Naval Submarine Medical Research Laboratory

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COMPUTER AIDED OCULAR ASSESSMENT: PROGRAMMER'S MANUAL

by
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by
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Naval Submarine Medical Research LDaboratory
Report 1173

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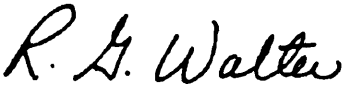

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Summary Page

PROBLEM:

To provide a programmer's reference manual for the Computer Aided Ocular Assessment (CAOA) program.

FINDINGS:

The manual describes the distributed files and programs included with the CAOA program. Complete listings of the program code are presented. In addition, selected examples from the source code are described in detail.

APPLICATION:

The information presented in this manual will allow programmers to modify the CAOA program.

ADMINISTRATIVE INFORMATION

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ABSTRACT

Computer Aided Ocular Assessment (CAOA) is a computer program designed to aid submarine Independent Duty Corpsmen with the diagnosis and treatment of eye disease. This manual serves as a programmer's reference for the program. It provides complete documentation of all of the program's source code. In addition, selected portions of the code are thoroughly explained.

Expertise with the Exsys Professional expert system development package is required to use this manual effectively.

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COMPUTER AIDED OCULAR ASSESSMENT: PROGRAMMER'S MANUAL

1. INTRODUCTION

The Computer Aided Ocular Assessment (CAOA) program is designed to aid submarine Independent Duty Corpsmen (IDC) with diagnosis and treatment of eye diseases. The purpose of this programmer's manual is to document the actual program code and to provide a limited explanation of the code. Companion publications are available which describe the use of the program (User's Manual), and the philosophy of the design and features of the program.

The CAOA program was written using version 2.0.9 of Exsys Professional, an expert system development package. This manual is intended for readers who are familiar with that package. No attempt is made to replicate information contained in the Exsys Professional documentation.

In addition, readers should be familiar with IBM-PC and compatible computers, the MS-DOS operating system, and have some general computer programming abilities.

In many of the figures that appear throughout this manual, line numbers are used for descriptive purposes. It is important to note that line numbers are not used in any of the actual program code.

2. DESCRIPTION OF DISTRIBUTED PROGRAM FILES

Because the CAOA program was written to operate on IBM-PC compatible computers with either EGA or VGA color monitors, two versions, one for each monitor type, are currently available. Notice will be given where files are specific to one monitor type. The program listings provided in this manual are all from the VGA version.

2.1. Exsys Proprietary Files

These are files provided by the manufacturer of the expert system development package. The laboratory owns a non-commercial unlimited runtime license to distribute these files without alteration of their contents.

2.1.1. Exsysp.exe

This is the main inference engine program. It works in conjunction with the overlay file to run existing, fully developed knowledge bases.

2.1.2. Exsysp.ovl

This is an overlay file that works with exsysp.exe to reduce memory requirements.

2.1.3. Exsysp.hlp

This is the main help file providing user assistance for the mechanics of the Exsys Professional runtime.

2.1.4. Exsysii.exe

This program is used to display graphic files from outside the Exsys

runtime. If the user presses a key while the image is displayed, the key value is written to the file is.rtn. Exsysii.exe is called by the idx.bat batch file.

2.1.5. Ex_ii.exe

This program is used from within the Exsys runtime to display graphics files. It is called from the re7.scr screen file.

2.1.6. Pager.exe

This is a utility program that reformats ASCII files. It is called from the re7.cmd and the *.rpt files. A more complete description of this program is available in the file pager.doc which is located on the original Exsys diskettes.

2.1.7. Num2err.exe

This is a utility program that sets a DOS error level based on a keystroke input by the user. Num2err.exe sets a DOS error level equal to the number contained in the is.rtn file. Num2err.exe is called from the idx.bat batch file. A more complete description of this program is available in the file num2err.doc which is located on the original Exsys diskettes.

2.2. Enter.com

This is a public domain utility that simply transmits a keyboard scan code simulating the depression of the enter key. It is called from the re7.cmd file.

2.3. CAOA Specific Files

These are files created at this laboratory. They include the knowledge base, script files that provide procedural and logical control of the program, graphic and character-based screens, and medical user assistance. Files designated as ASCII were created using a text editor. All other files were created using the Exsys Professional Rule editor.

2.3.1. Re7.cfg

This ASCII script file sets the global configuration for the CAOA knowledge base. A listing of the contents of this file appears in appendix A. Chapter E of the Exsys manual describes all of the possible parameters for the configuration file.

Six global parameters are set by the re7.cfg file. FORWARD specifies forward chaining of the rules overriding the native backward chaining mode. RECOVER allows the user to save and restart a case. REDISPOFF overrides the display of files called by the display command when a change and rerun is ordered by the user. NOTITLE overrides the default exsys generated character-based knowledge base title screen. The WHYOFF and HOWOFF parameters prevent the user from viewing the knowledge base rules during a run.

2.3.2. Re7.cmd

Re7.cmd is an ASCII script file that provides specific procedural control over the execution of the CAOA pro-

```
1    :LOOP                    13   GOTO LOOP2
2    RULES 1-115 /F /N        14   ENDIF
3    IF QCHK(51,1)            15   IF QCHK(70,1)
4    GOTO LOOP2               16   GOTO LOOP2
5    ENDIF                    17   ENDIF
6    IF QCHK(26,1)            18   IF QCHK(69,2)
7    GOTO LOOP2               19   GOTO LOOP3
8    ENDIF                    20   ENDIF
9    IF QCHK(60,1)            21   :LOOP2
10   GOTO LOOP2               22   REPORT SPTST.RPT
11   ENDIF                    23   DISPLAY SPTST.SCR
12   IF QCHK(32,1)            24   :LOOP3
```

Figure 1. RE7.CMD Part 1

gram. Chapter J of the Exsys manual describes the command language in detail. A complete listing of the command file appears in appendix A.

The first section of the re7.cmd file is shown in figure 1. It begins with a marker, :loop, that is used in a goto statement used later in the command file. When the program is first started, this marker is skipped over. In line 2 rules 1-115 are run in forward chaining (/F) mode with no backward chaining (/N). Next, in lines 3-17, a series of if-then statements are invoked which determine whether a special test screen should be created. These if-then statements test the truth condition of qualifiers 51, 26, 60, 32, and 70. If any of these qualifiers are true, processing jumps to the marker :loop2, line 21. If a qualifier returns a false value, its goto statement is skipped and processing continues in a linear fashion. Next, qualifier 69 is tested in line 18 (unless it has been skipped over by a previous goto statement). If it returns a true value, processing jumps over lines 21-23 to the marker :loop3 in line 24, and the special test screen is not created. If qualifier 69 returns a false value the report generator is called to build the special test screen using the sptst.rpt specification file (line 22). Finally, line 23 displays the special test screen produced by the report generator.

The command file continues in figure 2. In line 25, rules 116-161 are run using forward chaining and no backward chaining (/F /N). Then a series of if-then statements are tested to determine if the user has made a data input error in essentially the same manner described above. In lines 26-55, qualifiers 73-76, and 78-83 are tested. If any of these tests returns a true value, processing jumps to :loop5, line 57. Line 58 then calls the report generator to build the error screen specified by the file error.rpt. The screen created by the report generator is then displayed by the command in line 59. If all of the qualifier tests return false values, the goto statement in line 56

```
25  RULES 116-161 /F /N
26  IF QCHK(73,1)
27  GOTO LOOP5
28  ENDIF
29  IF QCHK(74,1)
30  GOTO LOOP5
31  ENDIF
32  IF QCHK(75,1)
33  GOTO LOOP5
34  ENDIF
35  IF QCHK(76,1)
36  GOTO LOOP5
37  ENDIF
38  IF QCHK(78,1)
39  GOTO LOOP5
40  ENDIF
41  IF QCHK(79,1)
42  GOTO LOOP5
43  ENDIF
44  IF QCHK(80,1)
45  GOTO LOOP5
46  ENDIF
47  IF QCHK(81,1)
48  GOTO LOOP5
49  ENDIF
50  IF QCHK(82,1)
51  GOTO LOOP5
52  ENDIF
53  IF QCHK(83,1)
54  GOTO LOOP5
55  ENDIF
56  GOTO LOOP6
57  :LOOP5
58  REPORT ERROR.RPT
59  DISPLAY ERROR.SCR
60  :LOOP6
```

Figure 2. RE7.CMD Part 2

is invoked and processing jumps to :loop6, line 60 and the error screen is not created or displayed.

The final diagnosis screen is created by the call to the report generator in line 61, as shown in figure 3. The screen is then displayed by the command in line 62. After the user is finished viewing the final diagnosis screen, qualifier 68 is displayed by the command in line 64. If the user selects value 1, Change data and rerun, the commands in lines 65-69 are invoked. Line 65 checks the truth condition of value 1 of qualifier 68. If it is found to be true, the screen is cleared in line 66, enter.com is run to issue a enter keystroke to the typematic buffer (this is done to override a decision screen the runtime module displays by default), the change data screen is displayed and processing jumps back to the beginning of the command file. In line 70, the truth condition of qualifier 68 value 2 is tested. If this test returns a true value, the current case is saved and processing jumps to :loop4, line 63. Finally, in line 74 the truth condition of qualifier 68 value 3 is tested. If a true value is returned,

```
61  REPORT RE7.RPT
62  DISPLAY SCREEN2.TXT
63  :LOOP4
64  ASK Q 68
65  IF QCHK(68,1)
66  CLS
67  RUN ENTER.COM
68  CHANGE LOOP
69  ENDIF
70  IF QCHK(68,2)
71  SAVEDATA
72  GOTO LOOP4
73  ENDIF
74  IF QCHK(68,3)
75  SAVEDATA
76  CLEAR ALL
77  GOTO LOOP
78  ENDIF
```

Figure 3. RE7.CMD Part 3

the current case is saved, all rules, qualifiers and variables are cleared and processing jumps back to the beginning of the command file. Although it is not explicit in the command file, if value 4 is set for qualifier 68 is set, the command file terminates and control is passed back to the batch file idx.bat.

2.3.3. Re7.hyt

This file is an index file for the hypertext help facility. It is actually generated automatically during an exsys run by the runtime program; it was not created by the laboratory.

2.3.4. Re7.rpt

This ASCII script file is a report generator specification that builds the final diagnosis screen. It is called by the re7.cmd file and produces a file called screen.txt which is then formatted by pager.exe, producing the file screen2.txt. Screen2.txt is then displayed by the re7.cmd command file.

For descriptive purposes, an abbreviated listing of the Re7.rpt report specification file appears in figure 4. The complete listing is reprinted in appendix B. The first command in Re7.rpt opens the file screen.txt for input. In general, lines that contain the " " /L command simply add a carriage return line feed to the file. Lines that contain text surrounded by quotation marks add the enclosed text to the screen.txt file. Line 11 contains text formatting instructions for the pager.exe program. The real screen building begins with line 12 where all choices are tested to determine if their confidence value equals or exceeds 100. If the confidence value of any choice is greater than or equal to 100, the test returns a true value and the goto (/G) command is invoked. Processing jumps to line 14. Then the category label VERY PROBABLE is added to the screen.txt file in line 15. In line 16, the command C=>100 /T causes the report generator to print the text of all of the choices that received a confidence value greater than or equal to 100. If no choice confidence value exceeds or equals 100, the test in line 12 fails and processing proceeds to line 13. There, a goto command is issued which skips over the category building processes of lines 14-17, and the VERY PROBABLE category is not created. This process is repeated two more times

```
1    FILE SCREEN.TXT
2    " "/L
4    "CAOA FINAL DIAGNOSES"
11   ">left_margin=10"
12   C =100 /G:STOP1
13   GOTO SKIP1
14   :STOP1
15   "VERY PROBABLE:"
16   C =100 /T
17   " "/L
18   :SKIP1
32   C 0 /G:STOP4
35   "Insufficient information for
     accurate diagnosis."
36   :STOP4
43   CLOSE
44   RUN pager screen.txt
                screen2.txt 2 80
     20 /C
```

Figure 4. RE7.RPT

in lines 19-31 (not shown) to establish similar category listings for PROBABLE and CONSIDER.

In line 32, another test of the confidence values attained by the choices is performed. The purpose of this test is to determine if no choice received a confidence value of greater than 0, in which case the statement 'Insufficient information for accurate diagnosis' is added to the screen.txt file. Specifically, line 32 tests whether any choice received a value of greater than 0. If so, the goto command is exercised and processing skips to line 36. If no choice received a confidence value greater than 0, the test in line 32 fails, and processing moves to line 35 where the text string is added to the file. The screen.txt file is closed in line 43. Then pager.exe is run in the next line to reformat the screen, creating the file screen2.txt.

2.3.5. Re7.rul

This file is generated using the Exsys Professional rule editor. It contains the text independent numeric representation of the knowledge base rules. Chapters B, C, and D of the Exsys manual explain the fundamentals of rule construction. A complete commented listing of the rules appears in appendix C, and a detailed description of rule structure is provided in section 3 of this manual.

2.3.6. Re7.scr

This ASCII file is the screen definition file associated with the CAOA knowledge base as well as the shell program. It contains custom screens which replace all of the default screens that ask the user for data for variables. It also contains all of the hypertext help text screens, treatment protocol screens, and calls for graphic help screens. Chapter I of the Exsys manual describes the screen definition language in detail. In section 4 of this document, four of the major screen types used in the CAOA program are explained. A complete listing of the screen definition file appears in appendix D.

Two versions of the re7.scr file have been produced. One is optimized for VGA monitors while the other is optimized for EGA. The only difference between the files is that graphics calls use different filenames (see section 2.3.12) and the graphic mode is set for 16 in the EGA version and 18 for the VGA version.

2.3.7. Re7.txt

This file is a companion to the re7.rul file. It is also generated using the rule editor. It contains the text portion of the knowledge base rules.

2.3.8. Shell.*

This group of files comprises the shell program. Shell is a second expert system that simply provides the user with direct access to the treatment protocols and the hypertext help system. The various shell.* files are directly analogous to the re7.* files listed above. Listings of all of the shell files can be found in appendix E.

```
1    FILE SPTST.SCN
2    " "/L
3    " "/L
4    " SPECIAL EXAMINATION PROCEDURES" /L
5    " "/L
6    " The program is now going to ask about the results of some "
7    "procedures you may not have done or may not be familiar with."
8    "Those procedures are:"
9    " "/L
10   ">LEFT_MARGIN=15"
11   Q57  1 /"^^CORNEAL SENSITIVITY MEASUREMENT^^" /L
12   Q26  1 /"^^INTRAOCULAR PRESSURE MEASUREMENT^^" /L
13   Q60  1 /"^^CONTACT LENS EXAMINATION^^" /L
14   Q32  1 /"^^VISUAL FIELD EXAMINATION^^" /L
15   Q70  1 /"^^EYELID EVERSION^^" /L
16   ">LEFT_MARGIN=5"
17   "You can use Keyword help to obtain more information on these "
18   "procedures.  Simply press until the procedure you are  interested "
19   "in is displayed at the bottom of the screen, then press the "ENTER" key  "
20   "to display the information."
21   close
22   RUN pager sptst.scn sptst.scr 5 80 20 /C
```

Figure 5. SPTST.RPT

2.3.9. Sorry.scr

This is an ASCII file that is displayed by the idx.bat file if the user selects the tutorial option. It explains that the tutorial is not yet available.

2.3.10. Sptst.rpt

This is another ASCII script file that contains a report generator specification. This file is sometimes called (depending on data input by the user) by re7.cmd to create a file named sptst.scn. Sptst.scn is then formatted by pager.exe, producing the file sptst.scr which is displayed by re7.cmd to warn the user that the program is about to ask for results from some special test procedure(s).

A complete listing of the sptst.rpt report specification file appears in figure 5 and is reprinted in appendix B. The first command in sptst.rpt opens the file sptst.scn for input. Lines 2, 3, 5 and 9 simply add a carriage return line feed to the file. Lines 4, 6-8, and 17-20 simply add the text enclosed in the quotation marks to sptst.scn. The commands in lines 10 and 16 are text formatting parameters used by the pager.exe program. In lines 11-15 the truth condition of qualifiers 57, 26, 60, 32, and 70 is tested. In each case, if value 1 of the qualifier is true, the test passes and the quoted text and a carriage return line feed (/L) are added to the sptst.scn file. If the value of a given qualifier is not 1, the test fails and processing passes to the next line with no entries in the sptst.scn file. After all the qualifiers are tested and the appropriate text is entered in sptst.scn, the file is closed by the command in line 21. Finally, in line 22, the pager.exe program is run to reformat sptst.scn to create sptst.scr for screen display.

2.3.11. Idx.bat

This is simply a DOS batch file that displays the preliminary screen and then the menu screen. Depending on the user's input, it then calls the appropriate executable file. After the user completes a given menu task, processing control returns to the batch file which then recycles to redisplay the menu. A complete listing appears in figure 6.

While most of the commands are simple DOS commands, a couple of command line parameters that are or can be used in the idx.bat file warrant special attention. The command line parameter maxmem must be used to override the default condition of the runtime module whereby it loads the re7.txt and re7.rul files into memory. This is due to the extensive use of the note feature to provide programming documentation for the rules. Nocolor is another command line parameter which can be used to optimize the color set used by the runtime module for LCD displays.

Two versions of the idx.bat file have been produced. One is optimized for VGA monitors while the other is optimized for EGA. The only difference between the files is that graphics calls use different filenames (see section 2.3.12) and the graphic mode is set for 16 in the EGA version and 18 for the VGA version.

2.3.12. Error.rpt

This is another report specification file that uses the report generator to produce a screen to warn the user if he/she has entered inconsistent data. It is called by the re7.cmd command file. It produces a screen file called error.scr which is formatted by pager.exe to produce the file error.scr for screen display. This report specification is similar to those discussed in sections 2.3.4 and 2.3.10. A complete listing can be found in appendix B.

```
off
REM
cls
exsysii
-IEMCNBLUE.PCX -K'1234' -
    M18 -Q2
:START EXSYSII -ITITLE.PCX -
    K'1234' -M18
NUM2ERR
IS.RTN
if errorlevel 4 goto quit
if errorlevel 3 goto tutorial
if errorlevel 2 goto protocols
if errorlevel 1 goto exsys :exsys
SET EXSYS_TITLE=(C) EXSYS
    Inc., 1988
exsysp re7 maxmem
GOTO START
:protocols
SET EXSYS_TITLE=(C) EXSYS
    Inc., 1988
exsysp shell maxmem
GOTO START :tutorial
cls
type sorry.scr
pause
GOTO START
:quit
cls
```

Figure 6. IDX.BAT

2.3.13. Graphics files

All of the graphics files are single screen *.pcx files (PC Paintbrush). Printouts of all of the graphic files can be found in appendix F. Most are scanned images that were edited using PC Paintbrush IV Plus and Microsoft Windows Paintbrush. Separate EGA and VGA versions of each file were produced:

VGA Filenames	EGA Filenames	Description
anatomyv.pcx	anatomy.pcx	labeled cross section of human eye
conjv.pcx	conj.pcx	labeled drawing of anterior human eye
cornsnsv.pcx	cornsns.pcx	diagram of corneal sensitivity test
dendritv.pcx	dendrite.pcx	drawings of herpetic corneal ulcer
emblemv.pcx	emcnblue.pcx	NSMRL emblem for preliminary screen
eversiov.pcx	eversion.pcx	diagram of lid eversion procedure
fbtrackv.pcx	fbtrack.pcx	drawing of foreign body staining
infiltv.pcx	inflt.pcx	drawing of corneal infiltrate
schiotzv.pcx	schiotz.pcx	photo of tonometer procedure
titlev.pcx	title.pcx	NSMRL emblem with user menu overlay
trigemv2.pcx	trigem2.pcx	diagram of trigeminal nerve
visionv.pcx	re.pcx	refractive eror diagram

3. General Rule Structure

To understand the meaning of rules created in Exsys Professional, we will need to define a number of terms: inference engine, knowledge base, condition, value, qualifier, choice, confidence level, rule, and forward chaining.

3.1. Inference Engine

In Exsys Professional, the inference engine is embodied in the two files exsysp.exe and exsysp.ovl. The inference engine is a knowledge independent software program that contains the computer instructions to reason with the rules of the knowledge base.

3.2. Knowledge Base

A knowledge base is a set of rules that an inference engine uses to solve a particular problem. In the case of the CAOA program, the files re7.rul and re7.txt contain the rules used to arrive at an ocular diagnosis. While two other knowledge base files, shell.rul and shell.txt, are distributed with the CAOA program, their purpose is entirely procedural.

3.3. Condition

In Exsys Professional, a condition is a statement of fact. A condition is made up of a formula or a qualifier and one or more values. It may be textual or mathematical. An example of a text condition from rule 19 of the knowledge base (appendix C) is, "The condition is affecting

both eyes." A text condition may be true or false, depending on the data input by the corpsman. A mathematical condition is represented by an algebraic expression such as "[IOP OD] > 25" from rule 160, appendix C. The term [IOP OD] is a variable which stands for intraocular pressure of the right eye. Mathematical expressions can also be tested for validity. In this case, the expression can be tested to determine whether the intraocular pressure of the right eye is or is not greater than 25 millimeters mercury.

3.4. Qualifier

In general, a qualifier is the part of a text condition up to and including the verb. For example, "The condition is affecting" would be the qualifier for the text condition described in the previous paragraph. Many of the conditions in the CAOA rule base are written in the form of a question. With an interrogative condition, the qualifier is the part of the condition up to and including the question mark.

For programming ease, qualifiers have generally been given names. This allows the programmer to quickly locate qualifiers while using the rule editor. The name consists of two parts: a designation of the qualifier type followed by a mnemonic. The qualifier type designations are M for meta-qualifier, Sx for a symptom query, and Sn for a sign query. Meta-qualifiers represent intermediate states of knowledge set by the conclusions of some rules. The truth value of a meta-qualifier is determined by the inference engine from the rules, not by direct query of the end user. The meaning of symptom and sign query is obvious, and their truth values are set by direct query of the user.

3.5. Values

For every qualifier, there are at least two values. Values are the possible completion of a sentence for declarative conditions. In the case of interrogative conditions, values are the possible answers to the question posed in the qualifier. Continuing with the example from above, the possible values attributed to the qualifier "The condition is affecting" are "only the right eye", "only the left eye", and "both eyes".

3.6. Choice

In the CAOA program, a choice corresponds to a diagnosis. The goal of the expert system is to create a list of probable choices or diagnoses.

3.7. Confidence Level

A confidence level is a numeric value associated with a particular choice which indicates the degree of confidence that the choice is correct. In Exsys, a confidence level may be positive or negative and may have any integer value. In the CAOA program however, only values of 50, 30, 20, 10, 0, -10, -20, -30, and -50 were used. The CAOA program uses an increment/decrement system to combine the confidence levels assigned to each

choice as a result of rules firing. The inference engine simply sums the confidence values for each choice to arrive at a final confidence level for each diagnoses. The report specification file re7.rpt then separates the diagnoses into categories of "very probable", "probable" and "consider" depending on the final confidence level achieved by each diagnosis.

3.8. Rules

Rules are the text representation of the knowledge embedded in the CAOA program. In general, they are readable as plain English if-then statements created from the components described above. All rules in exsys must have at least two parts: an IF clause and a THEN clause. In the CAOA program, all rules also include a NOTE which contains programmer's documentation. Two other options which sometimes appear in CAOA rules are an ELSE clause and a REFERENCE.

The IF clause of a rule is made up of one or more conditions. The conditions may be textual or algebraic. The conditions are statements which may be true or false, and they may be connected by the Boolean operators AND, OR, or NOT. The inference engine tests the conditions to determine whether the IF clause of the rule is true or false.

The THEN clause of a rule can contain both conditions and choices with their associated confidence levels. Conditions which appear in the THEN clause of a rule generally set intermediate knowledge states which are termed meta-knowledge. Accordingly, rules that contain only conditions in the THEN clause are called meta-rules. When the inference engine determines that the IF clause of a rule is true, it sets all of the conditions in the THEN clause of the rule to true and increments or decrements all of the choices accordingly. Conversely, when the IF clause of a rule is found to be false, all of the conditions in the THEN clause are set to false, but the choices are neither incremented nor decremented; they are simply ignored.

The ELSE clause of a rule is optional. ELSE functions like THEN except the ELSE conditions are instantiated as true and the ELSE choices are incremented/decremented when the IF clause of the rule is found to be false. ELSE is used sparingly in the CAOA program because when ELSE exists in a rule, some part of the rule is always true. That is, when ELSE exists, the rule will always have some effect on the diagnostic outcome.

