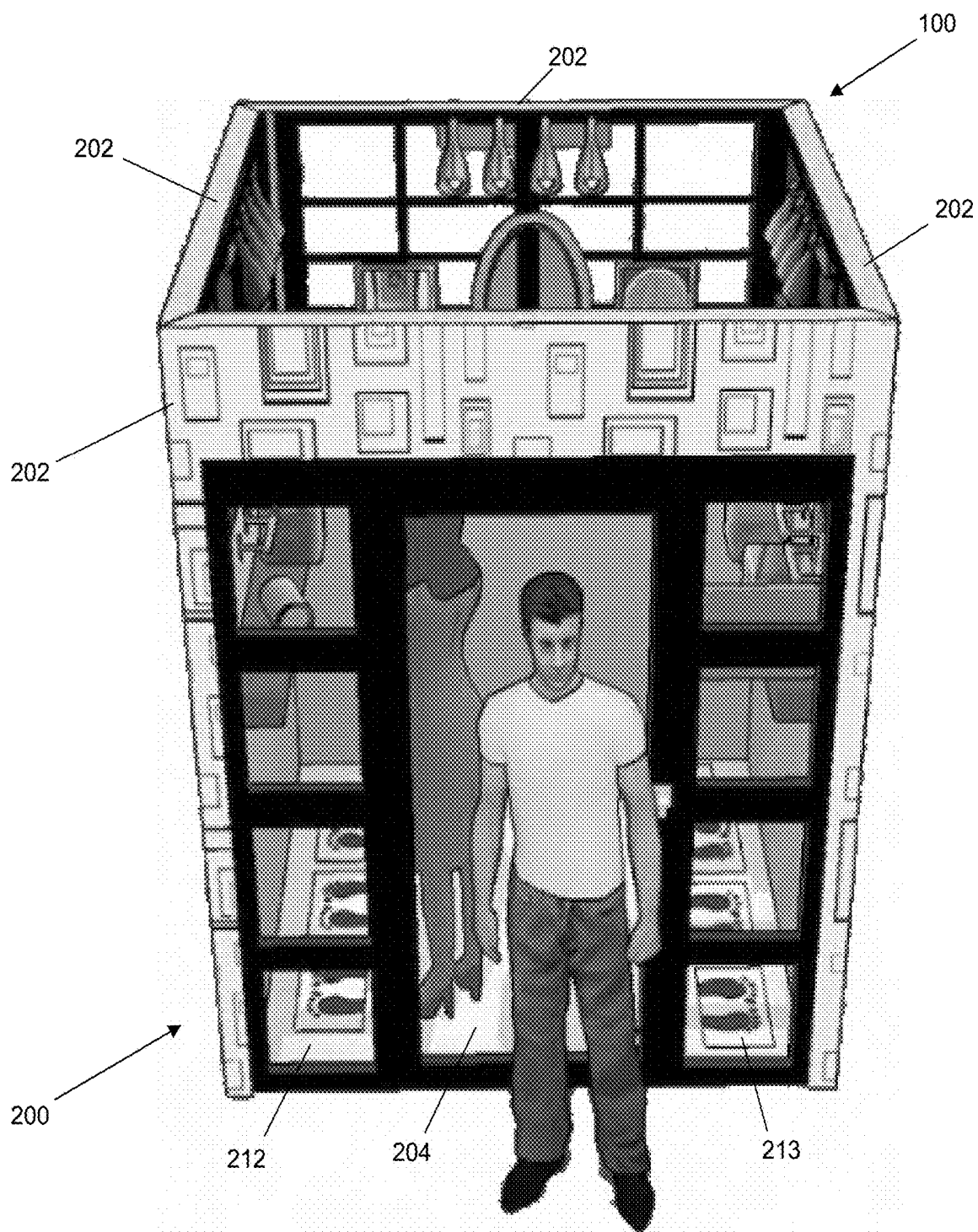


FIG. 1

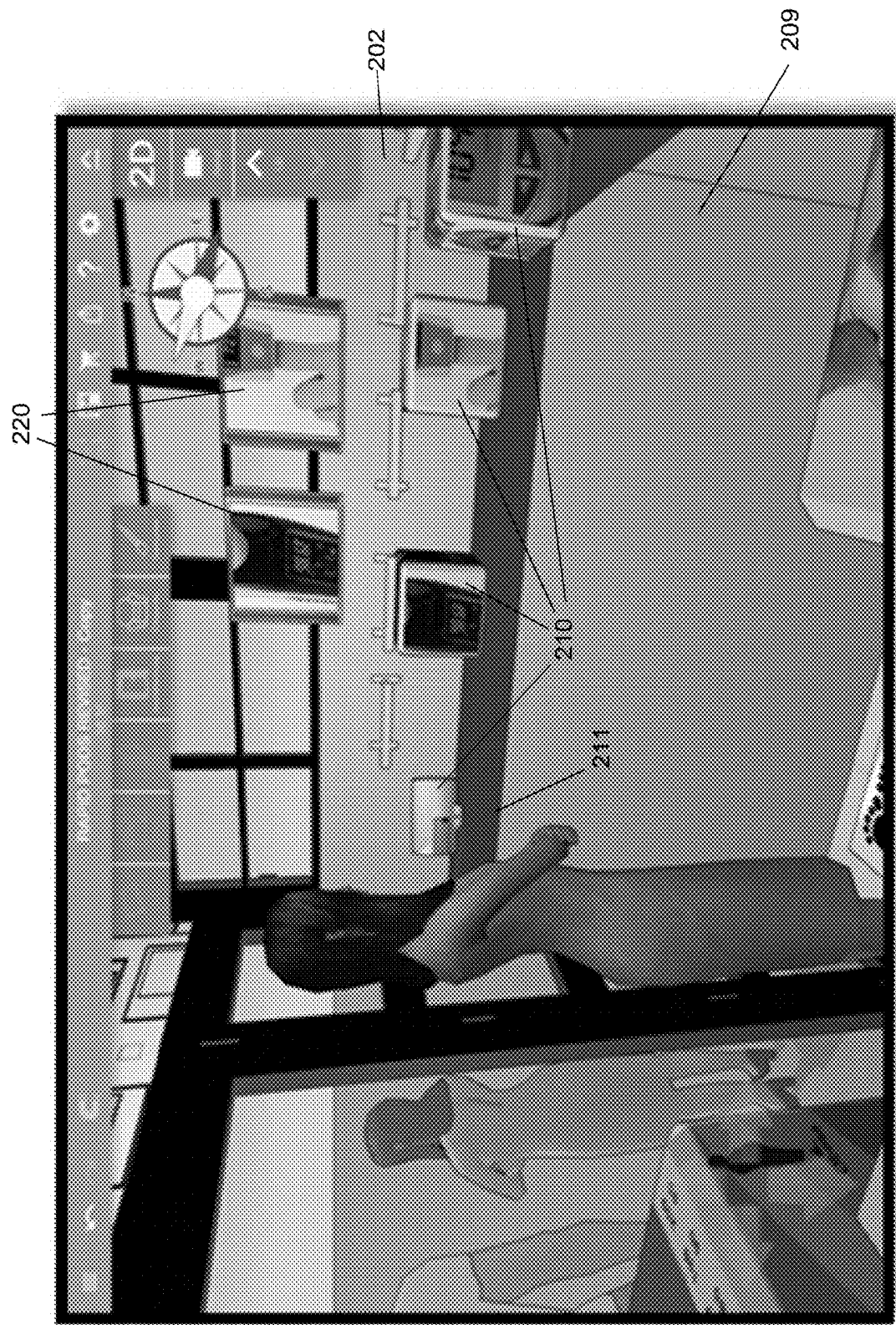


FIG. 2



FIG. 3

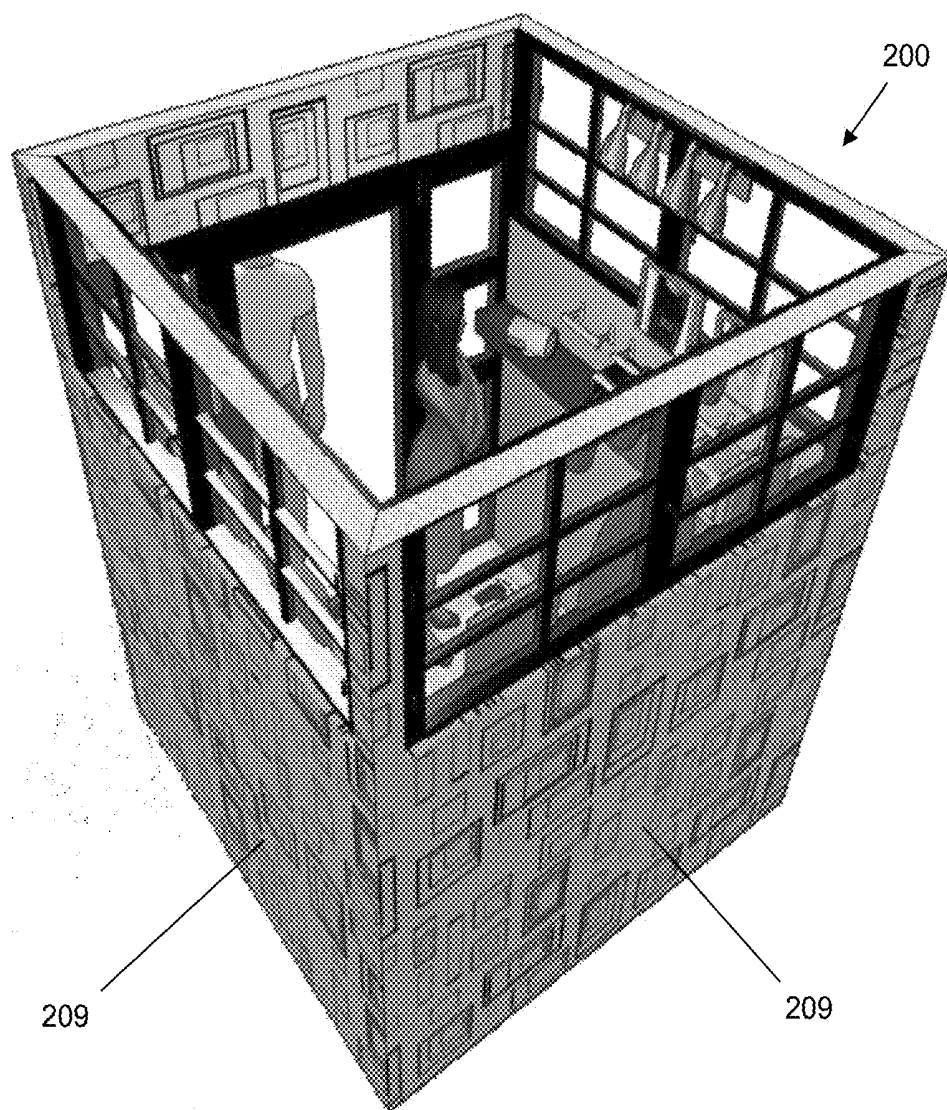


FIG. 4

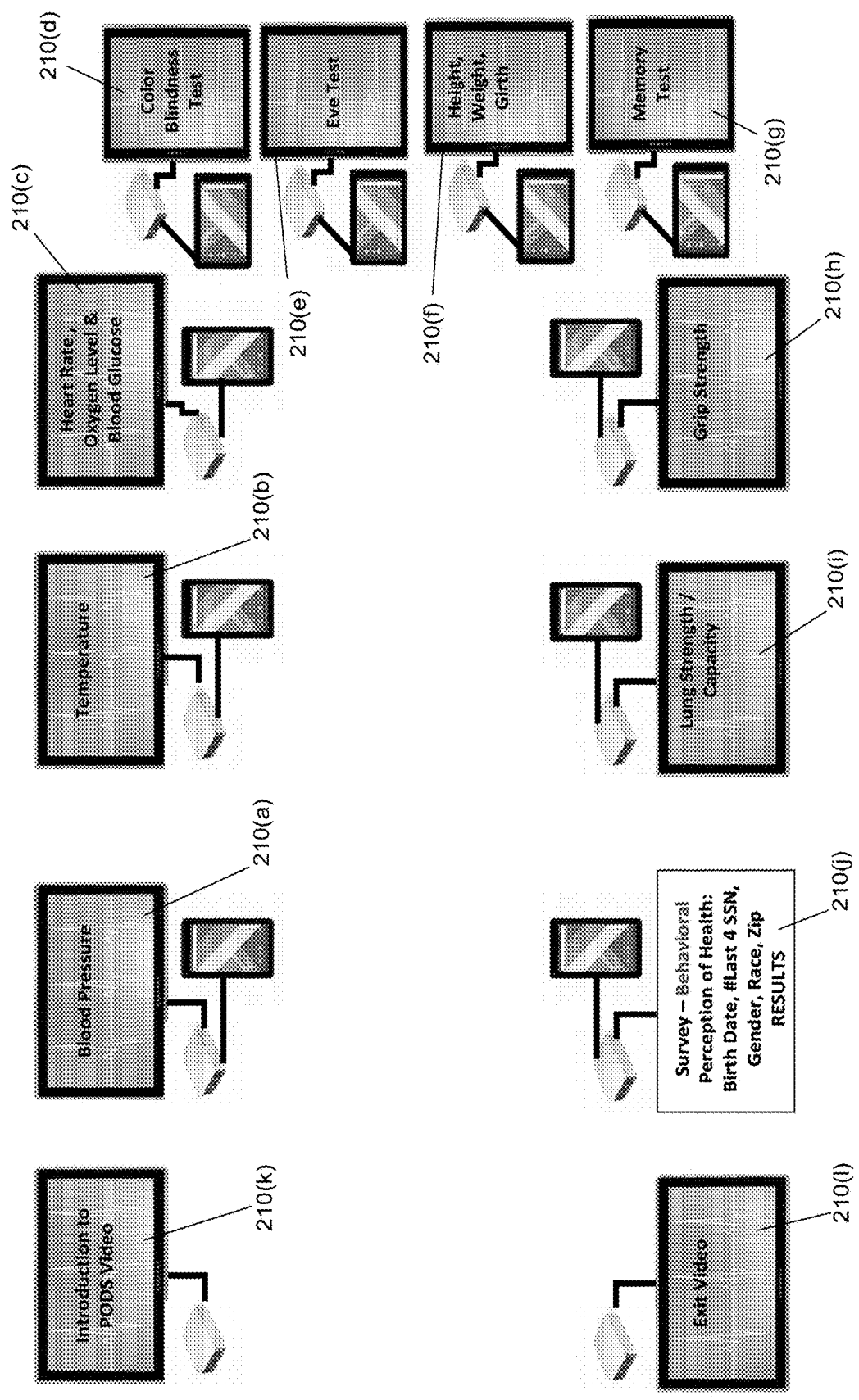


FIG. 5

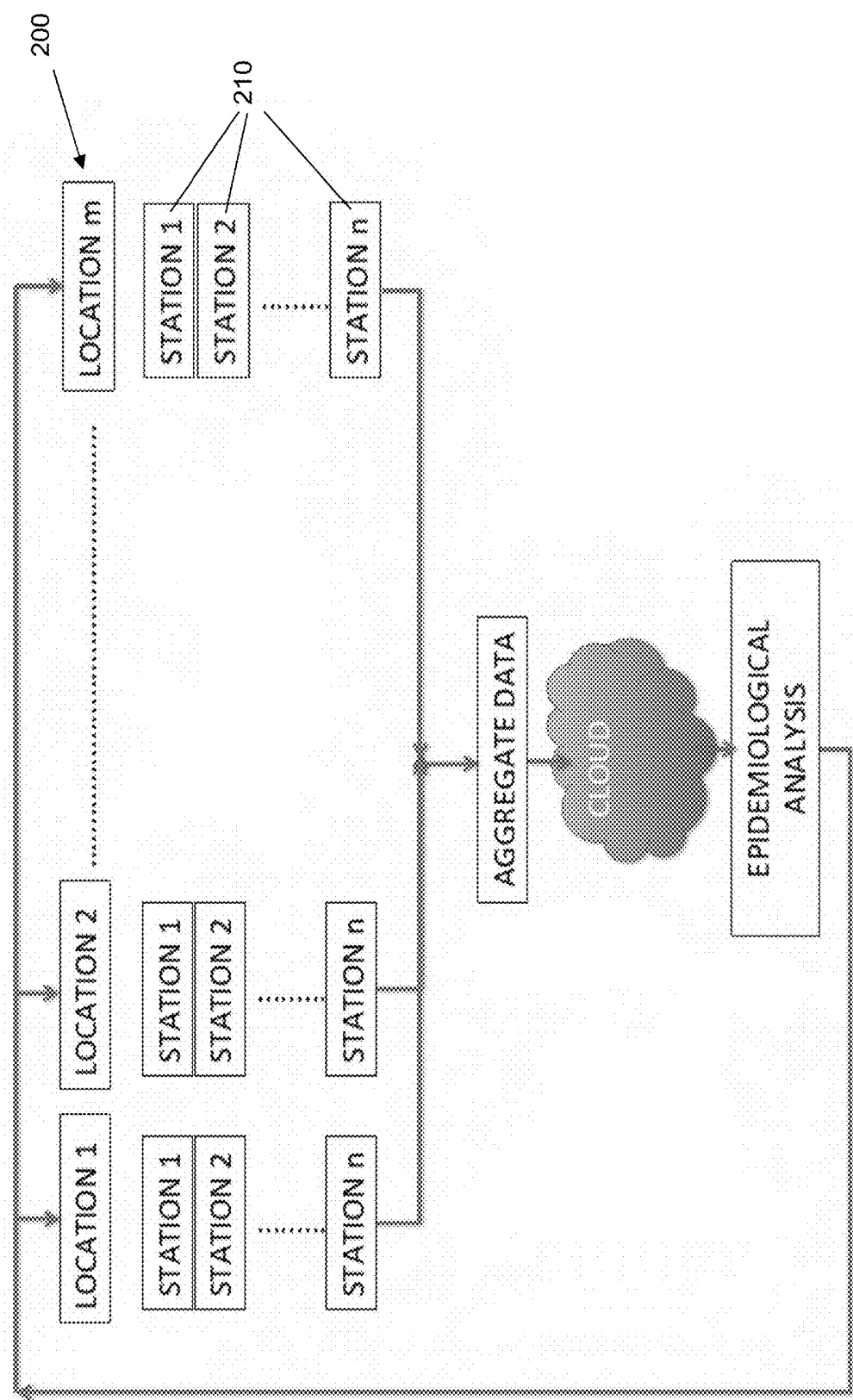


FIG. 6

MODULAR, PORTABLE AND RAPIDLY DEPLOYABLE SYSTEM FOR HEALTH ASSESSMENT

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This application is based upon and claims the benefit of U.S. Provisional Application No. 62/778,584 titled "Prevention On Demand Services for Rapid Deployment," filed with the United States Patent & Trademark Office on Dec. 12, 2018, the specification of which is incorporated herein by reference in its entirety.

FIELD OF THE INVENTION

