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(66) Abstract: A system, apparatus, and method is provided for isolating a patient from the surrounding environment by providing an enclosure that defines a isolated patient environment separate from the surrounding environment. The system includes a patient support base and an elongated walled enclosure having a periphery that is engageable with the patient support base. Further, the walled enclosure includes an operable accessway for accessing a portion of the patient while in the isolated patient environment. Preferably, the operable accessway is positioned in the walled enclosure such that the patient’s head is accessible while the patient is in the isolated patient environment. In another application, the walled enclosure is made from disposable material and also is pressure-equalizing between the isolated patient environment and the surrounding environment.
For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.
SYSTEM FOR ISOLATING A PATIENT FROM A SURROUNDING ENVIRONMENT

FIELD OF THE INVENTION

[0001] The present invention relates to a system, apparatus, and method for isolating a patient from the surrounding environment. More particularly, the present invention relates to a system, apparatus, and method for isolating a patient from a surrounding environment utilizing an elongated walled enclosure with a patient support device.

BACKGROUND OF THE INVENTION

[0002] In today’s world, there are many infective agents (such as HIV, Hepatitis B & C, MRSA, VRE, anthrax, smallpox, etc.) that are very virulent and, in some cases, untreatable with current anti-infective agents. In addition to infective agents, there is an increasing number of other biological contaminates, as well as an increased potential for nuclear and chemical industrial warfare.

[0003] Governments and armed forces are increasingly concerned over the potential for the use of chemical or biological weapons in terrorist attacks or in warfare. The use of chemical or biological weapons create special concerns among rescuers. Particularly, unlike conventional weapons, exposure by rescuers to victims of chemical or biological attack can adversely affect these rescuers. To avoid such affects on rescuers, including medical and transport personnel, it is necessary to isolate the victims of the attack. Additionally, it may be necessary to transport non-contaminated patients through zones that are already contaminated or are under the threat of chemical or biological attack. Meanwhile, in the civilian sector it is increasingly required to treat all emergency patients as potentially infectious and hazardous to personnel and equipment. This requires the use of isolation techniques during transport and treatment. Further, the resurgence of virulent strains of other diseases has required that the civilian medical community consider the need for individual isolation facilities.

[0004] Many United States Patents describe various devices for the isolation of victims, and other generally similar devices, some of them portable, for providing sterilized operating environments. These United States Patents include U.S. Pat. Nos. 5,725,426; 5,630,296; 5,626,151; 5,331,991; 5,314,377; 4,000,749; 3,766,844; 3,695,507; 3,272,199; 3,265,059; 3,119,358; 3,118,401; 2,985,129; and 2,683,262.
SUMMARY OF THE INVENTION

[0005] The present invention is directed to an improved system, apparatus, and method for isolating a patient from the surrounding environment. The inventive system, apparatus, and method are particularly adapted for use in the field or in situations where patients are infected or contaminated and must be transported to a medical facility for treatment. Accordingly, the following detailed description focuses on these types of systems, apparatuses, and methods to illustrate the invention. It should be noted, however, that the various aspects of the invention may be adapted for use in other types of isolation apparatuses and methods, as further described below.

[0006] In one specific embodiment of the present invention, a system for isolating a patient from a surrounding environment is provided. The system is comprised of a patient support base (for example, a gurney, stretcher, or hospital bed) for accommodating a patient and an elongated walled enclosure having a periphery for engaging the patient support base. The engagement of the periphery with the patient support base forms an isolated patient environment therebetween. The walled enclosure includes an operable accessway for accessing a portion of the patient.

[0007] In another embodiment of the present invention, an enclosure for use in a system for isolating a patient from a surrounding environment is provided. The enclosure is comprised of an elongated walled enclosure having a periphery for engaging a patient support base. The engagement of the periphery with the patient support base forms an isolated patient environment therebetween. The walled enclosure includes an operable accessway for accessing a portion of the patient.

[0008] In another embodiment of the present invention, a method of isolating a patient is disclosed. The method is comprised of the steps of: providing a patient support base for accommodating a patient; providing an elongated walled enclosure having a periphery for engaging the patient support base; engaging said periphery of said walled enclosure with said patient support base wherein after said periphery is engaged with said patient support base, an isolated patient environment is formed therebetween; and equalizing the pressure between the isolated patient environment and the surrounding environment by providing a fluid pressure-equalizing port communicating the isolated environment with the surrounding environment.