NOTEs are used primarily to document the purpose and logic of individual rules. This feature is used extensively in the CAOA knowledge base.

A REFERENCE can also be added to a rule. This feature was seldom utilized in the CAOA knowledge base because the sources of knowledge were intermixed and profoundly filtered by the developer.

3.9. Forward Chaining

Also known as data-directed search, forward chaining is a mode of rule execution where rules are fired in essentially the order they occur in the knowledge base. In a forward chaining system, rule firing is also controlled by the current knowledge state, i.e. the data accumulated at a given point in time. This is in contrast to backward chaining, which is the default mode of Exsys Professional. With backward chaining, a particular goal (i.e. diagnosis) is assumed, and appropriate rules are fired in an order determined by the inference engine to prove or disprove that goal. Then a second goal is assumed, it is proved or disproved and so on, until each goal is tested.

All rules in the CAOA program are run in a forward chaining mode. While a forward chaining system is much harder to implement, it offers one major advantage over a backward chaining system: the order of query is completely controllable. Thus, it is possible to build an expert system that interrogates the user in a planned and natural way. In the CAOA program, user questioning follows the standard medical SOAP format.

4. Custom Screens and Hypertext Help

Custom screens are special replacements for the screens the Exsys program builds to display queries. Hypertext help screens are also custom screens used for displaying information in response to the user's help request. There are four general types of custom screens used in the CAOA program: text query screens; text help screens; graphic help screens; and text list screens. All custom screens and hypertext help screens are contained in the file re7.scr which is listed in appendix D.

4.1. Text Query Screens

In its default mode, when it came time to query the user about his patient's visual acuity, Exsys Professional would display a screen reading "Input a value for the variable: Visual Acuity, OD." A custom screen was needed to provide more specific information about what was being asked as well as to query the user in a more natural way. An example of the text query screen that replaces the default screen for variable 3 is shown in figure 7.

In the Exsys Professional screen definition language, the tilde (~) character is used as a marker to designate commands, hypertext keywords, and qualifier and variable names or numbers. The first entry in figure 7 is ~V3 which serves as the header for the screen that will be used to replace the default screen for variable 3. Lines 2-6 designate the background and text colors for the text that follows. The text of the replacement screen appears in lines 7-20. This is simply ASCII text with a CR-LF at the end of each line. In general, to avoid undesirable color effects, it is best to extend each line of the text to column 79 with spaces before inserting the CR-LF. A red border with the text "Exsys Pro" overlaying the upper right corner is created by the commands in lines 21-24 . A dark blue

```
1    ~V 3
2    ~CLS
3    ~BACKGROUND LTCYAN
4    ~COLOR BLACK
5    ~CLS
6    ~CURSET 0,0
7
8
9
10              VISUAL ACUITY OD
11
12   Please enter the best corrected distance visual acuityof the
13   right eye:
14
15
16
17
18                 V/A OD: 20/
19
20
21   ~BORDER 0,2,21,78, RED
22   ~Color BLUE
23   ~CURSET 0,4
24   EXSYS PRO
25   ~CURSET 22,0
26   ~BACKGROUND BLUE
27   ~COLOR WHITE
28   Enter the value for visual acuity and press
29   ?-details  Quit-save  H-help  -Keyword
30   ~CURSET 11, 42
```

Figure 7.

status bar is created at the bottom of the screen by the commands in lines 25-26. The text of the status bar is overlaid in lines 28-29. Finally, in line 30, the cursor position is reset so the blinking cursor will appear in the appropriate position for data entry.

4.2. Text Help Screens

Exsys Professional provides the facility for generating a hypertext help system. Hypertext is essentially a richly cross-referenced text file which allows instant access to any hypertext keyword highlighted on screen. Text help screens include screens for word definitions, instructions for specific procedures, and treatment protocols. An abbreviated example of a hypertext help screen definition appears in figure 8.

The help screen is defined in essentially the same manner as the custom screen described in the previous section. There are a few differences, however. A double tilde is used as a marker for hypertext keywords, as shown in line 1 of figure 8. The command SAMEAS is used to link synonymous keywords such as "myopia" and "high myopia" so that separate screens need not be created. Another departure from the custom screen format is the use of boxes to mark off separate sections of text. These boxes, created

```
1    ~~high myopia
2    ~SAMEAS myopia
3    ~~myopia
4    ~BACKGROUND BLUE
5    ~CLS
10   ~COLOR WHITE
11                  High Myopia
12
13   DEFINITION: High myopia is a condition where the axial length
14   of the eye is too long for the optics of the eye.
15   For the purposes of this program, high myopia is defined
16   as refractive error exceeding -3.00 diopters (e.g. -4.00D).
17   For more discussion about the nature of myopia, see the
18   screen on ^^refractive error^^.
21
22   BACKGROUND: Because myopic eyes are generally larger
23   than average, their retinas tend to be stretched compared
24   to non-myopic eyes. This stretching of the retina is
25   thought to increase the likelihood of ^^retinal breaks^^
26   and ^^vitreous detachments^^.
29
30   ~BORDER 2,2,21,78, CYAN
31   ~Color CYAN
32   ~CURSET 2, 5
33    MEDIC Hypertext Help System
34   ~BORDER 5,10,12,70, CYAN
35   ~BORDER 13,10,19,70, CYAN
```

Figure 8. Excerpt from RE7.SCR

by the commands in lines 34-35 are created in the same way the border is made. Finally, with hypertext help screens, there is no need for commands to draw the status bar at the bottom of the screen because the status bar is created automatically by the Exsys Professional runtime program.

4.3. Graphic Help Screens

In some cases it is desirable to include a graphic screen to illustrate a test procedure or to provide more background on word definitions. This facility is accomplished by calls for graphic help screens in the form of *.pcx files.

As shown in figure 9, the command for calling a graphic screen is quite simple. In line 1, the hypertext keyword is identified with a double tilde. The graphic screen is called in line 2 with the command IMAGE. The format of the command is IMAGE(filename.ext -K'\[acceptable keys]' -M[graphic mode number]). In this case, the IMAGE command would load the file cornsnsv.pcx, allow the use of the enter key only, and display the file using graphics mode 18 (640X480X16 colors). A complete description of all of the IMAGE command parameters is provided in chapter N of the Exsys Professional manual.

Exsys Professional always expects a text screen to be displayed immediately after a graphic screen. Accordingly, in lines 3-21 a text screen is defined in exactly the same way as a text help screen except there is

```
1    ~~corneal sensitivity test
2    ~IMAGE(CORNSNS.pcx -K'\N' -M16)
3    ~BACKGROUND BLUE
4    ~CLS
5
6
7
8
9    ~COLOR WHITE
10                Corneal Sensitivity Test
11
12     REVIEW METHOD: To measure corneal sensitivity, make a
13     cotton wisp from a cotton tipped applicator by pulling
14     some of the cotton swab from each of two applicators.
15     The goal is to create two applicators each with a single
16      fiber of cotton  extending from the tip.
17
18   ~BORDER 2,2,22,78, CYAN
19   ~Color CYAN
20   ~CURSET 2, 5
21    MEDIC Hypertext Help System
22   ~BORDER 5,10,11,73, CYAN
```

Figure 9. Excerpt from RE7.SCR

```
1    ~Q "always true"
2    ~CLS
3    ~COLOR WHITE
4    ~BACKGROUND BLUE
5    ~CLS
6                TREATMENT PROTOCOLS
7
8    Use the F1 key to select the treatment protocol you wish
9    to view, then press
      .
10
11       ^^Acute Angle Closure Glaucoma^^
12
13       ^^Acute Iritis^^
14
15       ^^Allergic Conjunctivitis^^
16
17       ^^Bacterial Conjunctivitis^^
18
19       ^^Blepharitis^^
20
21       ^^Chalazion^^
22
23       ^^Chronic Iritis^^
24
25       ^^Contact Lens Tear^^
26
27       ^^Contact Lens Deposit^^
28   ~PRESS ANY KEY
```

Figure 10. Excerpt from RE7.SCR

no need to redesignate the hypertext keyword.

4.4. Text List Screens

Direct access to treatment protocols is provided by the Shell.* program and a text list screen. The text list screen resides in the file re7.scr along with all the other custom screens. The text list screen shown in figure 10 is very similar to a text help screen. It's purpose is simply to display a list of hypertext keywords corresponding to the available treatment protocols. A similar approach could be used to provide direct access to a glossary of terms, but this feature was not implemented in the current version of CAOA.

Acknowledgements:

Special thanks are due to Captain Douglas M. Stetson, MC, USN for his support and guidance throughout this project. Many of the program's better features are a direct result of his suggestions. All of the graphics contained in the CAOA program were ably created by HM1 Todd Brewer, USN. HM1 Brewer also offered a number of useful comments from the user's perspective that helped to make CAOA a better program.

Appendix A

CAOA Configure and Command Files

RE7.CFG File

```
FORWARD
RECOVER
REDISPOFF
NOTITLE
WHYOFF
HOWOFF
```

RE7.CMD File

```
:LOOP
RULES 1-115 /F /N
IF QCHK(51,1)
GOTO LOOP2
ENDIF
IF QCHK(26,1)
GOTO LOOP2
ENDIF
IF QCHK(60,1)
GOTO LOOP2
ENDIF
IF QCHK(32,1)
GOTO LOOP2
ENDIF
IF QCHK(70,1)
GOTO LOOP2
ENDIF
IF QCHK(69,2)
GOTO LOOP3
ENDIF
:LOOP2
REPORT SPTST.RPT
DISPLAY SPTST.SCR
:LOOP3
RULES 116-161 /F /N
IF QCHK(73,1)
GOTO LOOP5
ENDIF
IF QCHK(74,1)
GOTO LOOP5
ENDIF
IF QCHK(75,1)
GOTO LOOP5
ENDIF
IF QCHK(76,1)
GOTO LOOP5
ENDIF
IF QCHK(78,1)
GOTO LOOP5
ENDIF
IF QCHK(79,1)
GOTO LOOP5
ENDIF
IF QCHK(80,1)
GOTO LOOP5
ENDIF
IF QCHK(81,1)
GOTO LOOP5
ENDIF
IF QCHK(82,1)
GOTO LOOP5
ENDIF
IF QCHK(83,1)
GOTO LOOP5
ENDIF
GOTO LOOP6
:LOOP5
REPORT ERROR.RPT
DISPLAY ERROR.SCR
:LOOP6
REPORT RE7.RPT
DISPLAY SCREEN2.TXT
:LOOP4
ASK Q 68
IF QCHK(68,1)
CLS
RUN ENTER.COM
CHANGE LOOP
ENDIF
IF QCHK(68,2)
SAVEDATA
GOTO LOOP4
ENDIF
IF QCHK(68,3)
SAVEDATA
CLEAR ALL
GOTO LOOP
ENDIF
```

Appendix B

Report Specification Files

FILE SCREEN.TXT

```
" " /L
" " /L
"                    CAOA FINAL DIAGNOSES"
" "
"    The final conclusions of the program are displayed below.  They are"
"grouped in three categories: 'Very Probable,' 'Probable,' and 'Consider.'"
"You should treat all diagnoses within a given category as equally likely,"
"and at least consider each of the diagnoses displayed."
" " /L
">>left_margin=10"
C>=100 /G:STOP1
GOTO SKIP1
:STOP1
      "VERY PROBABLE:"
      C>=100 /T
" " /L
:SKIP1
C>=50<100 /G:STOP2
GOTO SKIP2
:STOP2
      "PROBABLE:"
      C>=50<100 /T
" " /L
:SKIP2
C>5<50 /G:STOP3
GOTO SKIP3
:STOP3
       "CONSIDER:"
       C>5<50 /T
:SKIP3
C>0 /G:STOP4
" " /L
" " /L
"    Insufficient information for accurate diagnosis."
:STOP4
">>left_margin=2"
" " /L
"    You can use Keyword Information  <F1>  to display treatment advice for"
"any of the diagnoses listed.  Simply press <F1> until the disease you are"
"interested in is displayed at the bottom of the screen, then press the "
"<ENTER> key to display the treatment information."
CLOSE
RUN pager screen.txt screen2.txt 2 80 20 /C
```

SPTST.RPT file

FILE SPTST.SCN

```
" " /L
" " /L
"                SPECIAL EXAMINATION PROCEDURES" /L
" " /L
"    The program is now going to ask about the results of some "
"procedures you may not have done or may not be familiar with."
"Those procedures are:"
" " /L
">>LEFT_MARGIN=15"
Q57  1 /"^^CORNEAL SENSITIVITY MEASUREMENT^^" /L
Q26  1 /"^^INTRAOCULAR PRESSURE MEASUREMENT^^" /L
Q60  1 /"^^CONTACT LENS EXAMINATION^^" /L
Q32  1 /"^^VISUAL FIELD EXAMINATION^^" /L
Q70  1 /"^^EYELID EVERSION^^" /L
">>LEFT_MARGIN=5"
"    You can use Keyword help <F1> to obtain more information on"
"these procedures.  Simply press <F1> until the procedure you are "
"interested in is displayed at the bottom of the screen, then "
"press the <ENTER> key to display the information."
close
RUN pager sptst.scn sptst.scr 5 80 20 /C
```

ERROR.RPT File

FILE ERROR.SCN

```
" " /L
" " /L
"                INCONSISTENT DATA WARNING" /L
" " /L
"    Some of the data you have entered into the program may "
"be inconsistent with any of the diseases the program considers."
"Those inconsistencies are:"
" " /L
Q73  1 /"    You said the condition was affecting the left"
Q73  1 /"eye, but you also indicated that pressure was high"
Q73  1 /"in the right eye." /L
Q74  1 /"    You said the condition was affecting the right"
```

```
Q74  1 /"eye, but you also indicated that pressure was high"
Q74  1 /"in the left eye." /L
Q75  1 /"    You said the condition was affecting the left"
Q75  1 /"eye, but you also indicated that fields were abnormal"
Q75  1 /"in the right eye." /L
Q76  1 /"    You said the condition was affecting the right"
Q76  1 /"eye, but you also indicated that fields were abnormal"
Q76  1 /"in the left eye." /L
Q78  1 /"    You said the cornea was normal, but also indicated"
Q78  1 /"that you saw corneal staining.  Usually, if "
Q78  1 /"staining is present, you can see some corneal abnormality." /L
Q79  1 /"    You entered high intraocular pressure readings for"
Q79  1 /"both eyes.  This finding would be highly unlikely"
Q79  1 /"with any of the conditions the program considers." /L
Q80  1 /"    You indicated that visual fields were abnormal for"
Q80  1 /"both eyes.  This finding would be highly unlikely"
Q80  1 /"with any of the conditions the program considers." /L
Q81  1 /"    You said the condition was affecting the left"
Q81  1 /"eye, but you also indicated that the right pupil"
Q81  1 /"was abnormal." /L
Q82  1 /"    You said the condition was affecting the right"
Q82  1 /"eye, but you also indicated that the left pupil"
Q82  1 /"was abnormal." /L
Q83  1 /"    You indicated that the pupils were abnormal for"
Q83  1 /"both eyes.  This finding would be highly unlikely"
Q83  1 /"with any of the conditions the program considers." /L
" " /L
"    Inconsistencies may indicate a data entry error or they"
"may imply that your patient's condition is beyond the scope of"
"this program.  If you suspect a data entry error, you can use"
"the Change and Rerun feature which is available after the"
"diagnosis screen."
close
RUN pager ERROR.scn ERROR.scr 5 80 20 /C
```

Appendix C

CAOA Knowledge Base

Subject:
Computer Aided Ocular Assessment for Submarine Independent Duty Corpsmen

Author:
Naval Submarine Medical Research Laboratory

Starting text:
This program is a PROTOTYPE of a computer aided diagnosis module for submarine Independent Duty Corpsmen. As such, its diagnostic accuracy has not been verified. It should not be used for actual medical diagnosis. This program is the property of the Naval Submarine Medical Research Laboratory and may not be copied or distributed without written permission from the Commanding Officer.

Ending text: The progam is about to produce a list of possible diagnoses ordered from most to least likely. The numbers attached to a given diagnosis provide a relative scaling of the likelihood of that diagnosis. However, any of the diagnoses are possible. Only the corpsman can determine the correct final diagnosis.

Because this program is an untested prototype,
DO NOT RELY ON THIS PROGRAM FOR ACCURATE DIAGNOSES!

Uses all applicable rules in data derivations.

Probability System: Increment/decrement

DISPLAY THRESHOLD: 5
QUALIFIERS:

1 Does your patient complain of any of the following symptoms of ^^visual disturbance^^?
Blurred or decreased vision
^^Double vision^^
^^Distorted vision^^
^^Flashing lights^^
^^Floaters^^
^^Haloes around lights^^
None of the above

Name: Sx Visual
Used in rule(s): 0001 0002 0003 0004 0112 0113

2 Does your patient complain of any of the following symptoms of ocular ^^irritation^^?
Itching
Scratchy or foreign body sensation
Pain
Burning
^^Photophobia^^
None of the above

Name: Sx Sensory
Used in rule(s): 0005 0006 0007 0008 0009 0010
0012 0090 0112 0114 0116 0117
0118 0119

3 How does your patient rate the itching symptom?
Mild
Moderate
Severe
None of the above

Name: Sx Itch Degree
Maximum acceptable = 1
Used in rule(s): 0006

4 How does your patient rate the symptom of pain?
Mild
Moderate
Severe

None of the above

Name: Sx Pain Degree
Used in rule(s): 0008

5 Does your patient complain of any of these other ocular symptoms?
Redness
Discharge (other than tearing)
Excessive tearing
Lids stuck together upon arising
None of the above

Name: Sx Other Ocula
Used in rule(s): 0011 0013 0014 0067 0068 0069
0070 0071 0123

6 The condition is affecting:
Only the right eye
Only the left eye
Both eyes

Name: Sx Laterality1
Maximum acceptable = 1
Used in rule(s): 0018 0019 0041 0042 0043 0044
0045 0046 0047 0048 0132 0133
0135 0136 0137 0138 0139 0140
0141 0142 0143 0144 0153 0154
0155 0156 0157 0158

7 The condition is:
Unilateral
Bilateral

Name: M Laterality2
Used in rule(s): (0018) (0019) 0020 0021

8 Is there an ^^associated history of ocular trauma^^?
Yes
No

Name: Hx Trauma Y/N
Maximum acceptable = 1
Used in rule(s): 0022 0023 0113 0150

9 Does your patient have an ocular history of any of the following?
Previous ocular herpes infections
^^High Myopia^^ (spectacle Rx < -4.00D)
^^High Hyperopia^^ (spectacle Rx > +3.00D)
Recent or current soft contact lens wear
Recent or current hard or gas permeable contact lens wear
None of the above

Name: Hx Oc Msc 1
Used in rule(s): 0024 0025 0026 0027 0028 0029
0030 0111 0112 0113 0121

10 Does your patient wear the lenses on an extended wear (overnight) basis?
Yes
No

Name: Hx CL EW
Maximum acceptable = 1
Used in rule(s):

11 Does your patient have a significant medical history of any of the following conditions?
Allergies (hay fever, etc.)
Genital or Labial Herpes
Venereal disease
Connective tissue disorder (arthritis, etc.)
Recent or current URI
None of the above

Name: Hx Med
Used in rule(s): 0034 0035 0036 0037 0111 0112

12 The ^^onset^^ of symptoms can best be described as:
Sudden
Acute
Chronic

Name: Sx Onset
Maximum acceptable = 1
Used in rule(s): 0015 0016 0017 0113

13 The patient's lids appear to be:
Normal
Abnormal

Name: Sn Lids 1
Maximum acceptable = 1
Used in rule(s): 0049 0050 0051 0052 0053 0054 0055 0056

14 Are any of the following abnormalities present in your patient's lids and lashes?
Crusted material on lash line
^^Indurated^^ (hard or firm) mass
^^Erythema^^
^^Edema^^
^^Eczematous^^ flaking of lid skin
None of the above

Name: Sn Lids 2
Used in rule(s): 0050 0051 0052 0053 0054 0055 0056

15 The mass is:
^^Tender^^
^^Non-tender^^

Name: Sn Lids 3
Maximum acceptable = 1
Used in rule(s): 0051 0052

16 The ^^conjunctiva^^ appears to be:
Normal
Abnormal

Name: Sn Conj 1
Maximum acceptable = 1

Used in rule(s): 0057 0058 0059 0060 0061 0062
0063 0064 0065 0066 0067 0068
0069 0070 0071 0072 0073 0074
0075 0076 0077 0080 0090 0122

17 Are any of the following conjunctival abnormalities present?
^^Redness^^
^^Edema^^
^^Follicles^^
^^Papillae^^
None of the above

Name: Sn Conj 2

Used in rule(s): 0058 0059 0060 0061 0062 0063
0064 0065 0066 (0080) 0122 0123

18 The location of the conjunctival injection can best be described as:
^^Diffuse^^
^^Circumcorneal^^
^^Sectorial^^

Name: Sn Conj 3
Maximum acceptable = 1

Used in rule(s): 0058 0059 0060

19 How would you rate the degree of the ^^conjunctival redness^^?
Mild
Moderate
Severe

Name: Sn Conj 4
Maximum acceptable = 1

Used in rule(s): 0061 0062 0063

20 Are any of the following conjunctival discharges present?
^^Excessive tearing^^
^^Stringy^^
^^Mucoid^^
^^Mucopurulent^^
^^Purulent^^
None of the above

Name: Sn Disch
Used in rule(s): 0067 0068 0069 0070 0071

21 Were you able to obtain a conjunctival smear?
Yes
No

Name: Sn Conj Sm
Maximum acceptable = 1
Used in rule(s): 0072 0073 0074 0075 0076 0077

22 Did the conjunctival smear reveal abnormal amounts of any of the following cell types?
^^Neutrophils^^
^^Eosinophils^^
^^Lymphocytes^^
^^Monocytes^^
Bacteria
None of the above

Name: Sn Conj Sm2
Used in rule(s): 0072 0073 0074 0075 0076 0077

23 What type(s) of bacteria were present?
Gram-positive cocci
Gram-negative cocci
Gram-negative rods
None of the above

Name: Sn Conj Sm3
Used in rule(s): 0076 0077

24 Were you able to obtain ^^Intraocular pressure^^ readings from your patient?
Yes
No

Name: Sn IOP Y/N
Maximum acceptable = 1

Used in rule(s): 0134 0135 0136 0137 0138 0139
0140 0147 0148 0155 0156 0160

25 What were the results of your evaluation of ^^tactile tensions^^?
Both eyes equal and normal
Right eye firmer than left
Left eye firmer than right
None of the above / test not performed

Name: Sn TT
Maximum acceptable = 1

Used in rule(s): 0135 0136 0148

26 IOP should:
Be evaluated
Not be evaluated

Name: M IOP Eval

Used in rule(s): (0112) [0112] 0115 0134 0135 0136
0137 0138 0139 0140 0147 0148
0155 0156 0160

27 The pupillary size and response to light appear to be:
Normal, both eyes
Abnormal, right eye
Abnormal, left eye
Abnormal, both eyes

Name: Sn Pupil N/Ab
Maximum acceptable = 1

Used in rule(s): 0040 0041 0042 0043 0044 0045
0046 0047 0048 0112 0152 0153
0154

28 The pupillary response to light of the right eye is:
Normal
Sluggish
Absent

Name: Sn Pup Res OD
Maximum acceptable = 1
Used in rule(s): 0041 0045

29 The pupillary response to light of the left eye is:
Normal
Sluggish
Absent

Name: Sn Pup Res OS
Maximum acceptable = 1
Used in rule(s): 0042 0046 0048

30 The size of the right pupil is (as compared to the left):
Normal
Constricted
Dilated

Name: Sn Pup Sz OD
Maximum acceptable = 1
Used in rule(s): 0043 0047

31 The size of the left pupil is (as compared to the right):
Normal
Constricted
Dilated

Name: Sn Pup Sz OS
Maximum acceptable = 1
Used in rule(s): 0044

32 confrontation VF
Should be done
Should not be done

Name: M VF Eval

Used in rule(s): (0113) [0113] 0115 0141 0142 0143
0144 0157 0158 0161

33 What were the results of your ^^visual field examination^^ of the RIGHT eye?
Normal
^^General constriction of the visual field^^
^^Sectorial defect^^

Name: Sn VF Defect
Maximum acceptable = 1

Used in rule(s): 0141 0143

34 What were the results of your ^^visual field examination^^ of the LEFT eye?
Normal
^^General constriction of the visual field^^
^^Sectorial defect^^