[0002] This invention is directed to systems for self-administered health assessments, and more particularly to a portable platform that may quickly be setup in the field to provide remote, self-administered clinical screening services, including data collection, analysis, and information delivery.

BACKGROUND OF THE INVENTION

[0003] Research and practice has consistently shown that prevention is the best medicine to stave off disease and illness. Nationally, the U.S. Centers for Disease Control and Prevention (CDC) promotes prevention as the primary method to prevent disease outbreaks, epidemics, and injury, and to increase quality of life. Yet, in areas where healthcare services are scarce, or as in many cases not available at all, prevention is not practiced because of a lack of knowledge about one's own health. In remote areas, such as rural America, urban HubZone areas, military battlefields, or any part of the world, these areas are, in many ways, deserts remote from basic clinical tests and prevention services. Because the "prevention deserts" are removed from the most basic health education, prevention is not often practiced in such areas, simply because citizens and patients, or military personnel, are not informed, taught, or provided basic health screening services, nor do they know their own health status with respect to preventive clinical assessment data. For prevention to work, the most basic clinical assessment data can serve to be the most informative.

[0004] Most clinical devices are setup as single points in locations such as doctor's offices, hospitals, and the like. While there may be limited clinical devices deployed in the field, there remains a need in the art for platforms that are highly portable so that they can be readily deployed to the foregoing "prevention deserts," but that also combine multiple clinical devices in a single setting.

SUMMARY OF THE INVENTION

[0005] Disclosed herein is a modular, portable and rapidly deployable system for health assessment that avoids one or more disadvantages of the prior art. A system is described herein that provides a portable, rapidly deployable structure configured to provide immediate and real-time clinical prevention assessment services, which system allows for rapid assembly and disassembly, immediate deployment to even highly remote locations, and provides basic clinical prevention data and screening for a patient user, along with health education and awareness.