[0009] Other and further objects, features, and advantages of the present invention will be apparent from the following detailed description of a presently preferred
embodiment(s) of the invention, given for this purpose of disclosure, and taken in conjunction with the accompanying drawings.

**BRIEF DESCRIPTION OF THE DRAWINGS**

[00010] FIG. 1A is a simplified, side view of a patient-isolating system, according to the present invention;

[00011] FIG. 1B is a simplified, side view of a patient-isolating system, according to the present invention;

[00012] FIG. 2 is a simplified, top plan view of a patient-isolating system, according to the present invention;

[00013] FIG. 3A is a simplified, end view of a patient-isolating system, according to the present invention; and

[00014] FIG. 3B is a simplified, opposite end view of a patient-isolating system, according to the present invention.

**DETAILED DESCRIPTION OF THE INVENTION**

[00015] Upon review of the detailed description and the drawings provided herein, it will become apparent to one of ordinary skill in the relevant medical or isolation system art that various aspects of the invention are applicable to other apparatuses and methods, and, more specifically, to other isolation apparatuses, systems, and methods. Accordingly, the present invention is not intended to be limited to the structures and the methods specifically described and illustrated herein.

[00016] The present invention is directed to a system, apparatus, and method for isolating a patient from a surrounding environment by creating an isolated patient environment separate from the surrounding environment. Typically, the inventive system is operated to aid in the transport of infected or contaminated patients, such as burn victims, to a medical facility. In particular, the inventive system uses a walled enclosure engaged with a patient support base to define an isolated patient environment between the walled enclosure and the patient support base, distinct from the surrounding environment. More particularly, the walled enclosure includes an operable accessway for accessing a portion of the patient, such as the patient’s head.

[00017] FIGS. 1-3 depict a system for isolating a patient from the surrounding environment embodying several aspects of the present invention. In one aspect of the invention, the patient-isolation system 10 of FIGS. 1A and 1B includes an elongated walled structure 11 engaged with a patient support base (such as a gurney,
stretcher, or hospital bed) 32, defining an isolated patient environment separate from the surrounding environment.

[00018] Preferably, the patient is in a rest position on the patient support base, however, as one of ordinary skill in the art would know, gurneys, for example, are capable of being in a chair-like position as well. Accordingly, in the present invention, the patient could be in a position other than a rest position.

[00019] The walled structure 11 is preferably constructed of a disposable material, wherein the term “disposable material” refers to a material that is economically-feasible to only use one time. Such disposable materials include heavy paper, reinforced paper, lightweight plastic, poly vinyl, or any combination thereof. This feature is advantageous because it greatly reduces, or even eliminates, the need for cleaning and/or decontaminating the enclosure after use. As another example, the walled enclosure 11 can be formed of more than one material, all of which are disposable, where one material is transparent, such as clear plastic. In this embodiment, the transparent material allows easy observation of the patient while the patient is inside the isolated patient environment. Preferably, the transparent material portion or “window portion” 22 of the walled structure 11 is situated such that the patient’s head is easily observable while the patient is in the isolated patient environment. Additionally, the walled enclosure can be made from one or more materials that, in addition to being disposable, are lightweight, fire resistant, expandable, and/or sterile.

[00020] In one aspect of the invention, the walled structure 11 includes an operable accessway 28 for accessing a portion of the patient while in the isolated patient environment. The operable accessway 28 can be in the form of a completely removable portion of the walled structure 11 such as a cutaway, or alternatively can be in the form of a flap 34 (see FIG. 3B), separable from the walled structure 11, but remaining attached at a hinge 38, as shown in FIGS. 2 and 3B. Returning to FIGS. 1A and 1B, preferably, the operable accessway 28 is situated such that when operated, access to the patient’s head is provided while the patient is in the isolated patient environment.