Name: Sn VF OS
Maximum acceptable = 1

Used in rule(s): 0142 0144

35 What were the results of the ^^visual field examination^^?
Normal, both eyes
Abnormal, right eye
Abnormal, left eye
Abnormal, both eyes

Name: Sn Vf Exam
Maximum acceptable = 1

Used in rule(s): 0141 0142 0143 0144 0157 0158
0161

36 OD vision is:
Normal
Reduced

Name: M VA OD N/Ab

Used in rule(s): (0038) [0038] 0120

37 OS Vision is:
Normal
Reduced

Name: M VA OS N/Ab
Used in rule(s): (0039) [0039] 0120

38 What did your examination of the ^^pre-auricular nodes^^ Reveal?
Normal
^^Palpable and non-tender^^
^^Palpable and tender^^

Name: Sn PA Nodes
Maximum acceptable = 1
Used in rule(s): 0078 0079 0111

39 The cornea is:
Normal
Abnormal

Name: Sn Cor N/Ab
Maximum acceptable = 1
Used in rule(s): 0081 0082 0083 0084 0085 0086
0087 0088 0089 0090 0092 0149
0159

40 Are any of the following corneal abnormalities present?
Cloudy or hazy appearance
Scratch or abrasion
^^Localized edematous area^^
^^Infiltrates^^ (Gray or white patches)
Foreign body present
None of the above

Name: Sn Cor 2
Used in rule(s): 0081 0082 0083 0084 0085 0086
0087 0088 0089 0105 0149

41 Which of the following choices best describes the appearance of the abraded area?
Clean and sterile
Adherant greenish ^^discharge^^ or ^^exudate^^
Adherant white discharge or exudate
None of the above

Name: Sn Cor Abr
Maximum acceptable = 1
Used in rule(s): 0084 0085 0086 0088 0089

42 Were you able to obtain a ^^Gram's stain^^ of the ^^exudate^^ from the site of corneal involvement?
Yes
No

Name: Sn Cor G Stn Y
Maximum acceptable = 1
Used in rule(s): 0085 0086

43 What were the results of the ^^Gram's stain^^ of the corneal ^^exudate^^?
G+ Cocci
G- Cocci
G- Rods
None of the above

Name: Sn Cor G Stn 2
Maximum acceptable = 1
Used in rule(s): 0085 0086

44 Does the cornea exhibit ^^fluorescein staining^^?
Yes
No

Name: Sn Cor Fl St Y
Maximum acceptable = 1
Used in rule(s): (0091) 0092 0093 0094 0095 0096
0097 0098 0099 0100 0101 0102
0103 0104 0111 0150

45 The size of the area(s) of corneal staining can best be described as:
Punctate (pinpoint)
Less than 1mm
Larger than 1mm

Name: Sn Cor Stn Sz
Used in rule(s): 0096 0097 0098

46 There is:
Punctate Corneal Staining
No Punctate Corneal Staining

Name: M Cor Stn Pct
Used in rule(s): (0096) [0096] 0106 0124

47 The stained area is:
Less than 1mm
Not less than 1mm

Name: M Cor Stn
Used in rule(s): (0097) [0097] 0151

48 The area of staining is:
Larger than 1mm
Not larger than 1mm

Name: M Cor Stn 1
Used in rule(s): (0098) [0098] 0105 0151 0159

49 The amount of corneal staining is best characterized as:
A single area
2 to 3 areas
Multiple areas

Name: Sn Cor Stn Amt
Maximum acceptable = 1
Used in rule(s): 0099 0100 0101
50 Staining is:

Only in one area
Not only in one area

Name: M Stn Amt 1

Used in rule(s): (0099) [0099]

51 The staining is:
In 2-3 areas
Not in 2-3 areas

Name: M Stn Amt 2-3
Used in rule(s): (0100) [0100]

52 The location of the corneal staining is best characterized as:
Central
Peripheral
^^Diffuse^^

Name: Sn Stn Loc
Maximum acceptable = 1
Used in rule(s): 0102 0103 0104

53 Stain location is:
Central
Not central

Name: M Stn Loc Cen
Used in rule(s): (0102) [0102]

54 The stain location:
Is peripheral
Is not peripheral

Name: M Stn Loc Peri
Used in rule(s): (0103) [0103] 0121

55 The stain location is:
Diffuse
Not diffuse

Name: M Stn Loc Diff
Used in rule(s): (0104) [0104] 0106 0124 0151

56 The stain amt is:
Multiple areas
Not multiple areas

Name: M Stn Amt Mult
Used in rule(s): (0101) [0101] 0105 0124 0151

57 Corneal sensitivity should:
Be measured
Not be measured

Name: M Cor Sen Y/N
Used in rule(s): (0111) [0111] 0115 0131 0132 0133

58 What were the results of the ^^Corneal sensitivity test^^?
Both corneas are about equally sensitive
Right cornea more sensitive than left
Left cornea more sensitive than right.

Name: Sn Cor Sen Maximum acceptable = 1
Used in rule(s): 0131 0132 0133

59 Do you feel that your patient's problem is contact lens related?
Yes
No
Not sure

Name: Sn CL
Related Maximum acceptable = 1
Used in rule(s): 0027 0028 0029

60 The problem is:
CL Related
Not CL Related

Name: M CL Related

Used in rule(s): (0027) (0028) (0029) (0030) 0031 0032
0033 0049 0050 0051 0052 0053
0054 0055 0056 0072 0073 0074
0075 0076 0077 0078 0079 0083
0107 0108 0109 0111 0112 0113
0114 0115 0116 0117 0118 0119
0120 0121 0122 0123 0124 0125
0126 0127 0128 0129 0130 0145
0146

61 The peripheral corneal staining is predominantly:
Superior
Inferior
Lateral
None of the above

Name: Sn Cor Stn Per

Used in rule(s): 0121

62 Has your patient changed any of his ^^contact lens care solutions^^ to new brands in the past month?
Yes
No

Name: Sn CL Sol Chg
Maximum acceptable = 1

Used in rule(s): 0031

63 Is your patient using any contact lens care solutions with ^^preservatives^^?
Yes
No

Name: Sn CL Sol Pres
Maximum acceptable = 1

Used in rule(s): 0032 0033

64 Inspection of the contact lens (removed from the eye) reveals:
^^Deposits^^
^^Damaged edge^^
^^Inverted lens^^
None of the above

Name: Sn CL Insp
Used in rule(s): 0125 0126 0127 0128 0129 0130

65 Which part of the cornea appears cloudy or hazy?

Superior one-third
Middle one-third
Inferior one third
Entire cornea

Name: Sn Cor Hz Loc
Maximum acceptable = 2

Used in rule(s): 0082 0083

66 The ^^anterior chamber^^ is:
Normal
Abnormal

Name: Sn A/C N/Abn
Maximum acceptable = 1
Used in rule(s): 0107 0108 0109 0110

67 Are any of the following ^^anterior chamber^^ abnormalities present?
A/C contains blood
A/C contains pus
^^Aqueus humor^^ appears cloudy
None of the above

Name: Sn A/C Abn
Used in rule(s): 0107 0108 0109

68 Would you like to:
Change data and rerun the program
Save this case
Start a new patient encounter
Exit the diagnostic module

Name: X 1
Maximum acceptable = 1
Used in rule(s):

69 SPTST.SCR should
Be displayed
Not be displayed

Name: M SCR 1
Used in rule(s): (0115)

70 Lid eversion should:
Be performed
Not be performed

Name: M Lid 1
Maximum acceptable = 1
Used in rule(s): (0114) [0114] 0115 0145 0146 0149

71 ^^Eversion^^ of the eyelids reveals:
^^Papillae^^ (bumpy or velvety appearance to upper tarsal conjunctiva)
Foreign body
Inflammation
None of the above

Name: Sn Lid Evert
Used in rule(s): 0145 0146 0149

72 Fluorescien staining should:
Be done
Not be done

Name: M Cor Stn
Maximum acceptable = 1

Used in rule(s): (0090) [0090] 0091 0092 0093 0094
0095 0096 0097 0098 0099 0100
0101 0102 0103 0104 0150 0151
0159

73 LAT OS, IOP HIGH OD:
Warn
Don't warn

Used in rule(s): (0155) [0155]

74 Laterality OD, High IOP OS:
Warn
Don't warn

Used in rule(s): (0156) [0156]

75 Visual field abnormal OD, laterality OS:
Warn
Don't warn

Used in rule(s): (0157) [0157]

76 Visual field abnormal OS, laterality OD:
Warn
Don't warn

Used in rule(s): (0158) [0158]

77 Does the staining pattern match either of these patterns?
^^Dendritic^^ (branching)
^^Foreign body tracking^^ (zig-zag)
None of the above

Name: Sn Cor stn pat

Used in rule(s): (0091) 0093 0094 0095 0096 0097
0098 0099 0100 0101 0102 0103
0104 0151

78 Cornea normal, staining abnormal:
Warn
Don't warn
Used in rule(s): (0159) [0159]

79 High IOP OU:
Warn
Don't warn
Used in rule(s): (0160) [0160]

80 VF Abnormal OU:
Warn
Don't warn
Used in rule(s): (0161) [0161]

81 Pupil ABN RT, Laterality LEFT:
Warn
Don't warn
Used in rule(s): (0154) [0154]

82 Pupil abnormal left, laterality right:
Warn
Don't warn
Used in rule(s): (0153) [0153]

83 Pupils abnormal OU:
Warn
Don't warn
Used in rule(s): (0152) [0152]

84 Consider lid eversion:
Yes
No
Used in rule(s): (0094) [0094] 0114

CHOICES:

1 ^^Pneumococcal corneal ulcer^^

Used in rule(s): (0003) (0007) [0007] (0008) (0009) (0010)
(0012) (0015) (0016) (0017) (0021) (0057)
(0067) (0072) (0076) (0081) (0084) (0085)
(0086) (0088) (0089) (0092) (0093) (0094)
(0105) (0108) (0151)

2 ^^Pseudomonas corneal ulcer^^

Used in rule(s): (0003) (0007) [0007] (0008) (0009) (0010)
(0012) (0015) (0016) (0017) (0021) (0057)
(0067) (0072) (0077) (0081) (0084) (0085)
(0086) (0088) (0089) (0092) (0093) (0094)
(0105) (0108) (0151)

3 ^^Herpes simplex keratitis^^

Used in rule(s): (0003) (0007) [0007] (0008) (0009) (0010)
(0012) (0013) (0015) (0016) (0017) (0021)
(0025) (0035) (0057) (0067) (0074) (0079)
(0088) (0089) (0092) (0093) (0095) (0131)
(0132) (0133)

4 ^^Corneal abrasion^^

Used in rule(s): (0003) (0007) [0007] (0008) (0009) (0010)
(0011) (0012) (0013) (0015) (0016) (0017)
(0021) (0022) (0057) (0067) (0081) (0084)
(0085) (0086) (0088) (0089) (0092) (0093)
(0105) (0151)

5 ^^Traumatic iritis^^

Used in rule(s): (0007) [0007] (0008) (0009) (0013) (0015)
(0016) (0017) (0021) (0022) (0023) (0040)
(0041) (0042) (0043) (0044) (0047) (0048)
(0057) (0058) (0067) (0109) (0139) (0140)

6 ^^Acute iritis^^

Used in rule(s): (0003) (0007) [0007] (0008) (0009) (0010)
(0013) (0016) (0017) (0021) (0036) (0040)
(0041) (0042) (0043) (0044) (0047) (0048)
(0057) (0058) (0067) (0109) (0139) (0140)

7 ^^Chronic iritis^^

Used in rule(s): (0003) (0007) [0007] (0008) (0009) (0010)
(0013) (0015) (0016) (0017) (0021) (0036)
(0040) (0041) (0042) (0043) (0044) (0047)
(0048) (0057) (0058) (0067) (0109) (0139)
(0140)

8 ^^Acute angle closure glaucoma^^

Used in rule(s): (0002) (0003) (0007) [0007] (0008) (0010)
(0013) (0015) (0016) (0017) (0021) (0026)
(0040) (0041) (0042) (0043) (0044) (0045)
(0046) (0047) (0048) (0057) (0058) (0067)
(0082) (0115) (0134) (0135) (0136) (0137)
(0138) (0143) (0144) (0147) (0148)

9 ^^Retinal detachment^^

Used in rule(s): (0001) [0001] (0003) (0010) (0013) (0015)
(0016) (0017) (0022) (0024) (0141) (0142)

10 ^^Bacterial conjunctivitis^^

Used in rule(s): (0003) (0006) (0008) (0009) (0010) (0012)
(0013) (0014) (0015) (0016) (0017) (0056)
(0057) (0059) (0064) (0070) (0071) (0072)
(0075) (0078) (0079)

11 ^^Viral conjunctivitis^^

Used in rule(s): (0003) (0006) (0008) (0010) (0011) (0012)
(0013) (0014) (0015) (0016) (0017) (0037)
(0056) (0057) (0059) (0064) (0066) (0067)

(0069) (0070) (0071) (0074) (0078) (0079)
(0106)

12 ^^Allergic conjunctivitis^^

Used in rule(s): (0003) (0004) (0005) [0005] (0006) (0008)
(0009) (0010) (0011) (0012) (0014) (0015)
(0016) (0017) (0034) (0055) (0057) (0059)
(0061) (0064) (0065) (0066) (0067) (0068)
(0071) (0073) (0145) (0146)

13 ^^Chalazion^^

Used in rule(s): (0008) (0009) (0012) (0013) (0015) (0016)
(0017) (0049) (0051) (0052) (0053) (0054)

14 ^^Hordeolum^^

Used in rule(s): (0009) (0012) (0015) (0016) (0017) (0021)
(0049) (0051) (0052) (0053) (0054) (0055)

15 ^^Blepharitis^^

Used in rule(s): (0003) (0008) (0009) (0012) (0015) (0016)
(0017) (0020) (0049) (0050) (0054) (0055)
(0056)

16 ^^Subconjunctival hemorrhage^^

Used in rule(s): (0003) (0015) (0016) (0017) (0022) (0057)
(0060) (0061) (0062) (0063)

17 ^^Corneal foreign body^^

Used in rule(s): (0010) (0011) (0015) (0016) (0017) (0022)
(0087) (0094) (0149) (0150)

18 Contact lens induced ^^Giant papillary conjunctivitis^^

Used in rule(s): (0116) (0119) (0120) (0122) (0123) (0146)

19 Contact lens induced ^^Superior limbic conjunctivitis^^

Used in rule(s): (0083) (0116) (0117) (0118) (0120) (0121) (0123)

20 ^^Contact lens solution allergy^^

Used in rule(s): (0003) (0031) (0032) (0033) (0116) (0117) (0118) (0123) (0124)

21 ^^Contact lens deposit^^

Used in rule(s): (0119) (0120) (0123) (0125) (0128)

22 ^^Inverted contact lens^^

Used in rule(s): (0119) (0120) (0127) (0129)

23 ^^Damaged contact lens^^

Used in rule(s): (0119) (0126) (0130)

24 ^^Hyphema^^

Used in rule(s): (0107) (0110)

FORMULAS:

1 [VA OD] < 25

Used in rule(s): 0038

2 [VA OS] < 25

Used in rule(s): 0039

3 [IOP OD] > 0

Used in rule(s): 0134

4 [IOP OS] > 0
Used in rule(s): 0134

5 [IOP OD] > 30
Used in rule(s): 0137

6 [IOP OS] < 25
Used in rule(s): 0137

7 [IOP OS] > 30
Used in rule(s): 0138

8 [IOP OD] < 25
Used in rule(s): 0138

9 [IOP OD] < 25
Used in rule(s): 0139

10 [IOP OS] < 25
Used in rule(s): 0139

11 [IOP OD] < ([IOP OS] -2)
Used in rule(s): 0139

12 [IOP OD] < 25
Used in rule(s): 0140

13 [IOP OS] < 25

Used in rule(s): 0140

14 [IOP OS] < ([IOP OD] -2)
Used in rule(s): 0140

15 [IOP OD] < 25
Used in rule(s): 0147

16 [IOP OS] < 25
Used in rule(s): 0147

17 [IOP OD] > 25
Used in rule(s): 0155

18 [IOP OS] < 25
Used in rule(s): 0155

19 [IOP OD] < 25
Used in rule(s): 0156

20 [IOP OS] < 25
Used in rule(s): 0156

21 [IOP OD] > 25
Used in rule(s): 0160

22 [IOP OS] > 25
Used in rule(s): 0160

23 [CASE NO] = [DX]
Used in rule(s): 0162

VARIABLES:

1 IOP OD

Enter the intraocular pressure of the RIGHT eye

Numeric variable

Used in rule(s): 0134 0137 0138 0139 0140 0147 0155 0156 0160

2 IOP OS

Enter the intraocular pressure of the LEFT eye

Numeric variable

Used in rule(s): 0134 0137 0138 0139 0140 0147 0155 0156 0160

3 VA OD

Enter the ^^corrected visual acuity^^ for the RIGHT eye (just enter the denominator or second number of the snellen fraction. i.e. for 20/40, just enter 40).

Numeric variable

Used in rule(s): 0038

4 VA OS

Enter the ^^corrected visual acuity^^ for the LEFT eye (just enter the denominator or second number of the snellen fraction. i.e. for 20/40, just enter 40).

Numeric variable

Used in rule(s): 0039

5 CASE NO

Poise database case no

String variable

Used in rule(s): 0162

6 DX

Providers diagnosis

String variable

Used in rule(s): 0162

RULES:

RULE NUMBER: 1
IF:
Does your patient complain of any of the following symptoms of ^^visual disturbance^^? ^^Flashing lights^^ OR ^^Floaters^^

THEN:
^^Retinal detachment^^ - Confidence=30

ELSE:
^^Retinal detachment^^ - Confidence=-30

NOTE:
Flashes and/or floaters are probably the only clue an IDC will have to indicate the possibility of retinal detachment. Both the presence and absence of these symptoms are highly indicative of the possibility of retinal detachment. Thus, the presence of either or both of these symptoms increments (+30) to the retinal detachment register. Conversely, the absence of both of these symptoms decrements the retinal detachment register by (-30).

RULE NUMBER: 2
IF:
Does your patient complain of any of the following symptoms of ^^visual disturbance^^? ^^Haloes around lights^^

THEN:
^^Acute angle closure glaucoma^^ - Confidence=10

NOTE:
Severe corneal edema, common with angle closure glaucoma, causes the symptom of Haloes around point sources of light. The symptom may or may not be present with AACG and it may be present with other diseases which affect the clarity of the ocular media. So, only (+10) is incremented to the AACG register in the presence of the symptom while the absence of the symptom has no effect on the AACG register.

RULE NUMBER: 3
IF:
Does your patient complain of any of the following symptoms of ^^visual disturbance^^? ^^Distorted vision^^

THEN:
^^Retinal detachment^^ - Confidence=10
and^^Pneumococcal corneal ulcer^^ - Confidence=-10
and ^^Pseudomonas corneal ulcer^^ - Confidence=-10
and ^^Herpes simplex keratitis^^ - Confidence=-10
and ^^Corneal abrasion^^ - Confidence=-10
and ^^Acute iritis^^ - Confidence=-10
and ^^Chronic iritis^^ - Confidence=-10
and ^^Acute angle closure glaucoma^^ - Confidence=-10
and ^^Bacterial conjunctivitis^^ - Confidence=-10
and ^^Viral conjunctivitis^^ - Confidence=-10
and ^^Allergic conjunctivitis^^ - Confidence=-10
and ^^Blepharitis^^ - Confidence=-10
and ^^Subconjunctival hemorrhage^^ - Confidence=-10
and ^^Contact lens solution allergy^^ - Confidence=-10

NOTE:
The presence of metamorphopsia is indicative of a retinal disorder. Retinal detachment is the only disease considered by the program that is likely to cause metamorphopsia, hence its register is incremented +10 if the symptom is present. All other diseases are decremented -10 if metamorphopsia is present as it is an unlikely finding in all cases other than retinal disorders.

REFERENCE:
Roy p. 519

RULE NUMBER: 4
IF:
Does your patient complain of any of the following symptoms of ^^visual disturbance^^? Blurred or decreased vision

THEN:
^^Allergic conjunctivitis^^ - Confidence=-10

NOTE:
Blurred vision may or may not be present in virtually all of the diseases the program considers. Therefore, it is not a useful symptom to base differential diagnoses on. The presence of blurred vision can be used to help exclude certain conditions, however. For example, blurred vision is an unlikely finding in allergic conjunctivitis, so the allergic conjunctivitis register is decremented (-10) in the presence of blurred vision.

RULE NUMBER: 5
IF:
Does your patient complain of any of the following symptoms of ocular ^^irritation^^? Itching

THEN:
^^Allergic conjunctivitis^^ - Confidence=10

ELSE:
^^Allergic conjunctivitis^^ - Confidence=-10

NOTE:
The presence of itching is nearly pathonogmonic for allergy. Therefore, the presence of itching (without regard to severity) causes a small (+10) incremental change to the allergic conjunctivitis register. The absence of itching (at any severity) is suggestive that allergic conjunctivitis is not likely so that register is decremented (-10) in the absence of itching.

RULE NUMBER: 6
IF:
Does your patient complain of any of the following symptoms of ocular ^^irritation^^? Itching and How does your patient rate the itching symptom? Moderate OR Severe

THEN:
^^Allergic conjunctivitis^^ - Confidence=20
and ^^Bacterial conjunctivitis^^ - Confidence=-10
and ^^Viral conjunctivitis^^ - Confidence=-10

NOTE:
If the degree of itching is moderate to severe, the impact of the symptom is

more clearly suggestive of allergic conjunctivitis, thus the allergic conjunctivitis register is further incremented by (+20). Because viral and bacterial conjunctivitis are frequently in the differential, and the presence of moderate to severe itching is mildly suggestive that they are not reasonable diagnoses, their register values are decremented (-10).

RULE NUMBER: 7
IF:
Does your patient complain of any of the following symptoms of ocular ^^irritation^^? Pain

THEN:
^^Pneumococcal corneal ulcer^^ - Confidence=10
and ^^Pseudomonas corneal ulcer^^ - Confidence=10
and ^^Herpes simplex keratitis^^ - Confidence=10
and ^^Corneal abrasion^^ - Confidence=10
and ^^Traumatic iritis^^ - Confidence=10
and ^^Acute iritis^^ - Confidence=10
and ^^Chronic iritis^^ - Confidence=10
and ^^Acute angle closure glaucoma^^ - Confidence=10

ELSE:
^^Pneumococcal corneal ulcer^^ - Confidence=-10
and ^^Pseudomonas corneal ulcer^^ - Confidence=-10
and ^^Herpes simplex keratitis^^ - Confidence=-10
and ^^Corneal abrasion^^ - Confidence=-10
and ^^Traumatic iritis^^ - Confidence=-10
and ^^Acute iritis^^ - Confidence=-10
and ^^Chronic iritis^^ - Confidence=-10
and ^^Acute angle closure glaucoma^^ - Confidence=-10

NOTE:
The symptom of pain (without regard to severity) is common to many of the diseases the program considers. In addition, pain, especially mild pain, is often an uncorrelated finding. Therefore, in the presence of pain, the appropriate register values are incremented minimally. In the absence of pain, the registers are decremented minimally.

RULE NUMBER: 8
IF:
Does your patient complain of any of the following symptoms of ocular ^^irritation^^? Pain
and How does your patient rate the symptom of pain? Moderate OR Severe

THEN:
^^Pneumococcal corneal ulcer^^ - Confidence=10
and ^^Pseudomonas corneal ulcer^^ - Confidence=10
and ^^Herpes simplex keratitis^^ - Confidence=10
and ^^Corneal abrasion^^ - Confidence=10
and ^^Traumatic iritis^^ - Confidence=10
and ^^Acute iritis^^ - Confidence=10
and ^^Chronic iritis^^ - Confidence=10
and ^^Acute angle closure glaucoma^^ - Confidence=10
and ^^Bacterial conjunctivitis^^ - Confidence=-10
and ^^Viral conjunctivitis^^ - Confidence=-10
and ^^Allergic conjunctivitis^^ - Confidence=-30
and ^^Chalazion^^ - Confidence=-10
and ^^Blepharitis^^ - Confidence=-10

NOTE:
If the degree of pain is moderate to severe, the reliability of the patient's complaint is enhanced. This allows a further increment of (+10) in the presence of moderate to severe pain. Some diseases, such as allergic conjunctivitis would be highly unlikely if the patient complained of severe or moderate pain. Thus, they are decremented appropriately if this rule is true.