[0006] In an exemplary configuration, and in accordance with certain features of an embodiment, a system is provided

comprising modular walls that may be readily connected to one another to form the shell of a structure, and a plurality of medical instruments, all of which are configured for self-administration by a medically-untrained user, thus allowing even remotely located users the ability to obtain a health assessment and customized health-related information. The user may engage one or more user interface devices that guide the user through the use of each medical instrument and collect the user's clinical data for analysis. Once the desired medical assessment devices have been used and the data collected, the data may be analyzed to provide the user a customized health assessment.

[0007] In accordance with certain aspects of an embodiment, a modular, portable and rapidly deployable system for health assessment is provided comprising: a plurality of walls joined to one another with removable fasteners, the plurality of walls defining an open interior of a structure; a plurality of medical instruments positioned in the open interior of the structure, wherein each medical instrument enables self-administration of a distinct medical diagnostic exam by a user; and at least one user interface device having computer executable instructions stored thereon configured to present medical instrument usage instructions to the user, receive data from the plurality of medical instruments, and present results of an administration of the medical diagnostic exams to user.

[0008] In accordance with further aspects of an embodiment, a system for providing remote health assessment is provided, comprising: a plurality of modular, portable and rapidly deployable units for health assessment, each unit comprising: a plurality of walls joined to one another with removable fasteners, the plurality of walls defining an open interior of a structure; a plurality of medical instruments positioned in the open interior of the structure, wherein each medical instrument enables self-administration of a distinct medical diagnostic exam by a user; and at least one user interface device having computer executable instructions stored thereon configured to present medical instrument usage instructions to the user, receive data from the plurality of medical instruments, and present results of an administration of the medical diagnostic exams to the user; and a remote data processing unit in bidirectional data communication with the plurality of modular, portable and rapidly deployable units for health assessment, wherein the remote data processing unit further comprises computer executable instructions configured to: receive the results of an administration of the medical diagnostic exams from the plurality of modular, portable and rapidly deployable units for health assessment; perform an epidemiological analysis of the results; generate a comparative epidemiological analysis of the results from at least one of the plurality of modular, portable and rapidly deployable units; and transmit results of the comparative epidemiological analysis to the at least one of the plurality of modular, portable and rapidly deployable units.

[0009] Still other aspects, features and advantages of the invention are readily apparent from the following detailed description, simply by illustrating a number of particular embodiments and implementations, including the best mode contemplated for carrying out the invention. The invention is also capable of other and different embodiments, and its several details can be modified in various obvious respects, all without departing from the spirit and scope of the

invention. Accordingly, the drawings and description are to be regarded as illustrative in nature, and not as restrictive.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] The numerous advantages of the present invention may be better understood by those skilled in the art by reference to the accompanying drawings in which:

[0011] FIG. 1 is a front, perspective view of a modular, portable and rapidly deployable system for health assessment in accordance with certain aspects of an embodiment of the invention.

[0012] FIG. 2 is a perspective view of a portion of the interior of the system of FIG. 1.

[0013] FIG. 3 is a front perspective view of interior support members forming a portion of the system of FIG. 1.

[0014] FIG. 4 is a rear, perspective view of the system of FIG. 1.

[0015] FIG. 5 is a schematic view of medical instruments for use in the system of FIG. 1.

[0016] FIG. 6 is a schematic view of a data processing system for processing data from multiple modular, portable and rapidly deployable systems for health assessment in accordance with certain aspects of an embodiment of the invention.

DETAILED DESCRIPTION

[0017] The invention summarized above may be better understood by referring to the following description, claims, and accompanying drawings. This description of an embodiment, set out below to enable one to practice an implementation of the invention, is not intended to limit the preferred embodiment, but to serve as a particular example thereof. Those skilled in the art should appreciate that they may readily use the conception and specific embodiments disclosed as a basis for modifying or designing other methods and systems for carrying out the same purposes of the present invention. Those skilled in the art should also realize that such equivalent assemblies do not depart from the spirit and scope of the invention in its broadest form.

[0018] Descriptions of well-known functions and structures are omitted to enhance clarity and conciseness. The terminology used herein is for the purpose of describing particular embodiments only and is not intended to be limiting of the present disclosure. As used herein, the singular forms “a”, “an” and “the” are intended to include the plural forms as well, unless the context clearly indicates otherwise. Furthermore, the use of the terms a, an, etc. does not denote a limitation of quantity, but rather denotes the presence of at least one of the referenced items.

[0019] The use of the terms “first”, “second”, and the like does not imply any particular order, but they are included to identify individual elements. Moreover, the use of the terms first, second, etc. does not denote any order of importance, but rather the terms first, second, etc. are used to distinguish one element from another. It will be further understood that the terms “comprises” and/or “comprising”, or “includes” and/or “including” when used in this specification, specify the presence of stated features, regions, integers, steps, operations, elements, and/or components, but do not preclude the presence or addition of one or more other features, regions, integers, steps, operations, elements, components, and/or groups thereof.

[0020] Although some features may be described with respect to individual exemplary embodiments, aspects need not be limited thereto such that features from one or more exemplary embodiments may be combinable with other features from one or more exemplary embodiments.

