1
00:00:28,470 --> 00:00:25,830
space station freedom

2
00:00:32,549 --> 00:00:28,480
the next step in our continuing effort

3
00:00:34,950 --> 00:00:32,559
to explore beyond earth's boundaries

4
00:00:36,389 --> 00:00:34,960
as we establish a permanent presence in

5
00:00:38,549 --> 00:00:36,399
space

6
00:00:40,470 --> 00:00:38,559
new medical challenges will have to be

7
00:00:42,790 --> 00:00:40,480
met

8
00:00:44,709 --> 00:00:42,800
with longer missions

9
00:00:48,150 --> 00:00:44,719
larger cruise

10
00:00:49,990 --> 00:00:48,160
and the complexities of a medical rescue

11
00:00:52,229 --> 00:00:50,000
the health of freedom's international

12
00:01:06,469 --> 00:00:52,239
crew will be essential for the success

13
00:01:11,830 --> 00:01:08,870

the crew health care system

14
00:01:13,990 --> 00:01:11,840
or checks is currently being designed

15
00:01:19,109 --> 00:01:14,000
and developed primarily at nasa's

16
00:01:23,749 --> 00:01:21,910
distributed throughout the space station

17
00:01:25,990 --> 00:01:23,759
this system will provide the total

18
00:01:28,070 --> 00:01:26,000
spectrum of crew health healthcare with

19
00:01:31,270 --> 00:01:28,080
three distinct but interconnected

20
00:01:38,469 --> 00:01:35,350
the exercise countermeasures facility

21
00:01:43,270 --> 00:01:38,479
the environmental health system

22
00:01:51,429 --> 00:01:45,350
following is a description of the health

23
00:01:57,510 --> 00:01:54,630
the hmf will provide necessary in-flight

24
00:01:58,950 --> 00:01:57,520
medical care including prevention

25
00:01:59,990 --> 00:01:58,960
diagnosis

26
00:02:02,550 --> 00:02:00,000
treatment

27
00:02:05,749 --> 00:02:02,560
and care during transport if the patient

28
00:02:08,389 --> 00:02:05,759
must be evacuated

29
00:02:10,630 --> 00:02:08,399
in building the hmf current off the

30
00:02:12,150 --> 00:02:10,640
shelf equipment will be used as much as

31
00:02:14,630 --> 00:02:12,160
possible

32
00:02:16,470 --> 00:02:14,640
however existing technology must be

33
00:02:17,910 --> 00:02:16,480
adapted in order to operate in

34
00:02:20,309 --> 00:02:17,920
microgravity

35
00:02:25,270 --> 00:02:20,319
and conform to space station weight and

36
00:02:28,790 --> 00:02:26,030
the

37
00:02:31,350 --> 00:02:28,800
kc-135 provides a testing environment

38
00:02:41,589 --> 00:02:31,360

for equipment and procedures to be used

39
00:02:48,229 --> 00:02:45,830
using a parabolic flight path the kc-135

40
00:02:55,509 --> 00:02:48,239
can simulate weightlessness for a few

41
00:03:01,589 --> 00:02:57,589
here a prototype of the patient

42
00:03:06,869 --> 00:03:03,589
this piece of equipment must be both

43
00:03:09,430 --> 00:03:06,879
flexible and portable

44
00:03:10,790 --> 00:03:09,440
on space station it will be used as a

45
00:03:12,550 --> 00:03:10,800
stretcher

46
00:03:14,149 --> 00:03:12,560
a treatment area

47
00:03:20,470 --> 00:03:14,159
a dental chair

48
00:03:25,350 --> 00:03:22,630
the health maintenance facility has been

49
00:03:27,830 --> 00:03:25,360
divided into flight subsystems as well

50
00:03:29,830 --> 00:03:27,840
as ground support

51
00:03:31,990 --> 00:03:29,840
these subsystems are similar to the

52
00:03:36,309 --> 00:03:32,000
medical services found in a large

53
00:03:41,190 --> 00:03:39,110
for example the hmf will be designed to

54
00:03:44,630 --> 00:03:41,200
provide emergency medical care for

55
00:03:51,190 --> 00:03:46,869
medical life support with patient

56