RULE NUMBER: 9
IF:
Does your patient complain of any of the following symptoms of ocular ^^irritation^^? ^^Photophobia^^

THEN:
^^Pneumococcal corneal ulcer^^ - Confidence=10
and ^^Pseudomonas corneal ulcer^^ - Confidence=10
and ^^Herpes simplex keratitis^^ - Confidence=10
and ^^Corneal abrasion^^ - Confidence=10

and ^^Traumatic iritis^^ - Confidence=10
and ^^Acute iritis^^ - Confidence=10
and ^^Chronic iritis^^ - Confidence=10
and ^^Bacterial conjunctivitis^^ - Confidence=-10
and ^^Allergic conjunctivitis^^ - Confidence=-10
and ^^Chalazion^^ - Confidence=-10
and ^^Hordeolum^^ - Confidence=-10
and ^^Blepharitis^^ - Confidence=-10

NOTE:
Photophobia is a symptom common to all diseases affecting the cornea and/or iris. It is another symptom that is often present idiopathically, however. Therefore, the presence of photophobia provides a minimal incremental effect to the registers of corneal and iris related diseases. It also causes a minimal decremental effect to the registers of those diseases which do not normally affect the cornea.

RULE NUMBER: 10
IF:
Does your patient complain of any of the following symptoms of ocular ^^irritation^^? Scratchy or foreign body sensation

THEN:
^^Pneumococcal corneal ulcer^^ - Confidence=10
and ^^Pseudomonas corneal ulcer^^ - Confidence=10
and ^^Herpes simplex keratitis^^ - Confidence=10
and ^^Corneal abrasion^^ - Confidence=10
and ^^Bacterial conjunctivitis^^ - Confidence=10
and ^^Viral conjunctivitis^^ - Confidence=10
and ^^Allergic conjunctivitis^^ - Confidence=10
and ^^Acute iritis^^ - Confidence=-10
and ^^Chronic iritis^^ - Confidence=-10
and ^^Acute angle closure glaucoma^^ - Confidence=-10
and ^^Retinal detachment^^ - Confidence=-10
and ^^Corneal foreign body^^ - Confidence=10

NOTE:
A scratchy or foreign body sensation is a vague symptom of irritation that is often present in inflamed eyes. It may be due to chemosis, discharge, corneal compromise, and of course, a foreign body. Thus, this symptom is of minimal value in the differential. The registers of diseases that are likely to

cause this symptom are incremented (+10) while the registers of those diseases which generally do not cause a scratchy sensation are decremented minimally (-10). The absence of this symptom is probably not indicative of anything, so no else condition is used in this rule.

RULE NUMBER: 11
IF:
Does your patient complain of any of these other ocular symptoms?
Excessive tearing

THEN:
^^Corneal abrasion^^ - Confidence=10
and ^^Viral conjunctivitis^^ - Confidence=10
and ^^Allergic conjunctivitis^^ - Confidence=10
and ^^Corneal foreign body^^ - Confidence=10

NOTE:
The symptom of excessive tearing is indicative of a corneal problem or allergic conjunctivitis. Thus the registers of common corneal problems and allergic conjunctivitis are incremented (+10) if this symptom is present.

RULE NUMBER: 12
IF:
Does your patient complain of any of the following symptoms of ocular ^^irritation^^? Burning

THEN:
^^Pneumococcal corneal ulcer^^ - Confidence=10
and ^^Pseudomonas corneal ulcer^^ - Confidence=10
and ^^Herpes simplex keratitis^^ - Confidence=10
and ^^Corneal abrasion^^ - Confidence=10
and ^^Viral conjunctivitis^^ - Confidence=10
and ^^Bacterial conjunctivitis^^ - Confidence=-10
and ^^Allergic conjunctivitis^^ - Confidence=-10
and ^^Chalazion^^ - Confidence=-10
and ^^Hordeolum^^ - Confidence=-10
and ^^Blepharitis^^ - Confidence=-10

NOTE:
A burning sensation is often a vague description of pain. This symptom is of little value in the differential, therefore the effect of the presence of a burning sensation is to minimally increment diseases of corneal compromise and to minimally decrement those other diseases which are likely to be in the differential.

RULE NUMBER: 13
IF:
Does your patient complain of any of these other ocular symptoms?
Discharge (other than tearing)

THEN:
^^Herpes simplex keratitis^^ - Confidence=-10
and ^^Corneal abrasion^^ - Confidence=-10
and ^^Traumatic iritis^^ - Confidence=-10
and ^^Acute iritis^^ - Confidence=-10
and ^^Chronic iritis^^ - Confidence=-10
and ^^Acute angle closure glaucoma^^ - Confidence=-10
and ^^Retinal detachment^^ - Confidence=-10
and ^^Bacterial conjunctivitis^^ - Confidence=10
and ^^Viral conjunctivitis^^ - Confidence=10
and ^^Chalazion^^ - Confidence=-10

NOTE:
The presence of a discharge (other than tearing) is generally indicative of an external infection of the eye. Thus, Bacterial and Viral conjunctivitis are incremented +10 in the presence of a discharge (without regard to type, i.e. purulent, mucoid, etc.) while diseases that are generally internal or non-infectious are decremented -10 if a discharge is present. If the symptom is absent, there is no effect on any disease register because the symptom may be subclinical. The corpsman will be further queried about discharge character in the examination section of the program.

RULE NUMBER: 14
IF:
Does your patient complain of any of these other ocular symptoms? Lids stuck together upon arising

THEN:
^^Bacterial conjunctivitis^^ - Confidence=30
and ^^Viral conjunctivitis^^ - Confidence=-10
and ^^Allergic conjunctivitis^^ - Confidence=-10

NOTE:
If sufficient mucopurulent exudate is produced to cause this symptom, bacterial conjunctivitis is almost certain. Therefore, in the presence of this symptom, the bacterial conjunctivitis register is incremented +30. The registers for allergic and viral conjunctivitis are decremented -10 as they are likely to be in the differential. The absence of this symptom causes no effect on any disease register, as it may not be present early in the disease process.

RULE NUMBER: 15
IF:
The ^^onset^^ of symptoms can best be described as: Sudden

THEN:
^^Retinal detachment^^ - Confidence=10
and ^^Chronic iritis^^ - Confidence=-10
and ^^Corneal abrasion^^ - Confidence=10
and ^^Traumatic iritis^^ - Confidence=10
and ^^Acute angle closure glaucoma^^ - Confidence=10
and ^^Pneumococcal corneal ulcer^^ - Confidence=-10
and ^^Pseudomonas corneal ulcer^^ - Confidence=-10
and ^^Herpes simplex keratitis^^ - Confidence=-10
and ^^Bacterial conjunctivitis^^ - Confidence=-10
and ^^Viral conjunctivitis^^ - Confidence=-10
and ^^Allergic conjunctivitis^^ - Confidence=-10
and ^^Chalazion^^ - Confidence=-10
and ^^Hordeolum^^ - Confidence=-10
and ^^Blepharitis^^ - Confidence=-10
and ^^Subconjunctival hemorrhage^^ - Confidence=10
and ^^Corneal foreign body^^ - Confidence=10

NOTE:
The onset of symptoms is a good means of differentiating the various diseases the program considers. The quality of the patient's and corpsman's communication skills can affect the validity of the input greatly, however.

Thus, this symptom is used to differentiate between all diseases considered but any one disease register is affected only mildly by the onset finding.

RULE NUMBER: 16
IF:
The ^^onset^^ of symptoms can best be described as: Acute

THEN:
^^Pneumococcal corneal ulcer^^ - Confidence=10
and ^^Pseudomonas corneal ulcer^^ - Confidence=10
and ^^Herpes simplex keratitis^^ - Confidence=10
and ^^Corneal abrasion^^ - Confidence=10
and ^^Traumatic iritis^^ - Confidence=10
and ^^Acute iritis^^ - Confidence=10
and ^^Chronic iritis^^ - Confidence=0
and ^^Acute angle closure glaucoma^^ - Confidence=10
and ^^Retinal detachment^^ - Confidence=0
and ^^Bacterial conjunctivitis^^ - Confidence=10
and ^^Viral conjunctivitis^^ - Confidence=10
and ^^Allergic conjunctivitis^^ - Confidence=10
and ^^Chalazion^^ - Confidence=-10
and ^^Hordeolum^^ - Confidence=10
and ^^Blepharitis^^ - Confidence=0
and ^^Subconjunctival hemorrhage^^ - Confidence=0
and ^^Corneal foreign body^^ - Confidence=0

NOTE:
The onset of symptoms is a good means of differentiating the various diseases the program considers. The quality of the patient's and corpsman's communication skills can affect the validity of the input greatly, however. Thus, this symptom is used to differentiate between all diseases considered but any one disease register is affected only mildly by the onset finding.

RULE NUMBER: 17
IF:
The ^^onset^^ of symptoms can best be described as: Chronic

THEN:
^^Pneumococcal corneal ulcer^^ - Confidence=-10
and ^^Pseudomonas corneal ulcer^^ - Confidence=-10
and ^^Herpes simplex keratitis^^ - Confidence=-10
and ^^Corneal abrasion^^ - Confidence=-10
and ^^Traumatic iritis^^ - Confidence=-10
and ^^Acute iritis^^ - Confidence=-10
and ^^Chronic iritis^^ - Confidence=10
and ^^Acute angle closure glaucoma^^ - Confidence=-10
and ^^Retinal detachment^^ - Confidence=0
and ^^Bacterial conjunctivitis^^ - Confidence=-10
and ^^Viral conjunctivitis^^ - Confidence=0
and ^^Allergic conjunctivitis^^ - Confidence=0
and ^^Chalazion^^ - Confidence=10
and ^^Hordeolum^^ - Confidence=-10
and ^^Blepharitis^^ - Confidence=10
and ^^Subconjunctival hemorrhage^^ - Confidence=-10
and ^^Corneal foreign body^^ - Confidence=-10

NOTE:
The onset of symptoms is a good means of differentiating the various diseases the program considers. The quality of the patient's and corpsman's communication skills can affect the validity of the input greatly, however. Thus, this symptom is used to differentiate between all diseases considered but any one disease register is affected only mildly by the onset finding.

RULE NUMBER: 18
IF:
The condition is affecting: Only the right eye or: The condition is affecting: Only the left eye

THEN:
THE CONDITION IS UNILATERAL

NOTE:
The purpose of this rule is to provide a shorthand notation for laterality for use in later rules. The program only needs to consider unilateral vs. bilateral presentations in making diagnoses. Left and right information is collected for reporting purposes.

RULE NUMBER: 19
IF:
The condition is affecting: Both eyes

THEN:
THE CONDITION IS BILATERAL

NOTE:
The purpose of this rule is to provide a shorthand notation for laterality for use in later rules. The program only needs to consider unilateral vs. bilateral presentations in making diagnoses. Left and right information is collected for reporting purposes.

RULE NUMBER: 20
IF:
THE CONDITION IS UNILATERAL

THEN:
^^Blepharitis^^ - Confidence=-20

NOTE:
Blepharitis is almost always unilateral, thus if the corpsman inputs a unilateral presentation, the blepharitis register is decremented (-20).

RULE NUMBER: 21
IF:
THE CONDITION IS BILATERAL

THEN:

^^Pneumococcal corneal ulcer^^ - Confidence=-20
and ^^Pseudomonas corneal ulcer^^ - Confidence=-20
and ^^Herpes simplex keratitis^^ - Confidence=-20
and ^^Corneal abrasion^^ - Confidence=-10
and ^^Traumatic iritis^^ - Confidence=-10
and ^^Acute iritis^^ - Confidence=-10
and ^^Chronic iritis^^ - Confidence=-10

and ^^Acute angle closure glaucoma^^ - Confidence=-10
and ^^Hordeolum^^ - Confidence=-10

NOTE:
While many of the diseases can occur bilaterally, corneal ulcers, abrasions, iritis, etc. usually don't. It is fairly unlikely that a corneal ulcer would cause significant bilateral symptomology, thus each of the ulcer registers are decremented moderately (-20). It is also unlikely, but not impossible, that iritis would present bilaterally, thus the iritis registers are decremented slightly (-10) if the symptoms are bilateral. Although the anatomical features which predispose angle closure glaucoma are bilateral, pupillary block seldom occurs simultaneously in both eyes, thus the acute glaucoma register is decremented slightly (-10) if the condition is bilateral. While retinal detachment is seldom bilateral at onset, the symptomology can be confusing to the patient. It is often difficult for him to determine with certainty that photopsia is occurring in only one eye. Thus the retinal detachment register is unaffected by laterality. Corneal abrasions generally are unilateral.

RULE NUMBER: 22
IF:
Is there an ^^associated history of ocular trauma^^? Yes

THEN:
^^Retinal detachment^^ - Confidence=20
and ^^Traumatic iritis^^ - Confidence=20
and ^^Subconjunctival hemorrhage^^ - Confidence=10
and ^^Corneal abrasion^^ - Confidence=10
and ^^Corneal foreign body^^ - Confidence=10

NOTE:
Trauma can induce a retinal detachment. Retinal detachment is therefore more likely in patients who have experienced trauma. Trauma can also induce a traumatic iritis and to a lesser extent, a subconjunctival hemorrhage. Thus, if this rule fires, the RD and traumatic iritis registers are incremented (+20) and the subconjunctival hemorrhage register is incremented (+10). The presence of trauma does not affect any other disease register.

RULE NUMBER: 23
IF:
Is there an ^^associated history of ocular trauma^^? No

THEN:
^^Traumatic iritis^^ - Confidence=-50

NOTE:
By definition, traumatic iritis can not occur in the absence of trauma. If this rule fires, its register is decremented (-50). Other conditions such as RD and subconjunctival hemorrhage can occur in the absence of trauma, so this rule has no effect on their registers.

RULE NUMBER: 24
IF:
Does your patient have an ocular history of any of the following?
^^High Myopia^^ (spectacle Rx < -4.00D)

THEN:
^Retinal detachment^^ - Confidence=20

NOTE:
High myopia is a sign of an elongated eye with a stretched retina. Retinal detachment is more likely in patients with high myopia. The presence of high myopia does not affect any other disease register.

RULE NUMBER: 25
IF:
Does your patient have an ocular history of any of the following?
Previous ocular herpes infections

THEN:
^^Herpes simplex keratitis^^ - Confidence=30

NOTE:
A history of ocular herpes infections is strongly suggestive of the possibility

the current condition is herpes keratitis because herpes is a recurrent condition. Thus, this rule adds a value of +30 to the herpes register if true.

RULE NUMBER: 26
IF:
Does your patient have an ocular history of any of the following?
^^High Hyperopia^^ (spectacle Rx > +3.00D)

THEN:
^^Acute angle closure glaucoma^^ - Confidence=20

NOTE:
The finding of high hyperopia is indicative of a small eye which is more susceptible to angle closure than an average or large sized eye. Hyperopia has no significant effect on other disease registers. If high hyperopia is present, the AACG register is incremented moderately (+20). The absence of this finding may often be attributable to lack of previous diagnoses (i.e. latent hyperopia) or inadequate medical records. Thus, the absence of this sign has no effect on the AACG register.

RULE NUMBER: 27
IF:
Does your patient have an ocular history of any of the following?
Recent or current soft contact lens wear OR Recent or current hard or gas permeable contact lens wear and Do you feel that your patient's problem is contact lens related? Yes

THEN:
THE PROBLEM IS CL RELATED

NOTE:
The purpose of this and some following rules is to determine whether the patient's condition is related to the wearing of contact lenses. The effect of these rules is to create a major branch point in the questioning strategy. If the corpsman inputs that the problem is CL related, the physical examination questions will be directed toward a contact lens diagnoses. If the corpsman feels that the problem is not CL related, the PE questions will be directed to a non-CL diagnoses. If the corpsman is not sure, the program will examine

both possibilities. In any case, these rules prevent the program from considering a CL related diagnosis if the patient is not a CL wearer.

RULE NUMBER: 28
IF:
Does your patient have an ocular history of any of the following?
Recent or current soft contact lens wear OR Recent or current hard or gas permeable contact lens wear
and Do you feel that your patient's problem is contact lens related? No

THEN:
THE PROBLEM IS NOT CL RELATED

NOTE:
The purpose of this and some following rules is to determine whether the patient's condition is related to the wearing of contact lenses. The effect of these rules is to create a major branch point in the questioning strategy. If the corpsman inputs that the problem is CL related, the physical examination questions will be directed toward a contact lens diagnoses. If the corpsman feels that the problem is not CL related, the PE questions will be directed to a non-CL diagnoses. If the corpsman is not sure, the program will examine both possibilities. In any case, these rules prevent the program from considering a CL related diagnosis if the patient is not a CL wearer.

RULE NUMBER: 29
IF:
Does your patient have an ocular history of any of the following?
Recent or current soft contact lens wear OR Recent or current hard or gas permeable contact lens wear
and Do you feel that your patient's problem is contact lens related? Not sure

THEN:
THE PROBLEM IS CL RELATED
and THE PROBLEM IS NOT CL RELATED

NOTE:
The purpose of this and some following rules is to determine whether the patient's condition is related to the wearing of contact lenses. The effect of

these rules is to create a major branch point in the questioning strategy. If the corpsman inputs that the problem is CL related, the physical examination questions will be directed toward a contact lens diagnoses. If the corpsman feels that the problem is not CL related, the PE questions will be directed to a non-CL diagnoses. If the corpsman is not sure, the program will examine both possibilities. In any case, these rules prevent the program from considering a CL related diagnosis if the patient is not a CL wearer.

RULE NUMBER: 30
IF:
Does your patient have an ocular history of any of the following?
NOT Recent or current soft contact lens wear
OR Recent or current hard or gas permeable contact lens wear

THEN:
THE PROBLEM IS NOT CL RELATED

NOTE:
The purpose of this and some following rules is to determine whether the patient's condition is related to the wearing of contact lenses. The effect of these rules is to create a major branch point in the questioning strategy. If the corpsman inputs that the problem is CL related, the physical examination questions will be directed toward a contact lens diagnoses. If the corpsman feels that the problem is not CL related, the PE questions will be directed to a non-CL diagnoses. If the corpsman is not sure, the program will examine both possibilities. In any case, these rules prevent the program from considering a CL related diagnosis if the patient is not a CL wearer.

RULE NUMBER: 31
IF:
THE PROBLEM IS CL RELATED
and Has your patient changed any of his ^^contact lens care solutions^^
to new brands in the past month? Yes

THEN:
^^Contact lens solution allergy^^ - Confidence=10

NOTE:
This rule is specific for contact lens related conditions. It only fires if the

corpsman inputs that he feels the patient's problem is or may be contact lens related and that the patient has recently changes his contact lens care regimen. A recent change in the care products, is mildly suggestive that a solution allergy is possible. So, if this rule fires, (+10) is incremented to the CL soln allergy register.

RULE NUMBER: 32
IF:
THE PROBLEM IS CL RELATED
and Is your patient using any contact lens care solutions with ^^preservatives^^? Yes

THEN:
^^Contact lens solution allergy^^ - Confidence=10

NOTE:
This rule is specific for contact lens related conditions. It only fires if the corpsman inputs that he feels the patient's problem is or may be contact lens related and that the patient is using preserved contact lens care solutions. The use of preserved care products, is mildly suggestive that a solution allergy is possible. So, if this rule fires, (+10) is incremented to the CL soln allergy register.

RULE NUMBER: 33
IF:
THE PROBLEM IS CL RELATED
and Is your patient using any contact lens care solutions with ^^preservatives^^? No

THEN:
^^Contact lens solution allergy^^ - Confidence=-30

NOTE:
This rule is specific for contact lens related conditions. It only fires if the corpsman inputs that he feels the patient's problem is or may be contact lens related and that the patient is NOT using preserved contact lens care solutions. If the patient is not using preserved care products, the diagnosis of CL solution allergy can be virtually ruled out, so (-30) is decremented from the CL soln allergy register.

RULE NUMBER: 34
IF:
Does your patient have a significant medical history of any of the following conditions? Allergies (hay fever, etc.)

THEN:
^^Allergic conjunctivitis^^ - Confidence=10

NOTE:
History of allergies is mildly suggestive of allergic conjunctivitis, so presence of this finding increments the allergic conjunctivitis register (+10) and has no effect on any other condition.

RULE NUMBER: 35
IF:
Does your patient have a significant medical history of any of the following conditions? Genital or Labial Herpes

THEN:
^^Herpes simplex keratitis^^ - Confidence=10

NOTE:
History of generalized herpes infection is mildly indicative that the current eye disorder may be herpetic in nature. If this finding is positive the herpes keratitis register is incremented (+10).

RULE NUMBER: 36
IF:
Does your patient have a significant medical history of any of the following conditions? Connective tissue disorder (arthritis, etc.)

THEN:
^^Chronic iritis^^ - Confidence=10 and ^^Acute iritis^^ - Confidence=-10

NOTE:
The presence of a systemic condition which predisposes the patient to chronic iritis is about the only factor the program can use to distinguish be-

tween acute and chronic iritis. Thus, the chronic iritis register is incremented +10 and the acute iritis register is decremented -10 if the patient has a history of connective tissue disorder.

RULE NUMBER: 37
IF:
Does your patient have a significant medical history of any of the following conditions? Recent or current URI

THEN:
^^Viral conjunctivitis^^ - Confidence=10

NOTE:
A history of URI is often associated with viral conjunctivitis so the viral conjunctivitis register is incremented +10 if this finding is positive.

RULE NUMBER: 38
IF:
[VA OD] < 25

THEN:
OD VISION IS NORMAL

ELSE:
OD VISION IS REDUCED

RULE NUMBER: 39
IF:
[VA OS] < 25

THEN:
OS VISION IS NORMAL

ELSE:
OS VISION IS REDUCED

RULE NUMBER: 40
IF:
The pupillary size and response to light appear to be: Normal, both eyes

THEN:
^^Acute angle closure glaucoma^^ - Confidence=-30
and ^^Acute iritis^^ - Confidence=-20
and ^^Traumatic iritis^^ - Confidence=-20
and ^^Chronic iritis^^ - Confidence=-20

NOTE:
If the pupils are normal, glaucoma and iritis are less likely. If this rule fires, angle closure glaucoma is decremented (-30) and the iritis registers are each decremented (-20). Iritis is decremented less if the corpsman inputs that the pupils are normal because pupillary changes with iritis are more subtle than with glaucoma. Normal pupils essentially rule out angle closure, while abnormalities present with iritis may simply go undetected.

RULE NUMBER: 41
IF:
The pupillary size and response to light appear to be: Abnormal, right eye
and The pupillary response to light of the right eye is: Sluggish
and The condition is affecting: NOT Only the left eye

THEN:
^^Traumatic iritis^^ - Confidence=20
and ^^Acute iritis^^ - Confidence=20
and ^^Chronic iritis^^ - Confidence=20
and ^^Acute angle closure glaucoma^^ - Confidence=-20

NOTE:
The purpose of this rule is to help diagnose iritis. This rule only fires if the corpsman inputs that the right pupil is abnormal and its response to light is abnormal and that the patient's condition is affecting only the right eye or both eyes. If the condition is affecting only the left eye, but the right pupillary response is abnormal, which is conflicting information, the rule does not fire. If the rule does fire, the iritis registers are incremented (+20). A sluggish pupil in the affected eye contradicts glaucoma so its register is decremented (-20) if this rule fires.

RULE NUMBER: 42
IF:
The pupillary size and response to light appear to be: Abnormal, lefteye
and The pupillary response to light of the left eye is: Sluggish
and The condition is affecting: NOT Only the right eye

THEN:
^^Traumatic iritis^^ - Confidence=20
and ^^Acute iritis^^ - Confidence=20
and ^^Chronic iritis^^ - Confidence=20
and ^^Acute angle closure glaucoma^^ - Confidence=-20

NOTE:
The purpose of this rule is to help diagnose iritis. This rule only fires if the corpsman inputs that the left pupil is abnormal and its response to light is abnormal and that the patient's condition is affecting only the left eye or both eyes. If the condition is affecting only the right eye, but the left pupillary response is abnormal, which is conflicting information, the rule does not fire. If the rule does fire, the iritis registers are incremented (+20). A sluggish pupil in the affected eye contradicts glaucoma so its register is decremented (-20) if this rule is true.