[00021] FIGS. 2 and 3B illustrate this embodiment and show the flap 34 in an open position. The operable accessway 28 can encompass the same portion of the walled enclosure 11 as the window portion 22, or can be larger than the window portion 22 (as illustrated in FIG. 1A) or smaller than the window portion 22. The operable accessway 28 shown in FIG. 1A as a rectangular shape, can be any shape, including, but not limited to, a circular shape, or a slit in the walled structure 11.
[00022] In another aspect of the invention, the entire portion of the walled structure above the patient's head, the above-head portion 42 (as illustrated in FIG. 2), may be removed. The operable accessway 28 can be resealable, such as using a plastic recloseable fastner, with recloseable interlocking male and female profile elements (such as in a Ziploc bag) on the walled structure 11, such that after the operable accessway 28 is opened, it can be resealed with the walled structure 11. Similarly, the above-head portion 42 can be resealable. Alternatively, the operable accessway 28 and above-head portion 42 can be equipped with hook and loop fasteners, such that after opening, each can be resealed with hook and loop fasteners on the walled structure 11.

[00023] In another application, the walled enclosure 11 includes a passageway 40 operable to allow tubing or other medical apparatuses to pass from the surrounding environment to the isolated patient environment. The operable accessway 28 and the passageway 40 can be the same structure, or can be two different structures. Also, the operable accessway 28 and the passageway 40 may be included on the patient support base 32, instead of, or in addition to, on the walled structure 11.

[00024] In a preferred embodiment of the invention, the patient-isolation system 10 includes a pressure-equalizing port 26 communicating the isolated environment with the surrounding environment. This pressure-equalizing port 26 allows air from the surrounding environment to enter the isolated patient environment, and air from the isolated patient environment to enter the surrounding environment, such that the pressure in the isolated patient environment is equal to that of the surrounding environment. This feature is an improvement over other isolation apparatuses, because the patient inside the apparatus might need to be transported in an airplane, a pressurized environment, or might need to be treated in a hyperbaric chamber, also a pressurized environment. Because the present invention describes a pressure-equalized system, the pressure of the isolated patient environment need not be adjusted before entrance into a pressurized environment, such as an airplane or a hyperbaric chamber. In one application, the pressure-equalizing port 26 can also function as a filter port 27, such that contaminants from the surrounding environment are filtered out of air entering the isolated patient environment and contaminants from the isolated patient environment are filtered out of air entering the surrounding environment. The pressure-equalizing port 26 is preferably made of Hepa-filter material, though other suitable materials may be used.
[00025] In another application, a filter port 27 is a separate structure from the pressure-equalizing port 26. The filter port 27 is preferably made of a Hepa-filtering material, though other suitable materials such as reinforced paper can be used.

[00026] Turning back to FIG. 1A, a specific embodiment of the patient-isolation system 10 according to the present invention is illustrated. As previously discussed, the patient-isolation system 10 comprises a patient support base 32 and an elongated walled enclosure 11 having a periphery 30 for engaging the patient support base 32. In one embodiment, the periphery 30 of the walled enclosure 11 may be engaged with the patient support base 32 by securing the periphery 30 to the patient support base 32. In one embodiment of the invention, the periphery 30 is secured to the patient support base 32 by providing a skirt 16 to the periphery 30 and tucking the skirt 16 under either the patient or part of the patient support base 32, for example, the mattress of a gurney. FIG. 1B shows this embodiment of the invention with the skirt 16 tucked under the patient support base 32. This configuration allows for the quick removal of the entire device in the event of an emergency. The skirt 16 is preferably made out of reinforced paper, though other suitable materials such as heavy paper, lightweight plastic, and poly vinyl may be used. Alternatively, the skirt 16 can be an extension of the walled enclosure 11.

[00027] In one embodiment of the invention, the walled enclosure includes a covering 12 and at least one support structure 14. The support structure 14 extends across the covering 12 to provide clearance between the patient and the covering 12.