00:03:51,200 --> 00:03:55,910
respiratory support

57
00:04:01,910 --> 00:03:59,350
intravenous or iv fluid and nutritional

58
00:04:01,920 --> 00:04:06,550
a variety of physicians instruments

59
00:04:13,350 --> 00:04:09,350
imaging for diagnostics and therapeutic

60
00:04:17,909 --> 00:04:15,990
a clinical laboratory to provide tests

61
00:04:21,509 --> 00:04:17,919
and analysis in areas such as

62
00:04:26,550 --> 00:04:23,830
a pharmacy containing necessary

63
00:04:29,590 --> 00:04:26,560

medications and a computerized inventory

64
00:04:33,350 --> 00:04:29,600
control system

65
00:04:42,870 --> 00:04:35,830
and a hyperbaric facility for treatment

66
00:04:47,590 --> 00:04:45,110
although each of these capabilities will

67
00:04:49,670 --> 00:04:47,600
be needed on space station freedom

68
00:04:52,790 --> 00:04:49,680
it isn't feasible to launch a large

69
00:04:55,030 --> 00:04:52,800
hospital facility into orbit

70
00:04:57,430 --> 00:04:55,040
as a result the entire health

71
00:05:03,430 --> 00:04:57,440
maintenance facility must be designed to

72
00:05:08,150 --> 00:05:06,230
in a hospital a large staff of highly

73
00:05:11,029 --> 00:05:08,160
trained professionals provides health

74
00:05:13,110 --> 00:05:11,039
care services

75
00:05:14,790 --> 00:05:13,120
the space station will not have those

76
00:05:17,430 --> 00:05:14,800
resources

77
00:05:20,150 --> 00:05:17,440
because of limited medical personnel the

78
00:05:26,870 --> 00:05:20,160
hmf equipment will be user friendly and

79
00:05:33,510 --> 00:05:29,909
in order to provide maximum flexibility

80
00:05:35,189 --> 00:05:33,520
the hmf will have a modular design

81
00:05:37,430 --> 00:05:35,199
each piece of equipment will be

82
00:05:44,230 --> 00:05:37,440
self-contained and will be held in

83
00:05:48,790 --> 00:05:46,629
unlike a hospital with its mounds of

84
00:05:51,110 --> 00:05:48,800
forms and stacks of paper

85
00:05:52,950 --> 00:05:51,120
the hmf will use freedom's computer

86
00:05:59,749 --> 00:05:52,960
resources to integrate all the

87
00:06:05,270 --> 00:06:02,150
dr james logan of nasa headquarters

88
00:06:07,029 --> 00:06:05,280

explains this innovative approach

89
00:06:09,270 --> 00:06:07,039
one of the things that we're developing

90
00:06:11,830 --> 00:06:09,280
at johnson space center is a concept

91
00:06:13,270 --> 00:06:11,840
known as the medical information bus or

92
00:06:17,110 --> 00:06:13,280
mib

93
00:06:19,590 --> 00:06:17,120
devices on the health maintenance

94
00:06:22,390 --> 00:06:19,600
facility to not only interact with each

95
00:06:24,070 --> 00:06:22,400
other but also interact with the hmf

96
00:06:25,749 --> 00:06:24,080
computer

97
00:06:26,950 --> 00:06:25,759
additional things that would be housed

98
00:06:29,510 --> 00:06:26,960
in the health maintenance facility

99
00:06:31,990 --> 00:06:29,520
computer would be things like diagnostic

100
00:06:34,629 --> 00:06:32,000
and treatment protocols or inventory

101
00:06:36,309 --> 00:06:34,639
management for the hmf

102
00:06:38,550 --> 00:06:36,319
if there was an illness on board the

103
00:06:41,029 --> 00:06:38,560
space station after the crew medical

104
00:06:42,390 --> 00:06:41,039
officer did a diagnostic physical exam

105
00:06:45,270 --> 00:06:42,400
he would enter the results of that

106
00:06:47,270 --> 00:06:45,280
physical exam on a keyboard which would

107
00:06:48,469 --> 00:06:47,280
put those results in an electronic

108
00:06:51,350 --> 00:06:48,479
medical record