RULE NUMBER: 43
IF:
The pupillary size and response to light appear to be: Abnormal, righteye
and The size of the right pupil is (as compared to the left): Constricted
and The condition is affecting: NOT Only the left eye

THEN:
^^Traumatic iritis^^ - Confidence=20
and ^^Acute iritis^^ - Confidence=20
and ^^Chronic iritis^^ - Confidence=20
and ^^Acute angle closure glaucoma^^ - Confidence=-20

NOTE:
The purpose of this and the next rule is to help diagnose iritis. Only one of the two rules will fire. This rule only fires if the corpsman inputs that the right pupil is abnormal and its size is constricted relative to the left and that the patient's condition is affecting only the right eye or both eyes. If the condi-

tion is affecting only the left eye, but the right pupil size is constricted, which is conflicting information, the rule does not fire. If the rule does fire, the iritis registers are incremented (+20). An abnormal constricted right pupil contradicts angle closure glaucoma so its register is decremented (-20) if this rule fires.

RULE NUMBER: 44
IF:
The pupillary size and response to light appear to be: Abnormal, left eye
and The size of the left pupil is (as compared to the right): Constricted
and The condition is affecting: NOT Only the right eye

THEN:
^^Traumatic iritis^^ - Confidence=20
and ^^Acute iritis^^ - Confidence=20
and ^^Chronic iritis^^ - Confidence=20
and ^^Acute angle closure glaucoma^^ - Confidence=-20

NOTE:
The purpose of this and the previous rule is to help diagnose iritis. Only one of the two rules will fire. This rule only fires if the corpsman inputs that the left pupil is abnormal and its size is constricted relative to the right and that the patient's condition is affecting only the left eye or both eyes. If the condition is affecting only the right eye, but the left pupil size is constricted, which is conflicting information, the rule does not fire. If the rule does fire, the iritis registers are incremented (+20). An abnormal constricted left pupil contradicts glaucoma so its register is decremented (-20) if this rule is true.

RULE NUMBER: 45
IF:
The pupillary size and response to light appear to be: Abnormal, right eye
and The pupillary response to light of the right eye is: Absent
and The condition is affecting: NOT Only the left eye

THEN:
^^Acute angle closure glaucoma^^ - Confidence=30

NOTE:
The purpose of this rule is to help diagnose glaucoma. This rule only fires if

the corpsman inputs that the right pupil is abnormal and its response to light is absent and that the patient's condition is affecting only the right eye or both eyes. If the condition is affecting only the left eye, but the right pupillary response is absent, which is conflicting information, the rule does not fire. If the rule does fire, the glaucoma register is incremented (+20).

RULE NUMBER: 46
IF:
The pupillary size and response to light appear to be: Abnormal, left eye
and The pupillary response to light of the left eye is: Absent
and The condition is affecting: NOT Only the right eye

THEN:
^^Acute angle closure glaucoma^^ - Confidence=30

NOTE:
The purpose of this rule is to help diagnose glaucoma. This rule only fires if the corpsman inputs that the left pupil is abnormal and its response to light is absent and that the patient's condition is affecting only the left eye or both eyes. If the condition is affecting only the right eye, but the left pupillary response is absent, which is conflicting information, the rule does not fire. If the rule does fire, the glaucoma register is incremented (+30).

RULE NUMBER: 47
IF:
The pupillary size and response to light appear to be: Abnormal, right eye
and The size of the right pupil is (as compared to the left): Dilated
and The condition is affecting: NOT Only the left eye

THEN:
^^Acute angle closure glaucoma^^ - Confidence=20
and ^^Traumatic iritis^^ - Confidence=-20
and ^^Acute iritis^^ - Confidence=-20
and ^^Chronic iritis^^ - Confidence=-20

NOTE:
The purpose of this and the next rule is to help diagnose glaucoma. Only one of the two rules will fire. This rule only fires if the corpsman inputs that the right pupil is abnormal and its size is dilated relative to the left and that

the patient's condition is affecting only the right eye or both eyes. If the condition is affecting only the left eye, but the right pupil size is dilated, which is conflicting information, the rule does not fire. If the rule does fire, the glaucoma register is incremented (+20). A dilated right pupil in the affected eye contradicts iritis, so their registers are decremented (-20) if this rule fires.

RULE NUMBER: 48
IF:
The pupillary size and response to light appear to be: Abnormal, left eye
and The pupillary response to light of the left eye is: Absent
and The condition is affecting: NOT Only the right eye

THEN:
^^Acute angle closure glaucoma^^ - Confidence=20
and ^^Traumatic iritis^^ - Confidence=-20
and ^^Chronic iritis^^ - Confidence=-20
and ^^Acute iritis^^ - Confidence=-20

NOTE:
The purpose of this and the previous rule is to help diagnose glaucoma. Only one of the two rules will fire. This rule only fires if the corpsman inputs that the left pupil is abnormal and its size is dilated relative to the right and that the patient's condition is affecting only the left eye or both eyes. If the condition is affecting only the right eye, but the left pupil size is dilated, which is conflicting information, the rule does not fire. If the rule does fire, the glaucoma register is incremented (+20). A dilated pupil in the affected eye contradicts iritis so their registers are decremented (-20) if this rule fires.

RULE NUMBER: 49
IF:
THE PROBLEM IS NOT CL RELATED and The patient's lids appear to be Normal

THEN:
^^Blepharitis^^ - Confidence=-30 and ^^Chalazion^^ - Confidence=-30
and ^^Hordeolum^^ - Confidence=-30

NOTE:
If the lids are normal, diseases that primarily affect the lids can be virtually

ruled out. Thus, if this rule fires, the blepharitis, chalazion, and hordeolum registers are decremented (-30).

RULE NUMBER: 50
IF:
THE PROBLEM IS NOT CL RELATED
and The patient's lids appear to be Abnormal
and Are any of the following abnormalities present in your patient's lids and lashes? ^^Eczematous^^ flaking of lid skin

THEN:
^^Blepharitis^^ - Confidence=50

NOTE:
Flaking of the skin along the lash line is essentially pathognomonic for Blepharitis. Thus a positive finding for this sign increments the Blepharitis register (+50).

RULE NUMBER: 51
IF:
THE PROBLEM IS NOT CL RELATED
and The patient's lids appear to be Abnormal
and Are any of the following abnormalities present in your patient's lids and lashes? ^^Indurated^^ (hard or firm) mass
and The mass is ^^Tender^^

THEN:
^^Hordeolum^^ - Confidence=50
and ^^Chalazion^^ - Confidence=-30

NOTE:
A tender, swollen, red mass in the eyelid is essentially pathognomonic for hordeola (within the diagnostic domain of this program). Thus, a positive finding of a hard lid mass which is tender causes a (+50) increment to the hordeolum register and a (-30) decrement to the chalazion register.

RULE NUMBER: 52
IF:
THE PROBLEM IS NOT CL RELATED
and The patient's lids appear to be Abnormal
and Are any of the following abnormalities present in your patient's lids and lashes? ^^Indurated^^ (hard or firm) mass
and The mass is ^^Non-tender^^

THEN:

^^Chalazion^^ - Confidence=50 and ^^Hordeolum^^ - Confidence=-30

NOTE:
A non-tender mass without inflammation in the eyelid is essentially pathognomonic for chalazia (within the diagnostic domain of this program). Thus, a positive finding of a hard lid mass which is non-tender causes a (+50) increment to the chalazion register and a (-30) decrement to the hordeolum register.

RULE NUMBER: 53
IF:
THE PROBLEM IS NOT CL RELATED
and The patient's lids appear to be Abnormal
and Are any of the following abnormalities present in your patient's lids and lashes? NOT ^^Indurated^^ (hard or firm) mass

THEN:
^^Chalazion^^ - Confidence=-30 and ^^Hordeolum^^ - Confidence=-30

NOTE:
The absence of a mass in an otherwise abnormal eyelid indicates that hordeola and chalazia are unlikely diagnoses. Thus, their registers are decremented (-30) if this rule fires.

RULE NUMBER: 54
IF:
THE PROBLEM IS NOT CL RELATED
and The patient's lids appear to be Abnormal

and Are any of the following abnormalities present in your patient's lids and lashes? ^^Erythema^^

THEN:
^^Chalazion^^ - Confidence=-10
and ^^Hordeolum^^ - Confidence=10
and ^^Blepharitis^^ - Confidence=10

NOTE:
Among the lid diseases, redness is likely with hordeola and blepharitis but not chalazia. If this rule is true, the reristers of these diseases are incremented (+10) (+10) and (-10) respectively.

RULE NUMBER: 55
IF:
THE PROBLEM IS NOT CL RELATED
and The patient's lids appear to be Abnormal
and Are any of the following abnormalities present in your patient's lids and lashes? ^^Edema^^

THEN:
^^Allergic conjunctivitis^^ - Confidence=10
and ^^Hordeolum^^ - Confidence=10
and ^^Blepharitis^^ - Confidence=10

NOTE:
If the lids are edematous, the registers of allergic conjunctivitis, blepharitis and hordeolum are all incremented (+10) by this rule.

RULE NUMBER: 56
IF:
THE PROBLEM IS NOT CL RELATED
and The patient's lids appear to be Abnormal
and Are any of the following abnormalities present in your patient's lids and lashes? Crusted material on lash line

THEN:
^^Bacterial conjunctivitis^^ - Confidence=10
and ^^Viral conjunctivitis^^ - Confidence=10
and ^^Blepharitis^^ - Confidence=10

NOTE:
The presence of crusting along the lid margin is indicative of a conjunctival or lid infection. Thus, if this sign is present, this rule will increment (+10) to the registers of viral and bacterial conjunctivitis and blepharitis.

RULE NUMBER: 57
IF:
The ^^conjunctiva^^ appears to be Normal

THEN:
^^Bacterial conjunctivitis^^ - Confidence=-50
and ^^Viral conjunctivitis^^ - Confidence=-50
and ^^Allergic conjunctivitis^^ - Confidence=-50
and ^^Pneumococcal corneal ulcer^^ - Confidence=-20
and ^^Pseudomonas corneal ulcer^^ - Confidence=-20
and ^^Herpes simplex keratitis^^ - Confidence=-20
and ^^Traumatic iritis^^ - Confidence=-20
and ^^Acute iritis^^ - Confidence=-20
and ^^Chronic iritis^^ - Confidence=-10
and ^^Corneal abrasion^^ - Confidence=-10
and ^^Acute angle closure glaucoma^^ - Confidence=-20
and ^^Subconjunctival hemorrhage^^ - Confidence=-50

NOTE:
If the conjunctiva is normal, conjunctivitis is virtually ruled-out, thus each conjunctividity is decremented (-50) if this rule is true. To a lesser extent, corneal ulcers can be decremented (-20) and corneal abrasions can be decremented slightly (-10). Iritis and glaucoma usually cause some conjunctival injection so their registers are decremented also when this rule fires.

RULE NUMBER: 58
IF:
The ^^conjunctiva^^ appears to be Abnormal
and Are any of the following conjunctival abnormalities present?

^^Redness^^
and The location of the conjunctival injection can best be described as:
^^Circumcorneal^^

THEN:
^^Traumatic iritis^^ - Confidence=20
and ^^Acute iritis^^ - Confidence=20
and ^^Chronic iritis^^ - Confidence=20
and ^^Acute angle closure glaucoma^^ - Confidence=20

NOTE:
Circumcorneal injection is common in conditions such as iritis and acute glaucoma. However, this sign is of no value in differentiating between these conditions. Thus, if this rule is true, the iritis and glaucoma registers are all incremented (+20).

RULE NUMBER: 59
IF:
The ^^conjunctiva^^ appears to be Abnormal
and Are any of the following conjunctival abnormalities present?
^^Redness^^
and The location of the conjunctival injection can best be described as:
^^Diffuse^^

THEN:
^^Viral conjunctivitis^^ - Confidence=20
and ^^Allergic conjunctivitis^^ - Confidence=20
and ^^Bacterial conjunctivitis^^ - Confidence=20

NOTE:
Diffuse conjunctival injection is indicative of conjunctivitis of any etiology. Although other conditions such as corneal abrasion and ulcer will often produce diffuse injection, the firing of this rule does not affect their registers as other findings are more important for their diagnoses.

RULE NUMBER: 60
IF:
The ^^conjunctiva^^ appears to be Abnormal
and Are any of the following conjunctival abnormalities present?

^^Redness^^
and The location of the conjunctival injection can best be described as:
^^Sectorial^^

THEN:
^^Subconjunctival hemorrhage^^ - Confidence=30

NOTE:
Sectorial injection is generally indicative of a subconjunctival hemorrhage, thus, its register is incremented (+30) if this finding is positive. This rule has no effect on other disease registers because sectorial injection without regard to severity may or may not occur with virtually all of the diseases considered.

RULE NUMBER: 61
IF:
The ^^conjunctiva^^ appears to be Abnormal
and Are any of the following conjunctival abnormalities present?
^^Redness^^
and How would you rate the degree of the ^^conjunctival redness^^?
Severe

THEN:
^^Subconjunctival hemorrhage^^ - Confidence=30
and ^^Allergic conjunctivitis^^ - Confidence=-10

NOTE:
Severe conjunctival injection can occur with almost all of the disorders causing conjunctival injection. In the initial and early subsequent presentation of subconjunctival hemorrhage, redness will always be severe. When this rule fires, the subconjunctival hemorrhage register is incremented (+30). It is unlikely that allergic conjunctivitis would produce severe bulbar injection so its register is decremented (-10) if this rule is true.

RULE NUMBER: 62
IF:
The ^^conjunctiva^^ appears to be Abnormal
and Are any of the following conjunctival abnormalities present?
^^Redness^^

and How would you rate the degree of the ^^conjunctival redness^^?
Moderate

THEN:
^^Subconjunctival hemorrhage^^ - Confidence=-10

NOTE:
Moderate conjunctival injection can occur with almost all of the disorders causing conjunctival injection. In the initial and early subsequent presentation of subconjunctival hemorrhage, when this program is likely to be consulted, redness will always be severe--not moderate. When this rule fires, the subconjunctival hemorrhage register is decremented (-10). The firing of this rule has no effect on other disease registers.

RULE NUMBER: 63
IF:
The ^^conjunctiva^^ appears to be Abnormal
and Are any of the following conjunctival abnormalities present?
^^Redness^^
and How would you rate the degree of the ^^conjunctival redness^^?
Mild

THEN:
^^Subconjunctival hemorrhage^^ - Confidence=-30

NOTE:
Mild conjunctival injection can occur with almost all of the disorders causing conjunctival injection. In the initial and early subsequent presentation of subconjunctival hemorrhage, when this program is likely to be consulted, redness will always be severe--not mild. When this rule fires, the subconjunctival hemorrhage register is decremented (-30). The firing of this rule has no effect on other disease registers.

RULE NUMBER: 64
IF:
The ^^conjunctiva^^ appears to be Abnormal
and Are any of the following conjunctival abnormalities present?
^^Follicles^^

THEN:
^^Viral conjunctivitis^^ - Confidence=30
and ^^Allergic conjunctivitis^^ - Confidence=-10
and ^^Bacterial conjunctivitis^^ - Confidence=-10

NOTE:
Follicles (usually found in the inferior fornix conjunctiva) are fairly indicative of a viral infection. They are usually not present in bacterial (exception: chlamydia) or allergic conjunctivitis. It is unlikely that the corpsman will detect follicles unless they are severe so it is unlikely this rule will ever fire. If it does fire, the Viral conjunctivitis register is incremented (+30) and the bacterial and allergic conjunctivitis registers are decremented (-10).

RULE NUMBER: 65
IF:
The ^^conjunctiva^^ appears to be Abnormal
and Are any of the following conjunctival abnormalities present?
^^Papillae^^

THEN:
^^Allergic conjunctivitis^^ - Confidence=20

NOTE:
Papillary hypertrophy is associated with vernal conjunctivitis as well as CLI-GPC. The effect of this rule if true is to increment the allergic conjunctivitis register (+20). GPC is considered in a later contact lens specific rule.

RULE NUMBER: 66
IF:
The ^^conjunctiva^^ appears to be Abnormal
and Are any of the following conjunctival abnormalities present?
^^Edema^^

THEN:
^^Allergic conjunctivitis^^ - Confidence=20
and ^^Viral conjunctivitis^^ - Confidence=10

NOTE:
Chemosis is generally an allergic phenomenon, thus the allergic

conjunctivitis register is incremented (+20) if this rule fires. Chemosis can also be present in viral conditions, but generally this is a less likely cause of corpsman-detectable chemosis, so the viral conjunctivitis register is incremented (+10) if chemosis is present.

RULE NUMBER: 67
IF:
Does your patient complain of any of these other ocular symptoms?
Discharge (other than tearing) OR Excessive tearing OR Lids stuck together upon arising
or: The ^^conjunctiva^^ appears to be Abnormal
and Are any of the following conjunctival discharges present?
^^Excessive tearing^^

THEN:
^^Pneumococcal corneal ulcer^^ - Confidence=10
and ^^Pseudomonas corneal ulcer^^ - Confidence=10
and ^^Herpes simplex keratitis^^ - Confidence=10
and ^^Corneal abrasion^^ - Confidence=10
and ^^Traumatic iritis^^ - Confidence=10
and ^^Acute iritis^^ - Confidence=10
and ^^Chronic iritis^^ - Confidence=10
and ^^Acute angle closure glaucoma^^ - Confidence=10
and ^^Viral conjunctivitis^^ - Confidence=10
and ^^Allergic conjunctivitis^^ - Confidence=10

NOTE:
Like photophobia, which is often the cause of excessive tearing, this symptom can occur variably with many of the diseases the program considers. Thus, all conditions which affect the cornea and iris are incremented (+10) if excessive tearing is present. Also, viral and allergic conjunctivitis are incremented (+10) as this symptom often is present in this symptom. This rule also forces the corpsman to look for conjunctival discharge if either the conjunctiva is abnormal on exam or the patient c/o discharge in the history.

RULE NUMBER: 68
IF:
Does your patient complain of any of these other ocular symptoms?
Discharge (other than tearing) OR Excessive tearing OR Lids stuck

together upon arising
or: The ^^conjunctiva^^ appears to be Abnormal
and Are any of the following conjunctival discharges present?
^^Stringy^^

THEN:
^^Allergic conjunctivitis^^ - Confidence=20

NOTE:
A white or clear stingy discharge is present in some severe cases of allergic conjunctivitis (i.e. vernal conjunctivitis). It is unlikely this symptom will be present in most allergic conjunctividities but if it is, the allergic conjunctivitis register will be incremented (+20).

RULE NUMBER: 69
IF:
Does your patient complain of any of these other ocular symptoms?
Discharge (other than tearing) OR Excessive tearing OR Lids stuck together upon arising
or: The ^^conjunctiva^^ appears to be Abnormal
and Are any of the following conjunctival discharges present?
^^Mucoid^^

THEN:
^^Viral conjunctivitis^^ - Confidence=20

NOTE:
A purely mucoid discharge may be present in viral conjunctivitis. If this rule fires, the viral conjunctivitis register will be incremented (+20).

RULE NUMBER: 70
IF:
Does your patient complain of any of these other ocular symptoms?
Discharge (other than tearing) OR Excessive tearing OR Lids stuck together upon arising
or: The ^^conjunctiva^^ appears to be Abnormal
and Are any of the following conjunctival discharges present?
^^Mucopurulent^^

THEN:
^^Bacterial conjunctivitis^^ - Confidence=20
and ^^Viral conjunctivitis^^ - Confidence=10

NOTE:
A mucopurulent discharge is a fairly good sign of a bacterial conjunctivitis so the effect of this rule if true is to increment the bacterial conjunctivitis register (+20). There is no ELSE part to this rule because the absence of a mucopurulent discharge in no way rules out bacterial conjunctivitis. Viral conjunctivitis is also incremented (+10) because it can also cause a mucopurulent discharge although there should be little purulence with a viral infection.

RULE NUMBER: 71
IF:
Does your patient complain of any of these other ocular symptoms?
Discharge (other than tearing) OR Excessive tearing OR Lids stuck together upon arising
or: The ^^conjunctiva^^ appears to be Abnormal
and Are any of the following conjunctival discharges present?
^^Purulent^^

THEN:
^^Bacterial conjunctivitis^^ - Confidence=30
and ^^Viral conjunctivitis^^ - Confidence=-20
and ^^Allergic conjunctivitis^^ - Confidence=-20

NOTE:
A purulent discharge is a very good sign of a bacterial conjunctivitis so the effect of this rule if true is to increment the bacterial conjunctivitis register (+30). There is no ELSE part to this rule because the absence of a purulent discharge in no way rules out bacterial conjunctivitis. The presence of a purulent discharge contradicts viral and allergic conjunctivitis which are frequently in the differential with bacterial conjunctivitis, so their registers are decremented (-20) if this rule fires.

RULE NUMBER: 72
IF:
THE PROBLEM IS NOT CL RELATED
and The ^^conjunctiva^^ appears to be Abnormal
and Were you able to obtain a conjunctival smear? Yes
and Did the conjunctival smear reveal abnormal amounts of any of the following cell types? ^^Neutrophils^^

THEN:
^^Bacterial conjunctivitis^^ - Confidence=30
and ^^Pneumococcal corneal ulcer^^ - Confidence=20
and ^^Pseudomonas corneal ulcer^^ - Confidence=20

NOTE:
The presence of more than a few random neutrophils in a conjunctival smear usually is indicative of a bacterial infection. Thus, if this rule fires, the bacterial conjunctivitis register is incremented (+30). Also, the registers of the two bacterial corneal ulcers are incremented (+20). Their registers will be affected more by later rules dealing with corneal integrity.

RULE NUMBER: 73
IF:
THE PROBLEM IS NOT CL RELATED
and The ^^conjunctiva^^ appears to be Abnormal
and Were you able to obtain a conjunctival smear? Yes
and Did the conjunctival smear reveal abnormal amounts of any of the following cell types? ^^Eosinophils^^

THEN:
^^Allergic conjunctivitis^^ - Confidence=30

NOTE:
Eosinophils are almost always associated with an allergic condition, thus, if this rule fires, the allergic conjunctivitis register is incremented (+30). This rule has no effect on any other register and, because no else clause is used, it has no effect an any register if it is not true.

RULE NUMBER: 74
IF:
THE PROBLEM IS NOT CL RELATED
and The ^^conjunctiva^^ appears to be Abnormal
and Were you able to obtain a conjunctival smear? Yes
and Did the conjunctival smear reveal abnormal amounts of any of the following cell types? ^^Lymphocytes^^ OR ^^Monocytes^^

THEN:
^^Viral conjunctivitis^^ - Confidence=30
and ^^Herpes simplex keratitis^^ - Confidence=30

NOTE:
The presence of mononuclear cells (lymphocytes and monocytes) is indicative of a viral infection. Thus the registers of viral conjunctivitis and Herpes simplex keratitis are both incremented (+30) if mononuclear cells are present. If this rule is not true, it has no effect on any disease register.

RULE NUMBER: 75
IF:
THE PROBLEM IS NOT CL RELATED
and The ^^conjunctiva^^ appears to be Abnormal
and Were you able to obtain a conjunctival smear? Yes
and Did the conjunctival smear reveal abnormal amounts of any of the following cell types? Bacteria

THEN:
^^Bacterial conjunctivitis^^ - Confidence=30

NOTE:
If bacteria (without regard to type) are present in the conjunctival smear, the bacterial conjunctivitis register is incremented (+30). Bacterial corneal ulcers will be dealt with in later rules which differentiate types of bacteria or call for corneal smears. If bacteria is not present, this rule does not fire and has no effect on any disease register.

RULE NUMBER: 76
IF:
THE PROBLEM IS NOT CL RELATED
and The ^^conjunctiva^^ appears to be Abnormal
and Were you able to obtain a conjunctival smear? Yes and
Did the conjunctival smear reveal abnormal amounts of any of the following cell types? Bacteria
and What type(s) of bacteria were present? Gram-positive cocci

THEN:
^^Pneumococcal corneal ulcer^^ - Confidence=20

NOTE:
This rule helps to differentiate between pseudomonal and pneumococcal corneal ulcer. If G+ cocci are present in the conjunctival smear, it is suggestive that pneumococcus (among other pathogens) might be present. Thus, if this rule fires the pneumococcus register is incremented (+20). The corneal ulcers will be dealt with more fully in later rules regarding the cornea specifically.

RULE NUMBER: 77
IF:
THE PROBLEM IS NOT CL RELATED
and The ^^conjunctiva^^ appears to be Abnormal
and Were you able to obtain a conjunctival smear? Yes
and Did the conjunctival smear reveal abnormal amounts of any of the following cell types? Bacteria
and What type(s) of bacteria were present? Gram-negative rods

THEN:
^^Pseudomonas corneal ulcer^^ - Confidence=20

NOTE:
This rule helps to differentiate between pseudomonal and pneumococcal corneal ulcer. If G- rods are present in the conjunctival smear, it is suggestive that pseudomonas (among other pathogens) might be present. Thus, if this rule fires the pseudomonas register is incremented (+20). The corneal ulcers will be dealt with more fully in later rules regarding the cornea specifical-

ly. Gram negative cocci is not used in the present program but will be if hyperacute conjunctivitis is added to the disease list.