[0021] Disclosed herein is a portable, rapidly deployable system 100 for health monitoring that enables a user to self-administer a multi-point self-examination through use of a plurality of portable medical instruments positioned within a portable, rapidly deployable structure. As disclosed in greater detail below, system 100 includes a structure 200 comprising multiple walls 202, one of which includes a doorway opening 204 allowing a user to enter and exit an assembled structure 200. Mounted on the interior of at least some of walls 202 are portable medical instruments 210, each of which is configured for operation by a user without requiring that such user have specialized medical training. One or more user interface devices 220 are likewise positioned inside of structure 200 and are operable preferably to provide a user instructions on use of each medical instrument 210 inside of structure 200, to collect medical data generated by each medical instrument 210 as the user engages each medical instrument 210, and to provide feedback to the user, such as an assessment of their medical condition as determined through analysis of the clinical data generated by medical instruments 210. Such a system offers a comprehensive, self-serve, multi-point self-examination to empower users through education of their current health condition to, in turn, offer a better quality of life. The system offers a portable and rapidly deployable system for health education, health literacy, health screening, and health promotion that helps to identify early warning signs of risky health threats and health disparities, and that helps to manage better overall health outcomes. The system also provides rapid biomedical and behavioral metrics on an individualized basis and in real-time.

[0022] As shown in FIG. 3, structure 200 is formed by support members 206 that create a skeletal frame for structure 200. Support members 206 comprise elongate, metal studs having openings extending there through that may receive bolts or similar removable connecting members to allow adjacent support members 206 to be quickly connected to one another. L-brackets 207 may be used to attach adjacent, vertically-oriented support members 206. Likewise, corner brackets 208 may be affixed to intersecting support members 206 at corners of structure 200, and particularly preferably spanning at least the top and bottom interior corners of structure 200 to provide fixed, rigid support to those corners. Corner brackets 208 are similarly affixed to support members via bolts or similarly configured removable connecting members for rapid assembly and disassembly of structure 200. Further, in addition to support members 206 forming the outline of structure 200, support members 206 may also be positioned along wall sections of structure 200, such as at a middle of one of the walls of structure 200, to offer added rigidity to structure 200 while still enabling rapid setup and disassembly. In certain particularly preferred configurations, structure defines an interior space of 35-36 ft².

[0023] With reference to FIGS. 2 and 4, wall panels 209 are provided both on the interior and exterior of structure 200, and are configured for quick attachment to and removal from support members 206. By way of non-limiting example, wall panels 209 may attach to support member 206

by way of hooks engaging the openings in support members **206**, threaded members extending through wall panels **209** and into the openings in support members **206**, or such other attachment mechanisms as will be realized by those of ordinary skill in the art, and that will allow for the temporary attachment and ready removal of wall panels from support members **206** to maintain an easily deployable and disassembled structure.

[0024] Preferably, shelf units **211** are provided on the interior of structure **200** and extending horizontally around the interior wall panels **209**. Shelf units **211** are preferably similarly joined to support members **206** with threaded connectors that may extend through wall panels **209** and into the openings in support members **206**, again allowing their quick connection and disassembly from structure **200**. Shelf units **211** are preferably positioned to mount medical instruments **210** at a height that allows users to access such medical instruments **210**, preferably without having to bend or squat, while likewise being readily accessible to a person in a wheelchair without requiring that they stand or otherwise exit from the wheelchair. Further, one or more wall-mounted, fold-out seating units may be affixed to wall panels **209** below shelf units **211** to optionally allow a user to sit during self-administration of a test using one of medical instruments **210**. Optionally, multiple wall-mounted, fold-out seating units may be provided around the interior of structure **200** to allow a user to be seated at a plurality of, and optionally all of, the locations intended for administration of a test via a medical instrument **210**.

[0025] User interface devices **220**, which may comprise (by way of non-limiting example) tablets preferably each equipped with a touch screen display, a speaker, and a microphone, are provided inside of structure **200**, and may be mounted to the interior wall panels **209** above each medical instrument **210**. User interface devices **220** are configured to provide instructions to the user on how to use each medical instrument **210**, to receive data generated from each medical instrument after a user has engaged such medical instrument **210** (either through the user manually inputting that data on a data entry screen presented by user interface device **220**, or through direct wired or wireless communication with the respective medical instrument **210**), to transmit such data to a local processing hub in structure **200** or a remote processing hub for processing and storage of the user's medical data collected from medical instruments **210**, and to communicate results and other health related information back to the user.

[0026] Optionally, instead of multiple user interface devices **220**, a single user interface device **220** may be provided that may be moved from one medical instrument **210** to the next as the user progresses through each diagnostic step offered by system **100**, with the user interface device **220** being configured to sequentially step through each test administered by each medical instrument **210**. For example, a table mount may be movably attached to a rail or bar that is affixed to shelf units **211**, such that a user may slide the user interface device **220** along such rail or bar as they move from one medical instrument **210** to the next.

[0027] In each case, user interface devices **220** may, in certain configurations, have a touch screen that displays a person providing pre-recording instructions for use of each medical instrument **210**, along with selections or data entry fields that a user engages to enter their relevant data. While the system is preferably configured to enable automatic data

collection from medical instruments **210**, prompting the user to enter the data generated by each medical instrument may offer an added benefit of empowering the user by requiring that they engage and participate in their own health screening, health education, health promotion, and health literacy. Optionally, user interface devices **220** also allow the user to engage in two-way communication with a remote clinician, such as a nurse practitioner, who is in remote data communication (whether via text, video chat, or otherwise) with system **100**. Once the user selects such clinical interaction, the remote clinician preferably appears on the screen to interact with the user.

[0028] Optionally, a floor or partial floor **212** may be provided in structure **200**. In such configurations, foot position pads **213** may be provided on floor **212** that direct the user to the proper position to engage each respective medical instrument **210**.