[00028] The support structure 14 is preferably generally semi-circular in shape, although other shapes such as triangular, square, or angled, are included in the scope of the present invention. The support structure 14 extends across the covering 12 to provide clearance between the patient and the covering 12. The support structures 14 can be either semi-rigid or rigid and are preferably made out of premolded plastic, such as high density polyethylene, but can also be made of other suitable materials, such as lightweight metal wire or clear vinyl. It is to be understood that the term “semi-rigid,” when used to describe one embodiment of the support structure, means that the support structure can be flexed, while displaying some rigidity, but without breaking. The support structures 14 are attached to the covering by a suitable means, such as with an adhesive, or with hook and loop fasteners. In the embodiment where only one support structure 14 is used, that support structure 14 should be placed adjacent the head-end wall 18 to keep the covering 12 away from the patient.
[00029] End views of an embodiment according to the present invention are shown in FIGS. 3A and 3B. In one embodiment of the invention, the walled enclosure 11 includes end walls 18 and 20. The end wall designed to be closest to the patient’s head can be described as a head-end wall 18, illustrated in FIG. 3B and the opposite end as a foot-end wall 20, illustrated in FIG. 3A. The end walls 18 and 20 of the walled enclosure 11 can include a filter port 27 and/or a pressure-equalizing port 26, as described above. Further, in another embodiment of the invention, the end walls 18 and 20 include a passageway 40, as described above.

[00030] The walled enclosure 11 is foldable, for example accordion-like, into a compact size and preferably is provided in a sterile package that can be opened quickly and easily by one person.

[00031] The present invention is also directed to an enclosure for use in a system for isolating a patient. The enclosure comprises an elongated walled enclosure 11 (as described above) having a periphery 30 for engaging a patient support base (such as a gurney, stretcher, or hospital bed) 32 wherein after said periphery 30 is engaged with said patient support base 32, an isolated patient environment is formed therebetween, wherein said walled enclosure 11 includes an operable accessway 28 for accessing a portion of the patient.

[00032] The present invention is also directed to a method of isolating a patient, including the steps of providing a patient support base for accommodating a patient in a rest position; providing an elongated walled enclosure having a periphery for engaging the patient support base; engaging said periphery of said walled enclosure with said patient support base so as to define an isolated patient environment therebetween; and equalizing the pressure between the isolated patient environment and the surrounding environment by providing a fluid pressure-equalizing port communicating the isolated environment with the surrounding environment. Preferably, the engaging step includes providing a skirt extending from the periphery of the walled enclosure and securing the skirt to either the patient or the patient support base, or both. Typically, the securing step is accomplished by tucking the skirt under the patient or a portion of the patient support base, or both.

[00033] In another embodiment of the invention, the equalizing step can be accomplished by providing a filter port, as discussed above.

[00034] In the preferred embodiment, the method includes disposing of the walled enclosure after one use, thus eliminating the need for cleaning of the enclosure.
[00035] In another application, the method includes the step of accessing a portion of the patient in the isolated patient environment through an operable accessway included in said walled enclosure.

[00036] The patient-isolation system 10 can cover the entire patient, or a portion of the patient, as deemed necessary by the attending medical staff.

[00037] The foregoing description of the present invention has been presented for purposes of illustration and description. It is to be noted that the description is not intended to limit the invention to the apparatus and process disclosed herein. Various aspects of the invention as described above may be applicable to other types of isolation or patient enclosing devices. For example, the feature of a pressure-equalizing patient enclosing device may be implemented in other types of enclosing or isolating devices. These variations of the invention will become apparent to one skilled in the art provided with the present disclosure. Consequently, variations and modifications commensurate with the above teachings, in the skill and knowledge of the relevant art, are within the scope of the present invention. The embodiments described and illustrated herein are further intended to explain the best modes for practicing the invention, and to enable others skilled in the art to utilize the invention in other embodiments and with various modifications required by the particular applications or uses of the present invention.
CLAIMS

1. A system for isolating a patient from a surrounding environment, said system comprising:
   a. a patient support base for accommodating a patient; and
   b. an elongated walled enclosure having a periphery for engaging the patient support base wherein after said periphery is engaged with said patient support base, an isolated patient environment is formed therebetween;

   wherein said walled enclosure includes an operable accessway for accessing a portion of the patient.

2. The system of claim 1, wherein said enclosure is substantially made of a disposable material and said enclosure is readily separable from said support base for disposal.

3. The system of claim 2, wherein said disposable material is selected from the group of disposable materials consisting of: heavy paper; reinforced paper; lightweight plastic; poly vinyl, and combinations thereof.