RULE NUMBER: 78
IF:
THE PROBLEM IS NOT CL RELATED
and What did your examination of the ^^pre-auricular nodes^^ Reveal?
^^Palpable and non-tender^^

THEN:
^^Viral conjunctivitis^^ - Confidence=10
and ^^Bacterial conjunctivitis^^ - Confidence=-10

NOTE:
Swollen non tender PA nodes are usually indicative of a viral infection. This sign, if present is a good indicator so the viral conjunctivitis register is incremented (+10) if this rule fires. Because bacterial conjunctivitis would generally not cause PA node enlargement, its register is decremented (-10). The absence of this sign is not indicative of anything so there is no else component to this rule.

RULE NUMBER: 79
IF:
THE PROBLEM IS NOT CL RELATED
and What did your examination of the ^^pre-auricular nodes^^ Reveal?
^^Palpable and tender^^

THEN:
^^Viral conjunctivitis^^ - Confidence=10
and ^^Bacterial conjunctivitis^^ - Confidence=-10
and ^^Herpes simplex keratitis^^ - Confidence=10

NOTE:
Swollen tender PA nodes are usually indicative of a viral infection. This sign, if present is a good indicator so the viral conjunctivitis and Herpes keratitis registers are incremented (+10) if this rule fires. Because bacterial conjunctivitis would generally not cause PA node enlargement, its register is decremented (-10). The absence of this sign is not indicative of anything so there is no else component to this rule.

RULE NUMBER: 80
IF:
The ^^conjunctiva^^ appears to be Normal

THEN:
Are any of the following conjunctival abnormalities present? None of the above

NOTE:
The purpose of this rule is to assign a value to the qualifier "Are any of the following conjunctival abnormalities..." because this qualifier is used in an or clause of a later rule. Without this rule, it is possible that the program would ask this qualifier even if the corpsman had previously entered that the conjunctiva is normal.

RULE NUMBER: 81
IF:
The cornea is Abnormal and Are any of the following corneal abnormalities present? ^^Infiltrates^^ (Gray or white patches)

THEN:
^^Pneumococcal corneal ulcer^^ - Confidence=30 and ^^Pseudomonas corneal ulcer^^ - Confidence=30 and ^^Corneal abrasion^^ - Confidence=-30

NOTE:
The presence of a corneal infiltrate is almost pathognomatic for a corneal ulcer. It's presence also strongly argues against a simple corneal abrasion which would be in the differential. Thus, the result of this rule's firing is to increment the two ulcer registers (+30) and decrement the corneal abrasion register (-30).

RULE NUMBER: 82
IF:
The cornea is Abnormal
and Are any of the following corneal abnormalities present? Cloudy or hazy appearance

and Which part of the cornea appears cloudy or hazy? Entire cornea

THEN:
^^Acute angle closure glaucoma^^ - Confidence=30

NOTE:
If the cornea appears cloudy or steamy overall, generallized corneal edema is probably the cause. The only disease considered by this program which could cause this appearance is AACG. Thus, if this sign is present, the AACG register is incremented (+30).

RULE NUMBER: 83 IF:
The cornea is Abnormal
and Are any of the following corneal abnormalities present? Cloudy or hazy appearance
and Which part of the cornea appears cloudy or hazy? Superior one-third
and THE PROBLEM IS CL RELATED

THEN:
Contact lens induced ^^Superior limbic conjunctivitis^^ - Confidence=30

NOTE:
This rule is specific for contact lens related conditions. It only fires if the corpsman inputs that he feels the patient's problem is or may be contact lens related and that the cornea is coudy or hazy in the superior quadrant. If this rule fires, the register for CLI-SLK is incremented (+30). The order of qualifiers in this rule is designed to force the question of location of corneal clouding whether the condition is contact lens related or not if the corpsman has input the cornea is abnormal and cloudy.

RULE NUMBER: 84
IF:
The cornea is Abnormal
and Are any of the following corneal abnormalities present? Scratch or abrasion
and Which of the following choices best describes the appearance of the abraded area? Clean and sterile

THEN:
^^Pneumococcal corneal ulcer^^ - Confidence=-10
and ^^Pseudomonas corneal ulcer^^ - Confidence=-10
and ^^Corneal abrasion^^ - Confidence=10

NOTE:
If the abraded area is sterile, corneal ulcer is somewhat unlikely. Thus, the two ulcer registers are decremented (-10) and the corneal abrasion register is incremented (+10) if the abrasion site is clean and sterile.

RULE NUMBER: 85
IF:
The cornea is Abnormal
and Are any of the following corneal abnormalities present? Scratch or abrasion
and Which of the following choices best describes the appearance of the abraded area? Adherant greenish ^^discharge^^ or ^^exudate^^ OR Adherant white discharge or exudate
and Were you able to obtain a ^^Gram's stain^^ of the ^^exudate^^ from the site of corneal involvement? Yes
and What were the results of the ^^Gram's stain^^ of the corneal ^^exudate^^? G+ Cocci

THEN:
^^Pneumococcal corneal ulcer^^ - Confidence=20
and ^^Pseudomonas corneal ulcer^^ - Confidence=-20
and ^^Corneal abrasion^^ - Confidence=-50

NOTE:
If an abraded site contains G+ cocci, the only possible disease considered by this program is Pneumococcal corneal ulcer. Thus, its register is incremented +20 while the registers for Pseudomonas and corneal abrasion are decremented (-20) and (-50) respectively as they would frequently be in the differential.

RULE NUMBER: 86
IF:
The cornea is Abnormal

and Are any of the following corneal abnormalities present? Scratch or abrasion
and Which of the following choices best describes the appearance of the abraded area? Adherant greenish ^^discharge^^ or ^^exudate^^ OR Adherant white discharge or exudate
and Were you able to obtain a ^^Gram's stain^^ of the ^^exudate^^ from the site of corneal involvement? Yes
and What were the results of the ^^Gram's stain^^ of the corneal ^^exudate^^? G- Rods

THEN:
^^Pseudomonas corneal ulcer^^ - Confidence=20
and ^^Pneumococcal corneal ulcer^^ - Confidence=-20
and ^^Corneal abrasion^^ - Confidence=-50

NOTE:
If an abraded site contains G- rods, the only possible disease considered by this program is Pseudomonal corneal ulcer. Thus, its register is incremented +50 while the registers for Pneumococcas and corneal abrasion are decremented (-20) and (-50) respectively as they would frequently be in the differential.

RULE NUMBER: 87
IF:
The cornea is Abnormal
and Are any of the following corneal abnormalities present? Foreign body present

THEN:
^^Corneal foreign body^^ - Confidence=50

NOTE:
This diagnosis of corneal foreign body is fairly straight forward if a foreign body is present on the cornea. Thus, if true, this rule increments the corneal foreign body rule (+50).

RULE NUMBER: 88 IF:
The cornea is Abnormal

and Are any of the following corneal abnormalities present? Scratch or abrasion
and Which of the following choices best describes the appearance of the abraded area? Adherant greenish ^^discharge^^ or ^^exudate^^

THEN:
^^Pseudomonas corneal ulcer^^ - Confidence=20
and ^^Pneumococcal corneal ulcer^^ - Confidence=-20
and ^^Herpes simplex keratitis^^ - Confidence=-20
and ^^Corneal abrasion^^ - Confidence=-20

NOTE:
A greenish purulent discharge from an ulcer site is virtually pathognomonic for Pseudomonas. Thus, if this sign is present, its register is incremented (+20). The presence of a greenish exudate contradicts Pneumococcal ulcer, corneal abraision and herpes, so their registers are decremented (-20) if this rule fires.

RULE NUMBER: 89
IF:
The cornea is Abnormal
and Are any of the following corneal abnormalities present? Scratch or abrasion
and Which of the following choices best describes the appearance of the abraded area? Adherant white discharge or exudate

THEN:
^^Pneumococcal corneal ulcer^^ - Confidence=20
and ^^Pseudomonas corneal ulcer^^ - Confidence=20
and ^^Herpes simplex keratitis^^ - Confidence=-20
and ^^Corneal abrasion^^ - Confidence=-20

NOTE:
If a purulent discharge is present in an abrasion site, the abrasion is ulcerated. Both pseudomonas and pneumococcus can produce a white discharge so both of their registers are incremented (+20) if a discharge is present. If a white discharge is present, corneal abrasion and herpes are decremented (-20).

RULE NUMBER: 90
IF:
Does your patient complain of any of the following symptoms of ocular ^^irritation^^? Scratchy or foreign body sensation OR Pain OR Burning OR ^^Photophobia^^
or: The ^^conjunctiva^^ appears to be Abnormal
or: The cornea is Abnormal

THEN:
FLUORESCEIN STAINING SHOULD BE DONE

ELSE:
FLUORESCEIN STAINING SHOULD NOT BE DONE

NOTE:
The purpose of this rule is to determine whether questions about fluorescien staining should be asked. The qualifier in the THEN section of this rule is asked in the IF section of later rules. The second qualifier in the else part of the rule is included because it is asked as part of an or block in a later rule.

RULE NUMBER: 91
IF:
FLUORESCEIN STAINING SHOULD NOT BE DONE

THEN:
Does the cornea exhibit ^^fluorescein staining^^? No
and Does the staining pattern match either of these patterns? None of the above

NOTE:
This rule exists because the qualifiers in the then part are used in an or block in later rules.

RULE NUMBER: 92
IF:
FLUORESCEIN STAINING SHOULD BE DONE
and Does the cornea exhibit ^^fluorescein staining^^? No

and The cornea is Normal

THEN:
^^Pneumococcal corneal ulcer^^ - Confidence=-50
and ^^Pseudomonas corneal ulcer^^ - Confidence=-50
and ^^Herpes simplex keratitis^^ - Confidence=-50
and ^^Corneal abrasion^^ - Confidence=-50

NOTE:
If no corneal staining is present and the cornea is reported normal, the corneal epithelium is intact. The corneal diseases listed in the then section of this rule can be virtually ruled out if the epithelium is intact. Thus, each of their registers are decremented (-50) if no corneal staining is present. The rule is also designed to fire the corneal staining question if the conjunctiva is abnormal even if the corpsman reports that the cornea is normal.

RULE NUMBER: 93 IF:
FLUORESCEIN STAINING SHOULD BE DONE
and Does the cornea exhibit ^^fluorescein staining^^? Yes
and Does the staining pattern match either of these patterns?
^^Dendritic^^ (branching)

THEN:
^^Herpes simplex keratitis^^ - Confidence=50
and ^^Pneumococcal corneal ulcer^^ - Confidence=-20
and ^^Pseudomonas corneal ulcer^^ - Confidence=-20
and ^^Corneal abrasion^^ - Confidence=-20

NOTE:
This rule increments herpes (+50) if dendritic staining is present as this is pathognomonic for herpes. Other corneal conditions are decremented (-20). FB is not decremented because a FB tracking stain could be confused for a dendritic stain by an inexperienced observer.

RULE NUMBER: 94 IF:
FLUORESCEIN STAINING SHOULD BE DONE
and Does the cornea exhibit ^^fluorescein staining^^? Yes
and Does the staining pattern match either of these patterns? ^^Foreign body tracking^^ (zig-zag)

THEN:
^^Corneal foreign body^^ - Confidence=20
and ^^Pneumococcal corneal ulcer^^ - Confidence=-20
and ^^Pseudomonas corneal ulcer^^ - Confidence=-20
and CONSIDER LID EVERSION YES

ELSE:
CONSIDER LID EVERSION NO

NOTE:
This rule increments FB if a tracking stain is present. Pseudo and pneumo are decremented (-20), but corneal abrasion and herpes are not affected because a corneal abrasion is still present with a FB that causes tracking and the dendritic pattern of herpes could be mistaken for FB tracking. Consider lid eversion is included because a later rule (114) needs this information in an or block.

RULE NUMBER: 95
IF:
FLUORESCEIN STAINING SHOULD BE DONE
and Does the cornea exhibit ^^fluorescein staining^^? Yes
and Does the staining pattern match either of these patterns? NOT ^^Dendritic^^ (branching)

THEN:
^^Herpes simplex keratitis^^ - Confidence=-20

NOTE:
This rule decrements herpes (-20) if dendritic staining is not present. Such staining does not have to be present to diagnose herpes but is very common.

RULE NUMBER: 96
IF:
FLUORESCEIN STAINING SHOULD BE DONE
and Does the cornea exhibit ^^fluorescein staining^^? Yes
and Does the staining pattern match either of these patterns? None of the above
and The size of the area(s) of corneal staining can best be described as Punctate (pinpoint)

THEN:
THERE IS PUNCTATE CORNEAL STAINING

ELSE:
THERE IS NO PUNCTATE CORNEAL STAINING

NOTE:
The purpose of this series of rules is two-fold. First, these rules force the program to ask questions about staining in a logical sequence and prevent the program from asking questions about the nature of the corneal staining if there is no corneal staining or there is no corneal or conjunctival abnormality, or if a pathognomonic staining pattern has already been revealed. Second, these rules conclude in conditions which will be combined in later rules. In this way, the IF part of the later rules can be less complex as the question order hierachy will already be established.

RULE NUMBER: 97
IF:
FLUORESCEIN STAINING SHOULD BE DONE
and Does the cornea exhibit ^^fluorescein staining^^? Yes
and Does the staining pattern match either of these patterns? None of the above
and The size of the area(s) of corneal staining can best be described as Less than 1mm

THEN:
THE STAINED AREA IS LESS THAN 1MM

ELSE:
THE STAINED AREA IS NOT LESS THAN 1MM

NOTE:
The purpose of this series of rules is two-fold. First, these rules force the program to ask questions about staining in a logical sequence and prevent the program from asking questions about the nature of the corneal staining if there is no corneal staining or there is no corneal or conjunctival abnormality, or if a pathognomonic staining pattern has already been revealed. Second, these rules conclude in conditions which will be combined in later rules. In this way, the IF part of the later rules can be less complex as the question order hierachy will already be established.

RULE NUMBER: 98
IF:
FLUORESCEIN STAINING SHOULD BE DONE
and Does the cornea exhibit ^^fluorescein staining^^? Yes
and Does the staining pattern match either of these patterns? None of the above
and The size of the area(s) of corneal staining can best be described as Larger than 1mm

THEN:
THE AREA OF STAINING IS LARGER THAN 1MM

ELSE:
THE AREA OF STAINING IS NOT LARGER THAN 1MM

NOTE:
The purpose of this series of rules is two-fold. First, these rules force the program to ask questions about staining in a logical sequence and prevent the program from asking questions about the nature of the corneal staining if there is no corneal staining or there is no corneal or conjunctival abnormality, or if a pathognomonic staining pattern has already been revealed. Second, these rules conclude in conditions which will be combined in later rules. In this way, the IF part of the later rules can be less complex as the question order hierachy will already be established.

RULE NUMBER: 99
IF:
FLUORESCEIN STAINING SHOULD BE DONE
and Does the cornea exhibit ^^fluorescein staining^^? Yes
and Does the staining pattern match either of these patterns? None of the above
and The amount of corneal staining is best characterized as A single area

THEN:
STAINING IS ONLY IN ONE AREA

ELSE:
STAINING IS NOT ONLY IN ONE AREA

NOTE:
The purpose of this series of rules is two-fold. First, these rules force the program to ask questions about staining in a logical sequence and prevent the program from asking questions about the nature of the corneal staining if there is no corneal staining or there is no corneal or conjunctival abnormality. Second, these rules conclude in conditions which will be combined in later rules. In this way, the IF part of the later rules can be less complex as the question order hierachy will already be established.

RULE NUMBER: 100
IF:
FLUORESCEIN STAINING SHOULD BE DONE
and Does the cornea exhibit ^^fluorescein staining^^? Yes
and Does the staining pattern match either of these patterns? None of the above
and The amount of corneal staining is best characterized as 2 to 3 areas

THEN:
THE STAINING IS IN 2-3 AREAS

ELSE:
THE STAINING IS NOT IN 2-3 AREAS

NOTE:
The purpose of this series of rules is two-fold. First, these rules force the program to ask questions about staining in a logical sequence and prevent the program from asking questions about the nature of the corneal staining if there is no corneal staining or there is no corneal or conjunctival abnormality. Second, these rules conclude in conditions which will be combined in later rules. In this way, the IF part of the later rules can be less complex as the question order hierachy will already be established.

RULE NUMBER: 101
IF:
FLUORESCEIN STAINING SHOULD BE DONE
and Does the cornea exhibit ^^fluorescein staining^^? Yes
and Does the staining pattern match either of these patterns? None of the above

and The amount of corneal staining is best characterized as Multiple areas

THEN:
THE STAIN AMT IS MULTIPLE AREAS

ELSE:
THE STAIN AMT IS NOT MULTPLE AREAS

NOTE:
The purpose of this series of rules is two-fold. First, these rules force the program to ask questions about staining in a logical sequence and prevent the program from asking questions about the nature of the corneal staining if there is no corneal staining or there is no corneal or conjunctival abnormality. Second, these rules conclude in conditions which will be combined in later rules. In this way, the IF part of the later rules can be less complex as the question order hierachy will already be established.

RULE NUMBER: 102
IF:
FLUORESCEIN STAINING SHOULD BE DONE
and Does the cornea exhibit ^^fluorescein staining^^? Yes
and Does the staining pattern match either of these patterns? None of the above
and The location of the corneal staining is best characterized as: Central

THEN:
STAIN LOCATION IS CENTRAL

ELSE:
STAIN LOCATION IS NOT CENTRAL

NOTE:
The purpose of this series of rules is two-fold. First, these rules force the program to ask questions about staining in a logical sequence and prevent the program from asking questions about the nature of the corneal staining if there is no corneal staining or there is no corneal or conjunctival abnormality. Second, these rules conclude in conditions which will be combined in later rules. In this way, the IF part of the later rules can be less complex as the question order hierachy will already be established.

RULE NUMBER: 103
IF:
FLUORESCEIN STAINING SHOULD BE DONE
and Does the cornea exhibit ^^fluorescein staining^^? Yes
and Does the staining pattern match either of these patterns? None of the above
and The location of the corneal staining is best characterized as:
Peripheral

THEN:
THE STAIN LOCATION IS PERIPHERAL

ELSE:
THE STAIN LOCATION IS NOT PERIPHERAL

NOTE:
The purpose of this series of rules is two-fold. First, these rules force the program to ask questions about staining in a logical sequence and prevent the program from asking questions about the nature of the corneal staining if there is no corneal staining or there is no corneal or conjunctival abnormality. Second, these rules conclude in conditions which will be combined in later rules. In this way, the IF part of the later rules can be less complex as the question order hierachy will already be established.

RULE NUMBER: 104
IF:
FLUORESCEIN STAINING SHOULD BE DONE
and Does the cornea exhibit ^^fluorescein staining^^? Yes
and Does the staining pattern match either of these patterns? None of the above
and The location of the corneal staining is best characterized as:
^^Diffuse^^

THEN:
THE STAIN LOCATION IS DIFFUSE

ELSE:
THE STAIN LOCATION IS NOT DIFFUSE

NOTE:
The purpose of this series of rules is two-fold. First, these rules force the program to ask questions about staining in a logical sequence and prevent the program from asking questions about the nature of the corneal staining if there is no corneal staining or there is no corneal or conjunctival abnormality. Second, these rules conclude in conditions which will be combined in later rules. In this way, the IF part of the later rules can be less complex as the question order hierachy will already be established.

RULE NUMBER: 105
IF:
THE AREA OF STAINING IS LARGER THAN 1MM
and THE STAIN AMT IS NOT MULTPLE AREAS
and Are any of the following corneal abnormalities present? ^^Localized edematous area^^ OR ^^Infiltrates^^ (Gray or white patches)

THEN:
^^Pneumococcal corneal ulcer^^ - Confidence=20
and ^^Pseudomonas corneal ulcer^^ - Confidence=20
and ^^Corneal abrasion^^ - Confidence=-20

NOTE:
The purpose of this rule is to increment the ulcer registers if staining is in 1-3 areas and corneal edema or infiltrates are present. This combination of symptoms is fairly indicative of an ulcer vs an abrasion.

RULE NUMBER: 106
IF:
THERE IS PUNCTATE CORNEAL STAINING
and THE STAIN LOCATION IS DIFFUSE

THEN:
^^Viral conjunctivitis^^ - Confidence=30

NOTE:
Diffuse punctate staining is often present in viral conjunctivitis, especially that caused by EKC. Thus, when present, the viral conjunctivitis register is incremented (+30).

RULE NUMBER: 107
IF:
THE PROBLEM IS NOT CL RELATED
and The ^^anterior chamber^^ is: Abnormal
and Are any of the following ^^anterior chamber^^ abnormalities present?
A/C contains blood

THEN:
^^Hyphema^^ - Confidence=50

NOTE:
This rule fires only if the corpsman inputs that the A/C is abnormal and that the A/C contains blood. Because blood in the A/C is, by definition, a hyphema, the hyphema register is incremented (+50) to ensure that it is above display threshold.

RULE NUMBER: 108
IF:
THE PROBLEM IS NOT CL RELATED
and The ^^anterior chamber^^ is: Abnormal
and Are any of the following ^^anterior chamber^^ abnormalities present?
A/C contains pus

THEN:
^^Pneumococcal corneal ulcer^^ - Confidence=10
and ^^Pseudomonas corneal ulcer^^ - Confidence=10

NOTE:
This rule fires only if the corpsman inputs that the A/C is abnormal and that the A/C contains pus. The only diseases that are considered by the program capable of causing purulence of the A/C are the two ulcerative keratitises. They are not the only possible causes, however, and the corpsman's ability to detect A/C purulence is suspect. Thus, if this rule is true, the registers of those two conditions are incremented (+10).

RULE NUMBER: 109
IF:
THE PROBLEM IS NOT CL RELATED
and The ^^anterior chamber^^ is: Abnormal
and Are any of the following ^^anterior chamber^^ abnormalities present?
^^Aqueus humor^^ appears cloudy

THEN:
^^Traumatic iritis^^ - Confidence=10
and ^^Acute iritis^^ - Confidence=10
and ^^Chronic iritis^^ - Confidence=10

NOTE:
This rule fires only if the corpsman inputs that the A/C is abnormal and that the A/C appears cloudy. The only diseases capable of causing cloudiness of the A/C are the three iritises They are not the only possible causes, however, and the corpsman's ability to detect A/C clouding is suspect. Thus, if this rule is true, the registers of those two conditions are incremented (+10).

RULE NUMBER: 110
IF:
The ^^anterior chamber^^ is: Normal

THEN:
^^Hyphema^^ - Confidence=-50

NOTE:
If the A/C is normal, hyphema can be virtually ruled out, thus if the corpsman inputs normal for this qualifier, the hyphema register is decremented (-50)

RULE NUMBER: 111
IF:
Does the cornea exhibit ^^fluorescein staining^^? Ye
or: Does your patient have an ocular history of any of the following?
Previous ocular herpes infections
or: Does your patient have a significant medical history of any of the following conditions? Genital or Labial Herpes

or: What did your examination of the ^^pre-auricular nodes^^ Reveal? ^^Palpable and tender^^
and THE PROBLEM IS NOT CL RELATED

THEN:
CORNEAL SENSITIVITY SHOULD BE MEASURED

ELSE:
CORNEAL SENSITIVITY SHOULD NOT BE MEASURED

NOTE:
The purpose of this rule is to determine when the corpsman should be asked to perform a test of corneal sensitivity. When any one of the conditions in the IF part of the rule is true, this rule fires and subsequent rules about the corneal sensitivity test will be tested.

RULE NUMBER: 112
IF:
Does your patient complain of any of the following symptoms of ^^visual disturbance^^? Blurred or decreased vision OR ^^Haloes around lights^^
or: Does your patient complain of any of the following symptoms of ocular ^^irritation^^? Pain
or: Does your patient have an ocular history of any of the following?^^High Hyperopia^^ (spectacle Rx > +3.00D)
or: Does your patient have a significant medical history of any of the following conditions? Connective tissue disorder (arthritis, etc.)
or: The pupillary size and response to light appear to be: NOT Normal, both eyes
and THE PROBLEM IS NOT CL RELATED

THEN:
IOP SHOULD BE EVALUATED

ELSE:
IOP SHOULD NOT BE EVALUATED

NOTE:
The purpose of this rule is to determine if symptoms suggesting the need for IOP evaluation are present. If any of the signs or symptoms listed in the if part of the rule are present, the program will decide it needs an IOP deter-

mination either by tonometer or tactile tensions. A series of later rules are effected by this rule as they test the conclusion of this rule in their premise.