[0029] As the foregoing components of structure **200** are all configured for quick connection and thus easy deployment and dismantling, the entire structure is highly portable and can readily be moved and deployed to a needed location. For instance, each of support members **206**, wall panels **209**, and shelf units **211** may be shipped flat, thus enabling easy packaging and transport of the structural elements of structure **200**. In certain configuration, fully assembled walls **202** (including that wall's support members **206** and wall panels **209**) may be pre-assembled and then stood up and connected to other walls **202** to form structure **200**, and may likewise be prewired with all communication and power cabling for medical instruments **210** and user interface devices **220**. In order to further enhance the portability of system **100**, wheels (not shown) may be attached to the bottom of support members **206** to allow structure **200** to be rolled to a desired position once placed and assembled at a given location. Likewise, the exterior of structure **200** may be provided a towing bar allowing connection to a vehicle for moving structure **200** longer distances, may be placed on a trailer for moving structure **200** still longer distances, and may be provided with structurally reinforced corners with connecting hooks for lift straps (all of standard configuration) to allow for helicopter lift and transport for even longer distances while maintaining the structural rigidity of structure **200**. Even further, structure **200** may be sized for fitment within a standard cargo/container shipping unit.

[0030] Next, FIG. 5 is a schematic view of exemplary medical instruments **210** that may be employed in system **100**, each of which is preferably portable and readily used to administer the respective test by a non-medical-professional user. Such medical instruments are preferably commercially readily available devices of configurations that are generally known to those skilled in the art, such that the operational details of those medical instruments are not further discussed here. However, such medical instruments **210** employed by system **100** will preferably include some collection of the following: a blood pressure test **210(a)**; a temperature test **210(b)**; a heart rate, blood oxygen level, and optionally blood glucose level test **210(c)**; a color blindness test **210(d)**; an eye/vision test **210(e)**; a height, weight, and girth/BMI index test **210(f)**; a memory test **210(g)**; a grip strength test **210(h)**; a lung strength/capacity test **210(i)**; and a survey and results interface **210(j)** configured to solicit behavioral data relating to the user's health and the user's biographical details, and to communicate the results of the user's self-assessment. Optionally, additional stations may

be provided to display an introductory video **210(k)** before the user begins the self-assessment, and an exit video **210(1)** after the user has completed the self-assessment. Further, those of ordinary skill in the art will recognize that other portable medical diagnostic devices may be included beyond those set forth above without departing from the spirit and scope of the invention.

[0031] Preferably, all of the clinical data collected by medical instruments **210(a)-210(j)** is aggregated to create a record for that individual user. For example, the data collected by medical instruments **210(a)-210(j)** may communicate with a local processing unit at structure **200** to create a patient record for that individual user. Once that patient record has been created, it may then optionally be communicated (for example via a wireless communication device or via connection to a wide area network such as the Internet) to a remote data processor and/or repository which may be accessible, for example, in a cloud computing environment. As shown in the schematic view of FIG. 6, multiple structures **200** may collect data from their respective medical instruments **210**, and may separately and independently upload that data for epidemiological analysis at a remote data processor. That remote data processor and/or repository may track each visit by each user for purposes of incident tracking and trend analysis. Optionally, that remote data processor may, with authorization of the user, carry out real-time epidemiologic comparative analysis of the user's data, with the results of that analysis and the user's individualized results being transmitted back to the user in real-time at the location of the user's respective structure **200**.

[0032] Upon completion of the analysis, and as mentioned briefly above, the user may receive the results of the analysis at medical instrument **210(j)**. In certain exemplary configurations, at that stage the user may have the options to (i) print their results for personal use and viewing, (ii) send their results to their own clinician for basic analysis and clinical recommendations for a subsequent visit to their clinician, (iii) send the result to a live clinical network partner, such as a nurse practitioner or other specialist that is in data communication with system **100**, (iv) send results to their telephone via text message or email, and (v) send their results to a software application that may show the user's number of visits, health trends, and other data as may occur to those skilled in the art.

[0033] Additionally, in certain configurations, system **100** may include a data card reader and writer configured to (i) write user biographical/identification information and their related results to a data card that the user may take with them after use of system **100**, and (ii) read such data from the card for subsequent visits to track the user's medical history and changes to their medical health status. Preferably, such data card reader may also be configured to automatically read data from the user's medical insurance card, driver's license, and such other data-carrying cards that may be relevant to the user's identification and medical history.

[0034] Preferably, in order to maintain patient privacy, access within each location will require that only authorized personnel are able to review data and results of any corresponding analysis.

[0035] The foregoing system offers a portable, readily deployable health assessment tool that does not require medical staff to be present to use, that may be engaged by individuals at any time, and that allow for results of a user's

health assessment to be uploaded onto a personal medical card, or delivered electronically to a medical practitioner through a secured cloud server.

[0036] Having now fully set forth the preferred embodiments and certain modifications of the concept underlying the present invention, various other embodiments as well as certain variations and modifications of the embodiments herein shown and described will obviously occur to those skilled in the art upon becoming familiar with said underlying concept. It should be understood, therefore, that the invention may be practiced otherwise than as specifically set forth herein.