4. The system of claim 1, wherein said accessway is situated on said enclosure to allow access to the patient’s head.

5. The system of claim 1, wherein one of at least said support base and said enclosure includes a fluid pressure-equalizing port communicating the isolated environment with the surrounding environment.

6. The system of claim 1, wherein said walled enclosure includes a covering and at least one support structure.

7. The system of claim 1, wherein said walled enclosure includes a skirt extending from said periphery.

8. The system of claim 1, wherein said walled enclosure has a head-end and a foot-end, and wherein said walled enclosure includes a head-end wall secured to the head-end of said walled enclosure, and a foot-end wall secured to the foot-end of said walled enclosure.

9. The system of claim 1, wherein one of at least said support base and said walled enclosure includes a filter port.
10. The system of claim 9, wherein said filter port is made from Hepa-filtering material.

11. The system of claim 1, wherein said walled enclosure includes a window portion made from a transparent material.

12. The system of claim 11, wherein said window portion is situated on said enclosure to allow visibility of the patient’s head.

13. The system of claim 11, wherein said transparent material is clear plastic.

14. The system of claim 1, wherein said walled enclosure is foldable into a compact space.

15. The system of claim 1, wherein one of at least said support base and said walled enclosure includes a passageway for passing medical tubes from a surrounding environment to the isolated patient environment.

16. In a system for isolating a patient, an enclosure, said enclosure comprising:
   an elongated walled enclosure having a periphery for engaging a patient support base wherein after said periphery is engaged with said patient support base, an isolated patient environment is formed therebetween, wherein said walled enclosure includes an operable accessway for accessing a portion of the patient.

17. The enclosure of claim 16, wherein said walled enclosure is substantially made of a disposable material and said enclosure is readily separable from a support base for disposal.

18. The enclosure of claim 17, wherein said disposable material is selected from the group of disposable materials consisting of: heavy paper; reinforced paper; lightweight plastic; poly vinyl, and combinations thereof.

19. The enclosure of claim 16, wherein said accessway is situated on said enclosure to allow access to the patient’s head.

20. The enclosure of claim 16, wherein said walled enclosure includes a fluid pressure-equalizing port communicating the isolated environment with the surrounding environment.

21. The enclosure of claim 16, wherein said walled enclosure includes a covering and at least one support structure.
22. The enclosure of claim 21, wherein said walled enclosure includes a skirt extending from said covering.

23. The enclosure of claim 16, wherein said walled enclosure has a head-end and a foot-end, and wherein said walled enclosure includes a head-end wall secured to the head-end of said walled enclosure, and a foot-end wall secured to the foot-end of said walled enclosure.

24. The enclosure of claim 16, wherein said walled enclosure includes a filter port.

25. The enclosure of claim 24, wherein said filter port is made from Hepa-filtering material.

26. The enclosure of claim 16, wherein said walled enclosure includes a window portion made from a transparent material.

27. The enclosure of claim 26, wherein said window portion is situated on said enclosure to allow visibility of the patient’s head.

28. The enclosure of claim 26, wherein said transparent material is clear plastic.

29. The enclosure of claim 16, wherein said walled enclosure is foldable into a compact space.

30. The enclosure of claim 16, wherein one of at least said support base and said walled enclosure includes a passageway for passing medical tubes from the surrounding environment to the isolated patient environment.

31. A method of isolating a patient, said method comprising the steps of:
   a. providing a patient support base for accommodating a patient;
   b. providing an elongated walled enclosure having a periphery for engaging the patient support base;
   c. engaging said periphery of said walled enclosure with said patient support base wherein after said periphery is engaged with said patient support base, an isolated patient environment is formed therebetween; and
   d. equalizing the pressure between the isolated patient environment and the surrounding environment by providing a fluid pressure-equalizing port communicating the isolated environment with the surrounding environment.
32. The method of claim 31, wherein said equalizing step further includes providing a filter port.

33. The method of claim 31, wherein said engaging step includes providing a skirt extending from said periphery of said walled enclosure and securing said skirt to at least one of the patient and said patient support base.

34. The method of claim 31, further including the step of disposing of said walled enclosure after one use.

35. The method of claim 31, further including the step of accessing a portion of the patient in the isolated patient environment through an operable accessway included in said walled enclosure.