RULE NUMBER: 113
IF:
Does your patient complain of any of the following symptoms of ^^visual disturbance^^? ^^Distorted vision^^ OR ^^Flashing lights^^ OR ^^Floaters^^ OR ^^Haloes around lights^^
or: Is there an ^^associated history of ocular trauma^^? Yes
or: Does your patient have an ocular history of any of the following? ^^High Myopia^^ (spectacle Rx < -4.00D) OR ^^High Hyperopia^^ (spectacle Rx > +3.00D)
or: The ^^onset^^ of symptoms can best be described as: Sudden and THE PROBLEM IS NOT CL RELATED

THEN:
confrontation VF Should be done

ELSE:
confrontation VF Should not be done

NOTE:
The purpose of this rule is to decide if confrontation visual fields should be performed based on the presence of the symptoms listed in the if part of the rule. If any one of the symptoms listed is positive, the rule is true and the corpsman will be asked for visual field findings. If all of the symptoms listed are negative, the corpsman will not be queried about VF findings. The rule is currently quite conservative--in most cases the corpsman will be required to provide VF data.

RULE NUMBER: 114
IF:
THE PROBLEM IS CL RELATED
or: Does your patient complain of any of the following symptoms of ocular ^^irritation^^? Scratchy or foreign body sensation
or: CONSIDER LID EVERSION YES

THEN:
LID EVERSION SHOULD BE PERFORMED

ELSE:
LID EVERSION SHOULD NOT BE PERFORMED

NOTE:
The purpose of this rule is to determine if the lid eversion procedure should be performed. If the patient is a CL wearer or he complains of a scratchy sensation, or has FB tracking staining (from rule 94), this rule fires and subsequent rules asking about the everted lids are tested.

RULE NUMBER: 115
IF:
IOP SHOULD NOT BE EVALUATED
and confrontation VF Should not be done
and CORNEAL SENSITIVITY SHOULD NOT BE MEASURED
and THE PROBLEM IS NOT CL RELATED
and LID EVERSION SHOULD NOT BE PERFORMED

THEN:
SPTST.SCR SHOULD NOT BE DISPLAYED
and ^^Acute angle closure glaucoma^^ - Confidence=0

RULE NUMBER: 116
IF:
THE PROBLEM IS CL RELATED
and Does your patient complain of any of the following symptoms of ocular ^^irritation^^? Itching

THEN:
Contact lens induced ^^Giant papillary conjunctivitis^^ - Confidence=10
and Contact lens induced ^^Superior limbic conjunctivitis^^ - Confidence=10
and ^^Contact lens solution allergy^^ - Confidence=10

NOTE:
This rule is specific for contact lens related conditions. It only fires if the corpsman inputs that he feels the patient's problem is or may be contact lens related and itching is present. If this rule fires, the registers of the appropriate contact lens disorders are incremented (+10), as this symptom is only mildly suggestive of any of them.

RULE NUMBER: 117
IF:
THE PROBLEM IS CL RELATED
and Does your patient complain of any of the following symptoms of ocular ^^irritation^^? Burning

THEN:
Contact lens induced ^^Superior limbic conjunctivitis^^ - Confidence=10
and ^^Contact lens solution allergy^^ - Confidence=10

NOTE:
This rule is specific for contact lens related conditions. It only fires if the corpsman inputs that he feels the patient's problem is or may be contact lens related and a burning sensation is present. If this rule fires, the registers for SLK and solution allergy are incremented only (+10), because the meaning of the symptom is vague.

RULE NUMBER: 118
IF:
THE PROBLEM IS CL RELATED
and Does your patient complain of any of the following symptoms of ocular ^^irritation^^? ^^Photophobia^^

THEN:
Contact lens induced ^^Superior limbic conjunctivitis^^ - Confidence=10
and ^^Contact lens solution allergy^^ - Confidence=10

NOTE:
This rule is specific for contact lens related conditions. It only fires if the corpsman inputs that he feels the patient's problem is or may be contact lens related and photophobia is present. Photophobia is generally indicative of a corneal or iris problem so the only contact lens related diseases affected by this rule are SLK and solution allergy.

RULE NUMBER: 119
IF:
THE PROBLEM IS CL RELATED

and Does your patient complain of any of the following symptoms of ocular ^^irritation^^? Scratchy or foreign body sensation

THEN:
Contact lens induced ^^Giant papillary conjunctivitis^^ - Confidence=10
and ^^Contact lens deposit^^ - Confidence=10
and ^^Inverted contact lens^^ - Confidence=10
and ^^Damaged contact lens^^ - Confidence=10

NOTE:
This rule is specific for contact lens related conditions. It only fires if the corpsman inputs that he feels the patient's problem is or may be contact lens related and a foreign body sensation is present. Several contact lens related disorders are incremented mildly if this rule fires.

RULE NUMBER: 120
IF:
THE PROBLEM IS CL RELATED
and OD VISION IS REDUCED
or: OS VISION IS REDUCED

THEN:
Contact lens induced ^^Giant papillary conjunctivitis^^ - Confidence=10
and Contact lens induced ^^Superior limbic conjunctivitis^^ - Confidence=10
and ^^Contact lens deposit^^ - Confidence=10
and ^^Inverted contact lens^^ - Confidence=10

NOTE:
This rule is specific for contact lens related conditions. It only fires if the corpsman inputs that he feels the patient's problem is or may be contact lens related and V/A in either eye is less than 20/25. Several contact lens related disorders are incremented mildly if this rule fires.

RULE NUMBER: 121
IF:
THE PROBLEM IS CL RELATED
and Does your patient have an ocular history of any of the following?
Recent or current soft contact lens wear

and THE STAIN LOCATION IS PERIPHERAL
and The peripheral corneal staining is predominantly Superior

THEN:
Contact lens induced ^^Superior limbic conjunctivitis^^ - Confidence=30

NOTE:
This rule is specific for contact lens related conditions. It only fires if the corpsman inputs that he feels the patient's problem is or may be contact lens related and there is superior peripheral corneal staining. In addition, for this rule to fire, the patient must be a SOFT lens wearer as only SCL wearers are subject to SLK. The only contact lens related disorder that would typically cause this finding is SLK. Thus, if true, this rule increments (+30) to the SLK register.

RULE NUMBER: 122
IF:
THE PROBLEM IS CL RELATED
and The ^^conjunctiva^^ appears to be Abnormal
and Are any of the following conjunctival abnormalities present?
^^Papillae^^

THEN:
Contact lens induced ^^Giant papillary conjunctivitis^^ - Confidence=30

NOTE:
This rule is specific for contact lens related conditions. It only fires if the corpsman inputs that he feels the patient's problem is or may be contact lens related and there is papillary hypertrophy of the conjunctiva. The only contact lens related disorder that would typically cause this finding is GPC. Thus, if true, this rule increments (+30) to the GPC register.

RULE NUMBER: 123
IF:
THE PROBLEM IS CL RELATED
and Are any of the following conjunctival abnormalities present? ^^Redness^^
or: Does your patient complain of any of these other ocular symptoms?
Redness

THEN:
Contact lens induced ^^Giant papillary conjunctivitis^^ - Confidence=10
and Contact lens induced ^^Superior limbic conjunctivitis^^ - Confidence=10
and ^^Contact lens solution allergy^^ - Confidence=10
and ^^Contact lens deposit^^ - Confidence=10

NOTE:
This rule is specific for contact lens related conditions. It only fires if the corpsman inputs that he feels the patient's problem is or may be contact lens related and redness is present. Conjunctival injection can be present with virtually all of the contact lens related disorders, but only the four disorders listed in the THEN part of this rule are incremented (+10).

RULE NUMBER: 124
IF:
THE PROBLEM IS CL RELATED
and THE STAIN LOCATION IS DIFFUSE
and THERE IS PUNCTATE CORNEAL STAINING
and tHE STAIN AMT IS MULTIPLE AREAS

THEN:
^^Contact lens solution allergy^^ - Confidence=20

NOTE:
This rule is specific for contact lens related conditions. It only fires if the corpsman inputs that he feels the patient's problem is or may be contact lens related and diffuse punctate corneal staining is present. Of the contact lens related disorders, solution allergy is the most likely cause of this symptom, thus its register is incremented (+20) if this rule fires.

RULE NUMBER: 125
IF:
THE PROBLEM IS CL RELATED
and Inspection of the contact lens (removed from the eye) reveals:
^^Deposits^^

THEN:
^^Contact lens deposit^^ - Confidence=50

NOTE:
This rule is specific for contact lens related conditions. It only fires if the corpsman inputs that he feels the patient's problem is or may be contact lens related and that the lens is deposited with foreign material. If the lens is deposited, then the register for CL lens deposit is incremented (+50) to ensure that it is at threshold or higher.

RULE NUMBER: 126
IF:
THE PROBLEM IS CL RELATED
and Inspection of the contact lens (removed from the eye) reveals:
^^Damaged edge^^

THEN:
^^Damaged contact lens^^ - Confidence=50

NOTE:
This rule is specific for contact lens related conditions. It only fires if the corpsman inputs that he feels the patient's problem is or may be contact lens related and that the lens edge is damaged or torn. If the lens is damaged, then the register for damaged contact lens is incremented (+50) to ensure that it is at threshold or higher.

RULE NUMBER: 127
IF:
THE PROBLEM IS CL RELATED
and Inspection of the contact lens (removed from the eye) reveals: ^^Inverted lens^^

THEN:
^^Inverted contact lens^^ - Confidence=50

NOTE:
This rule is specific for contact lens related conditions. It only fires if the corpsman inputs that he feels the patient's problem is or may be contact lens related and that the lens is inverted. If the lens is inverted, then the register for inverted contact lens is incremented (+50) to ensure that it is at threshold or higher.

RULE NUMBER: 128
IF:
THE PROBLEM IS CL RELATED
and Inspection of the contact lens (removed from the eye) reveals: NOT
^^Deposits^^

THEN:
^^Contact lens deposit^^ - Confidence=-30

NOTE:
This rule decrements the Deposit register if the corpsman examines the lenses and reports no deposits on the lenses.

RULE NUMBER: 129
IF:
THE PROBLEM IS CL RELATED
and Inspection of the contact lens (removed from the eye) reveals: NOT
^^Inverted lens^^

THEN:
^^Inverted contact lens^^ - Confidence=-30

NOTE:
This rule decrements the Inverted CL register if the corpsman examines the lenses and reports no inversion of the lenses.

RULE NUMBER: 130
IF:
THE PROBLEM IS CL RELATED
and Inspection of the contact lens (removed from the eye) reveals: NOT
^^Damaged edge^^

THEN:
^^Damaged contact lens^^ - Confidence=-30

NOTE:
This rule decrements the Damaged CL register if the corpsman examines the lenses and reports no damage of the lenses.

RULE NUMBER: 131
IF:
CORNEAL SENSITIVITY SHOULD BE MEASURED
and What were the results of the ^^Corneal sensitivity test^^? Both corneas are about equally sensitive

THEN:
^^Herpes simplex keratitis^^ - Confidence=-10

NOTE:
Reduced corneal sensitivity commonly occurs in cases of ocular herpes. Because this test is unfamiliar to most corpsmen, the results may be somewhat suspect. Thus, while this is an important finding and should possibly be given a stronger weighting, this rule only decrements the herpes register -10 if corneal sensitivity is equal.

RULE NUMBER: 132
IF:
The condition is affecting: NOT Only the left eye
and CORNEAL SENSITIVITY SHOULD BE MEASURED
and What were the results of the ^^Corneal sensitivity test^^? Left cornea more sensitive than right.

THEN:
^^Herpes simplex keratitis^^ - Confidence=30

NOTE:
This rule tests whether corneal sensitivity in the right eye is reduced if the corpsman has input that the condition is affecting the right or both eyes and certain conditions triggering the corneal sensitivity test are met. If this rule is true, the Herpes register is incremented (+30).

RULE NUMBER: 133
IF:
The condition is affecting: NOT Only the right eye and CORNEAL SENSITIVITY SHOULD BE MEASURED and What were the results of the ^^Corneal sensitivity test^^? Right cornea more sensitive than left

THEN:
^^Herpes simplex keratitis^^ - Confidence=30

NOTE:
This rule tests whether corneal sensitivity in the left eye is reduced if the corpsman has input that the condition is affecting the right or both eyes and certain conditions triggering the corneal sensitivity test are met. If this rule is true, the Herpes register is incremented (+30).

RULE NUMBER: 134
IF:
IOP SHOULD BE EVALUATED
and Were you able to obtain ^^Intraocular pressure^^ readings from your patient? Yes
and [IOP OD] > 0
and [IOP OS] > 0

THEN:
^^Acute angle closure glaucoma^^ - Confidence=0

NOTE:
The purpose of this rule is to force the runtime to ask the user for IOP measures of the right and left eye in order if any of the listed signs and symptoms are present and he has access to a tonometer. It has no effect on any disease register (it simply adds 0 to the AACG register).

RULE NUMBER: 135
IF:
IOP SHOULD BE EVALUATED
and Were you able to obtain ^^Intraocular pressure^^ readings from your patient? No

and What were the results of your evaluation of ^^tactile tensions^^?
Right eye firmer than left
and The condition is affecting: NOT Only the left eye

THEN:
^^Acute angle closure glaucoma^^ - Confidence=20

NOTE:
the purpose of this rule is to help diagnose angle closure glaucoma based on the measure of tactile tensions. This rule only fires if certain sx are present, and the corpsman responds that he does not have a tonometer for IOP measurement. There is a corresponding rule for the other eye. If all conditions are met, this rule fires and increments the glaucoma register (+20). If any one of the conditions is false, the rule does not fire and effects no disease registers.

RULE NUMBER: 136
IF:
IOP SHOULD BE EVALUATED
and Were you able to obtain ^^Intraocular pressure^^ readings from your patient? No
and What were the results of your evaluation of ^^tactile tensions^^? Left eye firmer than right
and The condition is affecting: NOT Only the right eye

THEN:
^^Acute angle closure glaucoma^^ - Confidence=20

NOTE:
The purpose of this rule is to help diagnose angle closure glaucoma based on the measure of tactile tensions. This rule only fires if certain sx are present, and the corpsman responds that he does not have a tonometer for IOP measurement. There is a corresponding rule for the other eye. If all conditions are met, this rule fires and increments the glaucoma register (+20). If any one of the conditions is false, the rule does not fire and effects no disease registers.

RULE NUMBER: 137
IF:
IOP SHOULD BE EVALUATED
and Were you able to obtain ^^Intraocular pressure^^ readings from your patient? Yes
and The condition is affecting: NOT Only the left eye
and [IOP OD] > 30
and [IOP OS] < 25

THEN:
^^Acute angle closure glaucoma^^ - Confidence=20

NOTE:
This rule and the following rule help to diagnose angle closure glaucoma on the basis of increased (above 30) IOP in one eye with the other eye being normal. A numeric input is required (as opposed to categorical) for medical recording purposes. The screen asking for input of IOP readings only appears to the corpsman if certain sx are present and the corpsman tells the program he has a tonometer available. If any one of these conditions is not valid, the rule is set to be false and has no effect on any disease register. If all conditions are met, the rule fires and (+20) is added to the glaucoma register.

RULE NUMBER: 138
IF:
IOP SHOULD BE EVALUATED
and Were you able to obtain ^^Intraocular pressure^^ readings from your patient? Yes
and The condition is affecting: NOT Only the right eye
and [IOP OS] > 30
and [IOP OD] < 25

THEN:
^^Acute angle closure glaucoma^^ - Confidence=20

NOTE:
This rule and the previous rule help to diagnose angle closure glaucoma on the basis of increased (above 30) IOP in one eye with the other eye being normal. A numeric input is required (as opposed to categorical) for medical

recording purposes. The screen asking for input of IOP readings only appears to the corpsman if certain sx are present and the corpsman tells the program he has a tonometer available. If any one of these conditions is not valid, the rule is set to be false and has no effect on any disease register. If all conditions are met, the rule fires and (+20) is added to the glaucoma register.

RULE NUMBER: 139
IF:
The condition is affecting: NOT Only the left eye
and IOP SHOULD BE EVALUATED
and Were you able to obtain ^^Intraocular pressure^^ readings from your patient? Yes
and [IOP OD] < 25
and [IOP OS] < 25
and [IOP OD] < ([IOP OS] -2)

THEN:
^^Traumatic iritis^^ - Confidence=20 and ^^Acute iritis^^ - Confidence=20 and ^^Chronic iritis^^ - Confidence=20

NOTE:
This rule and the following rule test whether a significant reduction of IOP exists in the affected eye to help diagnose iritis. Only one of the two rules can fire. Often, iritis causes a drop in IOP. The rule only fires if these conditions are met: (1) symptoms are present suggestive of glaucoma or iritis; (2) the presentation is unilateral; (3) a tonometer is used to obtain pressures; (4) the pressure readings are within expected range, i.e. less than 25 mmHG O.U.; (5) the pressure of the affected eye is more than 2mmHg lower than the fellow eye. If the rule is true, (+20) is incremented to each of the iritis registers. There is no corresponding rule for tactile tensions because that procedure is not discriminant enough to aid the diagnosis of iritis.

RULE NUMBER: 140
IF:
The condition is affecting: NOT Only the right eye
and IOP SHOULD BE EVALUATED
and Were you able to obtain ^^Intraocular pressure^^ readings from your patient? Yes

and [IOP OD] 25
and [IOP OS] 25
and [IOP OS] ([IOP OD] -2)

THEN:
^^Traumatic iritis^^ - Confidence=20
and ^^Acute iritis^^ - Confidence=20
and ^^Chronic iritis^^ - Confidence=20

NOTE:
This rule and the previous rule test whether a significant reduction of IOP exists in the affected eye to help diagnose iritis. Only one of the two rules can fire. Often, iritis causes a drop in IOP. The rule only fires if these conditions are met: (1) symptoms are present suggestive of glaucoma or iritis; (2) the presentation is unilateral; (3) a tonometer is used to obtain pressures; (4) the pressure readings are within expected range, i.e. less than 25 mmHG O.U.; (5) the pressure of the affected eye is more than 2mmHg lower than the fellow eye. If the rule is true, (+20) is incremented to each of the iritis registers. There is no corresponding rule for tactile tensions because that procedure is not discriminant enough to aid the diagnosis of iritis.

RULE NUMBER: 141
IF:
confrontation VF Should be done
and What were the results of the ^^visual field examination^^? Abnormal, right eye
and What were the results of your ^^visual field examination^^ of the RIGHT eye? ^^Sectorial defect^^
and The condition is affecting: NOT Only the left eye

THEN:

^^Retinal detachment^^ - Confidence=30

NOTE:
The purpose of this and the next rule is to help diagnose retinal detachment. Only one of the two rules will fire. For this rule to fire, certain symptoms must be present to instantiate the need for a VF examination, only the right VF must be abnormal, and the abnormality must be a sectorial defect. In addition, the condition must not affect only the left eye. If the rule fires, (+30) is added to the retinal detachment register.

RULE NUMBER: 142
IF:
confrontation VF Should be done
and What were the results of the ^^visual field examination^^? Abnormal, left eye
and What were the results of your ^^visual field examination^^ of the LEFT eye? ^^Sectorial defect^^
and The condition is affecting: NOT Only the right eye

THEN:
^^Retinal detachment^^ - Confidence=30

NOTE:
The purpose of this and the previous rule is to help diagnose retinal detachment. Only one of the two rules will fire. For this rule to fire, certain symptoms must be present to instantiate the need for a VF examination, only the left VF must be abnormal, and the abnormality must be a sectorial defect. In addition, the condition must not affect only the right eye. If the rule fires, (+30) is added to the retinal detachment register.

RULE NUMBER: 143
IF:
confrontation VF Should be done
and What were the results of the ^^visual field examination^^? Abnormal, right eye
and What were the results of your ^^visual field examination^^ of the RIGHT eye? ^^General constriction of the visual field^^
and The condition is affecting: NOT Only the left eye

THEN:
^^Acute angle closure glaucoma^^ - Confidence=10

NOTE:
The purpose of this and the next rule is to help diagnose acute glaucoma. Only one of the two rules will fire. For this rule to fire, certain symptoms must be present to instantiate the need for a VF examination, only the right VF must be abnormal, and the abnormality must be a constriction defect. In addition, the condition must not affect only the left eye. If the rule fires, (+10) is added to the angle closure glaucoma register.

RULE NUMBER: 144
IF:
confrontation VF Should be done
and What were the results of the ^^visual field examination^^? Abnormal, left eye
and What were the results of your ^^visual field examination^^ of the LEFT eye? ^^General constriction of the visual field^^
and The condition is affecting: NOT Only the right eye

THEN:
^^Acute angle closure glaucoma^^ - Confidence=10

NOTE:
The purpose of this and the previous rule is to help diagnose acute glaucoma. Only one of the two rules will fire. For this rule to fire, certain symptoms must be present to instantiate the need for a VF examination, only the left VF must be abnormal, and the abnormality must be a constriction defect. In addition, the condition must not affect only the right eye. If the rule fires, (+10) is added to the angle closure glaucoma register.

RULE NUMBER: 145
IF:
THE PROBLEM IS NOT CL RELATED
and LID EVERSION SHOULD BE PERFORMED
and ^^Eversion^^ of the eyelids reveals: ^^Papillae^^ (bumpy or velvety appearance to upper tarsal conjunctiva)

THEN:
^^Allergic conjunctivitis^^ - Confidence=20

NOTE:
The presence of papillae on the upper tarsal conjunctiva indicate an allergic reaction, so the allergic conjunctivitis register is incremented (+20). The lid eversion question only fires if a previous rule establishes the need for the question.

RULE NUMBER: 146
IF:
THE PROBLEM IS CL RELATED
and LID EVERSION SHOULD BE PERFORMED
and ^^Eversion^^ of the eyelids reveals: ^^Papillae^^ (bumpy or velvety appearance to upper tarsal conjunctiva)

THEN:
Contact lens induced ^^Giant papillary conjunctivitis^^ - Confidence=50
and ^^Allergic conjunctivitis^^ - Confidence=-20

NOTE:
The presence of papillae in a contact lens wearer is highly indicative of GPC. If this rule fires, the GPC register is incremented (+50) and the allergic conjunctivitis register is decremented (-20) because it is frequently in the differential. The lid eversion question only fires if a previous rule indicates it needs to be asked.

RULE NUMBER: 147
IF:
IOP SHOULD BE EVALUATED
and Were you able to obtain ^^Intraocular pressure^^ readings from your patient? Yes
and [IOP OD] < 25
and [IOP OS] < 25

THEN:
^^Acute angle closure glaucoma^^ - Confidence=-50

NOTE:
If the IOP in both eyes is normal, AACG can be virtually ruled out. This rule decrements (-50) from the AACG register if pressure is normal.

RULE NUMBER: 148
IF:
IOP SHOULD BE EVALUATED

and Were you able to obtain ^^Intraocular pressure^^ readings from your patient? No
and What were the results of your evaluation of ^^tactile tensions^^? Both eyes equal and normal

THEN:
^^Acute angle closure glaucoma^^ - Confidence=-30

NOTE:
If the IOP in both eyes is normal, AACG can be virtually ruled out. Tactile tensions are considered less reliable than instrument readings so this rule decrements (-30) from the AACG register if pressure is normal.

RULE NUMBER: 149
IF:
LID EVERSION SHOULD BE PERFORMED
and ^^Eversion^^ of the eyelids reveals: NOT Foreign body
and The cornea is Abnormal
and Are any of the following corneal abnormalities present? NOT Foreign body present

THEN:
^^Corneal foreign body^^ - Confidence=-30

NOTE:
This rule decrements the corneal foreign body register (-30) if external evaluation of the eye reveals that no foreign body is present.

RULE NUMBER: 150
IF:
Is there an ^^associated history of ocular trauma^^? No
and FLUORESCIEN STAINING SHOULD BE DONE
and Does the cornea exhibit ^^fluorescein staining^^? No

THEN:
^^Corneal foreign body^^ - Confidence=-30

NOTE:
The purpose of this rule is to decrement foreign body if several key findings are absent.

RULE NUMBER: 151
IF:
FLUORESCIEN STAINING SHOULD BE DONE
and Does the staining pattern match either of these patterns? None of the above
and THE STAINED AREA IS NOT LESS THAN 1MM
or: THE AREA OF STAINING IS NOT LARGER THAN 1MM
and tHE STAIN AMT IS MULTIPLE AREAS
and THE STAIN LOCATION IS DIFFUSE

THEN:
^^Pneumococcal corneal ulcer^^ - Confidence=-30
and ^^Pseudomonas corneal ulcer^^ - Confidence=-30
and ^^Corneal abrasion^^ - Confidence=-30

NOTE:
The purpose of this rule is to decrement the ulcer and abrasion registers if several key findings are missing.