What is claimed is:

1. A modular, portable and rapidly deployable system for health assessment, comprising:

a plurality of walls joined to one another with removable fasteners, said plurality of walls defining an open interior of a structure;

a plurality of medical instruments positioned in said open interior of said structure, wherein each said medical instrument enables self-administration of a distinct medical diagnostic exam by a user; and

at least one user interface device having computer executable instructions stored thereon configured to present medical instrument usage instructions to said user, receive data from said plurality of medical instruments, and present results of an administration of said medical diagnostic exams to said user.

2. The system of claim 1, further comprising a remote data processor in data communication with said plurality of medical instruments, wherein said remote data processor further comprises computer executable instructions stored thereon configured to perform an epidemiological analysis of said data received from said plurality of medical instruments, and to transmit results of said epidemiological analysis back to said at least one user interface.

3. The system of claim 1, further comprising a plurality of user interface devices, wherein each said user interface device is configured to receive and process data from a single one of said medical instruments.

4. The system of claim 1, wherein said user interface device is movably mounted on said open interior of said structure to positions adjacent to each of said medical instruments.

5. The system of claim 1, said plurality of walls of said structure further comprising an entry wall including a doorway opening, and a plurality of non-entry walls, wherein said medical instruments further comprise at least one medical instrument positioned along an interior side of each non-entry wall of said structure.

6. The system of claim 5, wherein said medical instruments are selected from the group consisting of a blood pressure test, a temperature test, a heart rate test, a blood oxygen level test, a blood glucose level test, a color blindness test, a vision test, a height measurement, a weight measurement, a BMI measurement, a memory test, a grip strength test, and a lung capacity test.

7. The system of claim 1, further comprising a card reader and writer.

8. The system of claim 7, wherein said card reader and writer is configured to write said results of an administration of said medical diagnostic exams to said user to a data card.

9. The system of claim 8, wherein said card reader and writer is further configured to read at least one of a user's driver's license and health insurance card.

10. The system of claim 1, further comprising shelf units removably attached to an interior of said walls of said structure.

11. The system of claim 10, wherein said medical instruments further comprise at least one medical instrument positioned on each said shelf unit.

12. A system for providing remote health assessment, comprising:

- a plurality of modular, portable and rapidly deployable units for health assessment, each said unit comprising:
 - a plurality of walls joined to one another with removable fasteners, said plurality of walls defining an open interior of a structure;
 - a plurality of medical instruments positioned in said open interior of said structure, wherein each said medical instrument enables self-administration of a distinct medical diagnostic exam by a user; and
 - at least one user interface device having computer executable instructions stored thereon configured to present medical instrument usage instructions to said user, receive data from said plurality of medical instruments, and present results of an administration of said medical diagnostic exams to said user; and
- a remote data processing unit in bidirectional data communication with said plurality of modular, portable and rapidly deployable units for health assessment, wherein said remote data processing unit further comprises computer executable instructions configured to:
 - receive said results of an administration of said medical diagnostic exams from said plurality of modular, portable and rapidly deployable units for health assessment;
 - perform an epidemiological analysis of said results;
 - generate a comparative epidemiological analysis of said results from at least one of said plurality of modular, portable and rapidly deployable units; and

transmit results of said comparative epidemiological analysis to said at least one of said plurality of modular, portable and rapidly deployable units.

13. The system of claim 12, wherein each said unit further comprises a plurality of user interface devices, wherein each said user interface device is configured to receive and process data from a single one of said medical instruments.

14. The system of claim 12, wherein each said user interface device is movably mounted on said open interior of said structure to positions adjacent to each of said medical instruments.

15. The system of claim 12, wherein said plurality of walls of each said structure further comprises an entry wall including a doorway opening, and a plurality of non-entry walls, wherein said medical instruments further comprise at least one medical instrument positioned along an interior side of each non-entry wall of said structure.

16. The system of claim 15, wherein said medical instruments are selected from the group consisting of a blood pressure test, a temperature test, a heart rate test, a blood oxygen level test, a blood glucose level test, a color blindness test, a vision test, a height measurement, a weight measurement, a BMI measurement, a memory test, a grip strength test, and a lung capacity test.

17. The system of claim 12, wherein each said unit further comprises a card reader and writer.

18. The system of claim 17, wherein each said card reader and writer is configured to write said results of an administration of said medical diagnostic exams to said user to a data card.

19. The system of claim 18, wherein each said card reader and writer is further configured to read at least one of a user's driver's license and health insurance card.

20. The system of claim 12, wherein each said unit further comprises shelf units removably attached to an interior of said walls of said structure, and wherein said medical instruments further comprise at least one medical instrument positioned on each said shelf unit.

* * * * *

专利名称(译)	模块化，便携式，可快速部署的健康评估系统		
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外部链接	Espacenet USPTO		

摘要(译)

公开了一种用于健康评估的模块化，便携式，可快速部署的系统，该系统包括配置为提供即时和实时的临床预防评估服务的便携式，可快速部署的结构，该系统允许快速组装和拆卸，立即部署到甚至偏远的地方，并为患者用户提供基本的临床预防数据和筛查，以及健康教育和认识。在某些配置中，该系统包括彼此连接以形成结构的壳体的模块化壁，以及多个医疗器械，所有这些医疗器械都被配置为由未受过医学训练的用户自行管理。用户可以使用一个或多个用户界面设备，该设备指导用户使用每种医疗仪器并收集用户的临床数据以进行分析。一旦使用了所需的医学评估设备并收集了数据，就可以对数据进行分析以向用户提供定制的健康评估。