109
00:06:53,469 --> 00:06:51,360
however all the laboratory data and the

110
00:06:55,430 --> 00:06:53,479
radiographic data and the

111
00:06:58,150 --> 00:06:55,440
electrophysiologic data such as an

112
00:07:00,830 --> 00:06:58,160
electrocardiogram would automatically be

113
00:07:03,029 --> 00:07:00,840

entered into an electronic medical

114
00:07:05,110 --> 00:07:03,039
record this is the mission control

115
00:07:07,350 --> 00:07:05,120
center in houston texas this is the

116
00:07:08,710 --> 00:07:07,360
nerve center for the entire mission the

117
00:07:11,110 --> 00:07:08,720
flight director and all the flight

118
00:07:12,629 --> 00:07:11,120
controllers stay in this room throughout

119
00:07:14,469 --> 00:07:12,639
the duration of the mission

120
00:07:15,589 --> 00:07:14,479
this is also where the mission surgeon

121
00:07:17,670 --> 00:07:15,599
sits

122
00:07:19,510 --> 00:07:17,680
after the crew medical officer on the

123
00:07:21,990 --> 00:07:19,520
space station gathers all the medical

124
00:07:24,469 --> 00:07:22,000
data and the data is

125
00:07:26,390 --> 00:07:24,479
collated by the medical information bus

126
00:07:28,870 --> 00:07:26,400
that information is down linked to the

127
00:07:30,790 --> 00:07:28,880
earth and reconstructed at this console

128
00:07:32,710 --> 00:07:30,800
here in mission control

129
00:07:34,550 --> 00:07:32,720
when the information is reconstructed

130
00:07:36,070 --> 00:07:34,560
the mission surgeon has to make several

131
00:07:37,749 --> 00:07:36,080
key decisions

132
00:07:41,430 --> 00:07:37,759
the first decision here she would have

133
00:07:43,189 --> 00:07:41,440
to make is whether or not to activate a

134
00:07:45,029 --> 00:07:43,199
group of consultants which would be

135
00:07:46,710 --> 00:07:45,039
other physicians and surgeons located

136
00:07:48,790 --> 00:07:46,720
all across the country

137
00:07:51,029 --> 00:07:48,800
to have them actually look at the data

138
00:07:52,950 --> 00:07:51,039

with him or her

139
00:07:54,550 --> 00:07:52,960
the next decision that the doctor would

140
00:07:56,830 --> 00:07:54,560
have to make is whether or not the

141
00:07:59,350 --> 00:07:56,840
medical condition can be treated

142
00:08:02,469 --> 00:07:59,360
definitively at the hmf onboard the

143
00:08:04,629 --> 00:08:02,479
space station or whether a rescue needs

144
00:08:06,230 --> 00:08:04,639
to be even considered

145
00:08:08,309 --> 00:08:06,240
it becomes obvious then when you

146
00:08:10,710 --> 00:08:08,319
consider the mission and the cost of

147
00:08:12,390 --> 00:08:10,720
medical rescue that one of the prime

148
00:08:14,869 --> 00:08:12,400
goals of having a health maintenance

149
00:08:17,589 --> 00:08:14,879
facility on board the space station is

150
00:08:20,790 --> 00:08:17,599
to be able to treat as many medical

151
00:08:26,070 --> 00:08:20,800
conditions as possible in flight without

152
00:08:31,430 --> 00:08:28,230
on previous space flights there was

153
00:08:33,430 --> 00:08:31,440
nothing comparable to the hmf

154
00:08:35,589 --> 00:08:33,440
during those missions the need for

155
00:08:41,430 --> 00:08:35,599
in-flight health care was not as great

156
00:08:46,310 --> 00:08:44,389
as part of the crew healthcare system

157
00:08:49,110 --> 00:08:46,320
the health maintenance facility will

158
00:08:52,150 --> 00:08:49,120
provide a necessary tool in maintaining

159
00:08:54,949 --> 00:08:52,160
the crew's health as we begin to live