RULE NUMBER: 152
IF:
The pupillary size and response to light appear to be: Abnormal, both eyes

THEN:
PUPILS ABNORMAL OU WARN

ELSE:
PUPILS ABNORMAL OU DON'T WARN

NOTE:
The purpose of this rule is to warn the corpsman that his patient's disease may not be within the realm of this program if both pupils are abnormal. Except in rare bilateral occurrences of iritis or angle closure, bilateral pupillary abnormalities generally indicate a condition beyond the scope of this program.

RULE NUMBER: 153
IF:
The condition is affecting: Only the right eye
and The pupillary size and response to light appear to be: Abnormal, left eye

THEN:
PUPIL ABNORMAL LEFT, LATERALITY RIGHT WARN

ELSE:
PUPIL ABNORMAL LEFT, LATERALITY RIGHT DONT WARN

NOTE:
The purpose of this rule is to warn the corpsman if his pupil findings are inconsistent with the laterality of his patient's condition. That is, if he inputs that the disease is affecting one eye but the pupil is abnormal in the fellow eye, the pupil findings are ignored and the message pconwarn.txt is displayed at the end of the run. The user is then invited to recheck his pupil/laterality findings and use the Change and Rerun feature, if necessary, after the program finishes.

RULE NUMBER: 154
IF:
The condition is affecting: Only the left eye
and The pupillary size and response to light appear to be: Abnormal, right eye

THEN:
PUPIL ABN RT, LATERALITY LEFT WARN

ELSE:
PUPIL ABN RT, LATERALITY LEFT DON'T WARN

NOTE:
The purpose of this rule is to warn the corpsman if his pupil findings are inconsistent with the laterality of his patient's condition. That is, if he inputs that the disease is affecting one eye but the pupil is abnormal in the fellow eye, the pupil findings are ignored and the message pconwarn.txt is displayed at the end of the run. The user is then invited to recheck his pupil/laterality find-

ings and use the Change and Rerun feature, if necessary, after the program finishes.

RULE NUMBER: 155
IF:
IOP SHOULD BE EVALUATED
and The condition is affecting: Only the left eye
and Were you able to obtain ^^Intraocular pressure^^ readings from your patient? Yes
and [IOP OD] > 25
and [IOP OS] < 25

THEN:
LAT OS, IOP HIGH OD WARN

ELSE:

LAT OS, IOP HIGH OD DON'T WARN

NOTE:
The purpose of this rule is to provide the corpsman with a warning that some of the data may be inconsistent with the diagnoses this program can make. The then and else conclusions are tested by the report generator and the appropriate report is produced (if any). In this case, if the IOP is high in the right eye, but the corpsman indicates the laterality of the condition to be only the left eye, a warning is generated before the results are displayed.

RULE NUMBER: 156
IF:
IOP SHOULD BE EVALUATED and The condition is affecting: Only the right eye and Were you able to obtain ^^Intraocular pressure^^ readings from your patient? Yes
and [IOP OD] < 25
and [IOP OS] > 25

THEN:
LATERALITY OD, HIGH IOP OS WARN

ELSE:
LATERALITY OD, HIGH IOP OS DON'T WARN

NOTE:
The purpose of this rule is to provide the corpsman with a warning that some of the data may be inconsistent with the diagnoses this program can make. The then and else conclusions are tested by the report generator and the appropriate report is produced (if any). In this case, if the IOP is high in the left eye, but the corpsman has indicated that the laterality of the condition is only the right eye, a warning is generated which appears before the results are displayed.

RULE NUMBER: 157
IF:
confrontation VF Should be done
and The condition is affecting: Only the left eye
and What were the results of the ^^visual field examination^^? Abnormal, right eye

THEN:
VISUAL FIELD ABNORMAL OD, LATERALITY OS WARN

ELSE:
VISUAL FIELD ABNORMAL OD, LATERALITY OS DON'T WARN

NOTE:
The purpose of this rule is to provide the corpsman with a warning that some of the data may be inconsistent with the diagnoses this program can make. The then and else conclusions are tested by the report generator and the appropriate report is produced (if any).

RULE NUMBER: 158
IF:
confrontation VF Should be done
and The condition is affecting: Only the right eye
and What were the results of the ^^visual field examination^^? Abnormal, left eye

THEN:
VISUAL FIELD ABNORMAL OS, LATERALITY OD WARN

ELSE:
VISUAL FIELD ABNORMAL OS, LATERALITY OD DON'T WARN

NOTE:
The purpose of this rule is to provide the corpsman with a warning that some of the data may be inconsistent with the diagnoses this program can make. The then and else conclusions are tested by the report generator and the appropriate report is produced (if any).

RULE NUMBER: 159
IF:
The cornea is Normal
and FLUORESCEIN STAINING SHOULD BE DONE
and THE AREA OF STAINING IS LARGER THAN 1MM

THEN:
CORNEA NORMAL, STAINING ABNORMAL WARN

ELSE:
CORNEA NORMAL, STAINING ABNORMAL DON'T WARN

NOTE:
The purpose of this rule is to provide the corpsman with a warning that some of the data may be inconsistent with the diagnoses this program can make. The then and else conclusions are tested by the report generator and the appropriate report is produced (if any).

RULE NUMBER: 160
IF:
IOP SHOULD BE EVALUATED and Were you able to obtain ^^Intraocular pressure^^ readings from your patient? Yes
and [IOP OD] > 25
and [IOP OS] > 25

THEN:
HIGH IOP OU, WARN

ELSE:
HIGH IOP OU, DON'T WARN

NOTE:
The purpose of this rule is to provide the corpsman with a warning that some of the data may be inconsistent with the diagnoses this program can make. The then and else conclusions are tested by the report generator and the appropriate report is produced (if any). In this case, if the IOP is high in the both eyes, a warning is generated which appears before the results are displayed.

RULE NUMBER: 161
IF:
confrontation VF Should be done and What were the results of the ^^visual field examination^^? Abnormal, both eyes

THEN:
VF ABNORMAL OU WARN

ELSE:
VF ABNORMAL OU DONT WARN

NOTE:
The purpose of this rule is to provide the corpsman with a warning that some of the data may be inconsistant with the diagnoses this program can make. The then and else conclusions are tested by the report generator and the appropriate report is produced (if any). In this case, if the visual fields are abnormal in both eyes, a warning is generated which appears before the results are displayed.

RULE NUMBER: 162
IF:
[CASE NO] = [DX]

THEN:
STOP

NOTE:
This rule is used in automatic testing of the rulebase using data files

generated from the PHS POIS ophthalmic database. It can be turned on or off from the command (re7.cmd) file.

Appendix D

CAOA Screen Definition File

~~tonometer
~SAMEAS schiotz tonometer
~~Intraocular pressure measurement
~SAMEAS intraocular pressure
~~localized corneal edema
~SAMEAS localized edematous area
~~purulence
~SAMEAS purulent
~~Retinal breaks or detachments
~SAMEAS Retinal detachment
~~Retinal breaks
~SAMEAS Retinal detachment
~V 3
~CLS
~BACKGROUND LTCYAN
~COLOR BLACK
~CLS
~CURSET 0,0

VISUAL ACUITY OD

Please enter the best corrected distance visual acuity of the right eye:

V/A OD: 20/

~BORDER 0,2,21,78, RED
~Color BLUE
~CURSET 0,4
EXSYS PRO
~CURSET 22,0
~BACKGROUND BLUE
~COLOR WHITE

Enter the value for visual acuity and press <ENTER>
<?> -details Quit-save <H>-help <F1>-Keyword

~CURSET 11, 42
~V 4
~CLS
~BACKGROUND LTCYAN
~COLOR BLACK
~CLS
~CURSET 0,0

VISUAL ACUITY OS

Please enter the best corrected distance visual acuity of the left eye:

V/A OS: 20/

```
~BORDER 0,2,21,78, RED
~Color BLUE
~CURSET 0,4
EXSYS PRO
~CURSET 22,0
~BACKGROUND BLUE
~COLOR WHITE
    Enter the value for visual acuity and press <ENTER>
    <?>-details  Quit-save  <H>-help  <F1>-Keyword
~CURSET 11,42
~V 1
~CLS
~BACKGROUND LTCYAN
~COLOR BLACK
~CLS
~CURSET 0,0
```

INTRAOCULAR PRESSURE OD

Please enter the^^intraocular pressure^^ of the right eye in mmHg:

IOP OD:

```
~BORDER 0,2,21,78, RED
~Color BLUE
~CURSET 0,4
EXSYS PRO
~CURSET 22,0
~BACKGROUND BLUE
~COLOR WHITE
    Enter the value for Intraocular Pressure and press <ENTER>
    <?>-details  Quit-save  <H>-help  <F1>-Keyword
~CURSET 11, 38
~V 2
~CLS
~BACKGROUND LTCYAN
~COLOR BLACK
```

~CLS
~CURSET 0,0

INTRAOCULAR PRESSURE OS

Please enter the^^intraocular pressure^^ of the left eye in mmHg:

IOP OS:

~BORDER 0,2,21,78, RED
~Color BLUE
~CURSET 0,4
EXSYS PRO
~CURSET 22,0
~BACKGROUND BLUE
~COLOR WHITE

Enter the value for Intraocular Pressure and press <ENTER>
<?>-details Quit-save <H>-help <F1>-Keyword

~CURSET 11, 38
~V 7
~CLS
~BACKGROUND LTCYAN
~COLOR BLACK
~CLS
~CURSET 0,0

PROVIDER'S IDENTIFICATION NUMBER
Please enter your identification number.
ID NUMBER:_____

~BORDER 0,2,21,78, RED
~Color BLUE
~CURSET 0,4
EXSYS PRO
~CURSET 22,0
~BACKGROUND BLUE
~COLOR WHITE

Enter your identification number and press <ENTER>
<?>-details Quit-save <H>-help <F1>-Keyword

~CURSET 11, 38
~V 5
~CLS

```
~BACKGROUND LTCYAN
~COLOR BLACK
~CLS
~CURSET 0,0
```

PATIENT'S IDENTIFICATION NUMBER
Please enter the patient's identification number.
PATIENT'S ID NUMBER:

```
 ~BORDER 0,2,21,78, RED
~Color BLUE
~CURSET 0,4
EXSYS PRO
~CURSET 22,0
~BACKGROUND BLUE
~COLOR WHITE
      Enter the Patient's identification number and press <ENTER>
      <?>-details  Quit-save < H>-help  <F1>-Keyword
~CURSET 11, 38
~V 6
~CLS
~BACKGROUND LTCYAN
~COLOR BLACK
~CLS
~CURSET 0,0
```

PROVIDER'S DIAGNOSIS
Please enter your diagnosis:
DIAGNOSIS:

```
~BORDER 0,2,21,78, RED
~Color BLUE
~CURSET 0,4
EXSYS PRO
~CURSET 22,0
~BACKGROUND BLUE
~COLOR WHITE
      Enter the your diagnosis and press <ENTER>
      <?>-details  Quit-save  <H>-help  <F1>-Keyword
~CURSET 11, 39
~Q "always true"
~CLS
```

~COLOR WHITE
~BACKGROUND BLUE
~CLS

TREATMENT PROTOCOLS

Use the F1 key to select the treatment protocol you wish to view, then press <ENTER>

^^Acute Angle Closure Glaucoma^^

^^Acute Iritis^^

^^Allergic Conjunctivitis^^

^^Bacterial Conjunctivitis^^

^Blepharitis^^

^^Chalazion^^

^^Chronic Iritis^^

^^Contact Lens Tear^^

^^Contact Lens Deposit^^

~PRESS ANY KEY
~CLS

TREATMENT PROTOCOLS

Use the F1 key to select the treatment protocol you wish to view, then press <ENTER>

Contact Lens Induced ^^Superior Limbic Keratitis^^

Contact Lens Induced ^^Giant Papillary Conjunctivitis^^

^^Contact Lens Solution Allergy^^

^^Contact Lens Inversion^^

^^Corneal Abrasion^^

^^Corneal Foreign Body^^

^^Dislocation of the Lens^^

^^Flash Burn^^

^^Gonococcal Conjunctivitis^^
~PRESS ANY KEY
~CLS

TREATMENT PROTOCOLS

Use the F1 key to select the treatment protocol you wish to view, then press <ENTER>

^^Herpes Simplex Keratitis^^

^^Hordeolum^^

^^Hyphema^^

^^Inclusion Conjunctivitis^^

^^Ocular Foreign Body^^

^^Orbital Blowout Fracture^^

^^Penetrating Injury to the Eye^^

^^Pneumococcal Corneal Ulcer^^

^^Pseudomonas Corneal Ulcer^^
~PRESS ANY KEY
~CLS

TREATMENT PROTOCOLS

Use the F1 key to select the treatment protocol you wish to view, then press <ENTER>

^^Retinal Detachment^^

^^Rupture of the Globe^^

^^Subconjunctival Hemorrhage^^

^^Traumatic Iritis^^

^^Viral Conjunctivitis^^

~BACKGROUND WHITE
~COLOR BLUE
Keyword Information-<F1>, Return-<ESC>:
Press <ENTER> to continue:
~~PHOTOPHOBIA
~BACKGROUND BLUE
~CLS

~COLOR WHITE

Photophobia

DEFINITION: An abnormal intolerance to light ranging from mild light sensitivity to severe pain and ^^blepharospasm^^.

BACKGROUND: Photophobia is generally caused by ^^trigeminal^^ irritation due to ciliary spasm and/or corneal involvement. Photophobia is common in conditions which affect the cornea, such as Corneal Abrasions, Corneal Ulcers and Viral Conjunctivitis. It is also a common symptom of diseases affecting the iris and ciliary body, such as Iritis and Acute Glaucoma.

~BORDER 2,2,21,78, CYAN
~Color CYAN
~CURSET 2, 5
MEDIC Hypertext Help System
~BORDER 6,10,9,70, CYAN
~BORDER 11,10,19,70, CYAN

~~BLEPHAROSPASM
~BACKGROUND BLUE
~CLS

~COLOR WHITE

Blepharospasm

DEFINITION: Tonic spasm of the orbicularis oculi muscle, producing more or less complete closure of the eyelids. Symptomatic blepharospasm occurs in association with a lesion of the eye or of the ^^trigeminal^^ nerve.

~BORDER 2,2,21,78, CYAN
~COLOR CYAN
~CURSET 2, 5
MEDIC Hypertext Help System
~BORDER 6,10,11,70, CYAN

~~Corneal Abrasion
~BACKGROUND BLUE
~CLS
~BACKGROUND BLUE
~COLOR WHITE

CONDITION: Corneal Abrasion

STRUCTURES INVOLVED: Cornea

LATERALITY: Usually unilateral

HALLMARK SYMPTOMS: Pain, usually worse with blink

OTHER SYMPTOMS: ^^Photophobia^^
HALLMARK SIGNS:

OTHER SIGNS: ^^Weeping^^, conjunctival injection, history of ocular exposure to causative agent (wind, paper, foreign body, contact lens), history of recurrent corneal erosion

DIAGNOSTIC PROCEDURES: Examine affected eye with white light, large abrasions may be visible. Instill ^^fluorescein^^ and re-examine with UV light, abrasion will stain and appear bright green under UV illumination. Check for
~BORDER 1,2,22,78, CYAN
~COLOR CYAN
~CURSET 1, 5
MEDIC Hypertext Help System
~PRESS ANY KEY

~CLS
~COLOR WHITE

presence of foreign body and remove if necessary.

TREATMENT: Instill broad spectrum antibiotic ointment (sulfacetamide or neosporin) and patch affected eye, if necessary for comfort, for 24h. If pain is severe, in- still cycloplegic agent (atropine 1% 2 drops) and prescribe systemic analgesic (Tylenol) in addition to antibiotic and patching. Light duty or bed rest as needed for 24h. Patient should be instructed to minimize eye movement as much as possible (i.e. avoid reading. TV is OK)

PROGNOSIS: Usually full recovery is expected within 24h. Occasionally, a patient may experience recurrent corneal erosions in the same area the abrasion occurred. These patients should receive the same treatment for recurrencesand be referred to an ophthalmologist when convenient.

CL CONSIDERATIONS: Both Soft and Hard contact lenses can be the causative agent in cases of corneal abrasion. If

~BORDER 1,2,22,78, CYAN
~COLOR CYAN
~CURSET 1, 5
MEDIC Hypertext Help System
~PRESS ANY KEY
~CLS
~COLOR WHITE

contact lenses are the suspected cause, ^^inspect the lenses^^ with magnification. Look for tears or irregular edges. If the lenses are defective, discontinue lens wear, use new lenses if available after complete corneal recovery. If the lens appears to be deposited with protein or other material, instruct patient to clean lenses and use enzyme cleaner if appropriate. Re-inspect lens after cleaning. If foreign material is successfully removed, the lenses can be reinserted after complete recovery of the abrasion. If the foreign material is still present after cleaning, discontinue contact lens wear, use new lenses if available.

Primary Source: TRAINING MANUAL FOR SUBMARINE IDC'S
Secondary Source: Newell, Ophthalmology: Principles and Concepts, Mosby, St.Louis: 1978
~BORDER 1,2,22,78, CYAN
~COLOR CYAN
~CURSET 1, 5
MEDIC Hypertext Help System
~~contact lens tear
~BACKGROUND BLUE
~CLS
~BACKGROUND BLUE
~COLOR WHITE

CONDITION: Contact lens tear

STRUCTURES INVOLVED: Cornea

LATERALITY: Usually unilateral

HALLMARK SYMPTOMS:

OTHER SYMPTOMS: Blurred vision, scratchy sensation-especially with blinking.

HALLMARK SIGNS: Damaged lens on inspection

OTHER SIGNS: ^^Weeping^^, conjunctival injection,

DIAGNOSTIC PROCEDURES: ^^Carefully examine both contact lenses^^ using your Wood's lamp or any other magnifier. Look at the edges of the lenses as well as the the central portion. Tears and cracks can be very difficult to see.
~BORDER 1,2,22,78, CYAN
~COLOR CYAN
~CURSET 1, 5
MEDIC Hypertext Help System
~PRESS ANY KEY
~CLS
~COLOR WHITE

TREATMENT: The only treatment for a contact lens tear is to replace the contact lens or discontinue contact lens wear altogether. It is also

important to rule out ^^corneal abrasion^^ which sometimes may accompany a torn lens. The patient should be instructed on proper lens handling procedures.

PROGNOSIS: Usually lens replacement or removal will result in complete recovery. If symptoms persist, be alert to other conditions which may also be present, such as ^^contact lens deposits^^, ^^contact lens inversion^^, or ^^corneal abrasion^^.

~BORDER 1,2,22,78, CYAN
~COLOR CYAN
~CURSET 1, 5
MEDIC Hypertext Help System
~~contact lens deposit
~BACKGROUND BLUE
~CLS
~BACKGROUND BLUE
~COLOR WHITE

CONDITION: Contact lens ^^deposits^^

STRUCTURES INVOLVED: Cornea

LATERALITY: Usually bilateral

HALLMARK SYMPTOMS:

OTHER SYMPTOMS: Blurred vision, scratchy sensation-especially with blinking.

HALLMARK SIGNS: Deposited lens on inspection

OTHER SIGNS: ^^Weeping^^, conjunctival injection,

DIAGNOSTIC PROCEDURES: ^^Carefully examine both contact lenses^^ using your Wood's lamp or any other magnifier. Look at both the front and back surfaces of the lenses. Most deposits will occur
~BORDER 1,2,22,78, CYAN
~COLOR CYAN
~CURSET 1, 5
MEDIC Hypertext Help System
~PRESS ANY KEY
~CLS

~COLOR WHITE

on the front surface. Protein deposits will give the lens a hazy appearance under white light and magnification. Lipid ^^deposits^^ sometimes look like bumps of clear jelly on the surface of the lens. Mineral deposits usually appear to be hard white spots on the lens surface.

TREATMENT: Occasionally, enzyme and surfactant cleaning of the lenses is sufficient to eliminate lens deposits, especially if they are composed of protein. If cleaning fails, the only alternatives are to replace the lens or discontinue lens wear altogether. It is also important to rule out ^^corneal abrasion^^ which sometimes may accompany severely deposited lenses. The patient should be instructed on proper lens hygiene.

PROGNOSIS: Usually lens replacement or removal will result in complete recovery. If symptoms persist, be alert to other conditions which may also be present, such as ^^contact lens tear^^, ^^contact lens inversion^^, or ^^corneal abrasion^^.

~BORDER 1,2,22,78, CYAN
~COLOR CYAN
~CURSET 1, 5
MEDIC Hypertext Help System
~~solution allergy
~SAMEAS contact lens solution allergy
~~contact lens solution allergy
~BACKGROUND BLUE
~CLS
~BACKGROUND BLUE
~COLOR WHITE

CONDITION: Contact lens solution allergy

STRUCTURES INVOLVED: Cornea, ^^conjunctiva^^, lids

LATERALITY: Usually bilateral

HALLMARK SYMPTOMS: Itching, especially when wearing lenses

OTHER SYMPTOMS: scratchy sensation-especially with blinking.

HALLMARK SIGNS:

OTHER SIGNS: conjunctival injection, conjunctival ^^edema^^, lid edema, ^^stringy^^ or ropey white ^^discharge^^, ^^weeping^^.

DIAGNOSTIC PROCEDURES: ^^Wright's stain^^ of conjunctival scraping may reveal increased ^^eosinophils^^ indicating a allergic response. Check the patient's contact lens solutions for ^^preservatives^^,

~BORDER 1,2,22,78, CYAN
~COLOR CYAN
~CURSET 1, 5
MEDIC Hypertext Help System
~PRESS ANY KEY
~CLS
~COLOR WHITE

especially those which are frequently associated with solution allergy.

TREATMENT: The only satisfactory treatment for a contact lens solution allergy is to change to solutions containing different (or no) preservatives and to replace the lenses. Since this is impractical while underway, lens wear must be discontinued and the patient should be referred to an optometrist when convenient.

PROGNOSIS: Usually, removal of the lenses will result in complete recovery within 24 hours. If symptoms persist, be alert to other conditions which may also be present, such as ^^allergic conjunctivitis^^, ^^viral conjunctivitis^^, ^^bacterial conjunctivitis^^, or ^^corneal abrasion^^.

~BORDER 1,2,22,78, CYAN
~COLOR CYAN
~CURSET 1, 5
MEDIC Hypertext Help System
~~contact lens inversion
~BACKGROUND BLUE
~CLS
~BACKGROUND BLUE
~COLOR WHITE

CONDITION: Contact lens inversion

STRUCTURES INVOLVED: Cornea

LATERALITY: Usually unilateral

HALLMARK SYMPTOMS:

OTHER SYMPTOMS: Blurred vision, scratchy sensation-especially with blinking.

HALLMARK SIGNS: Inverted lens on inspection

OTHER SIGNS: ^^Weeping^^, conjunctival injection,

DIAGNOSTIC PROCEDURES: ^^Carefully examine both contact lenses^^ using your Wood's lamp or any other magnifier. Hold each lens on your fingertip and view it from the side. Try to determine if the lens contours consistently up to the edge. If the edge of the

~BORDER 1,2,22,78, CYAN
~COLOR CYAN
~CURSET 1, 5
MEDIC Hypertext Help System
~PRESS ANY KEY
~CLS
~COLOR WHITE

lens reflects slightly outward, an inverted lens is indicated.

TREATMENT: Reverting the lens to right-side-out usually will correct the problem. It is also important to rule out ^^corneal abrasion^^ and ^^contact lens tear^^ which sometimes may accompany inverted lenses. While hard or gas-permeable lenses may sometimes be inverted, they usually are damaged to the point that lens wear is contraindicated. The patient should be instructed on proper lens handling procedures.

PROGNOSIS: Usually, returning the lens to right-side-out will result in complete recovery. If symptoms persist, be alert to other conditions which may also be present, such as ^^contact lens tear^^, or ^^corneal abrasion^^.

~BORDER 1,2,22,78, CYAN

~COLOR CYAN
~CURSET 1, 5
MEDIC Hypertext Help System
~~hyperacute conjunctivitis
~SAMEAS gonococcal conjunctivitis
~~gonococcal conjunctivitis
~BACKGROUND BLUE
~CLS
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CONDITION: Gonococcal conjunctivitis (hyperacute conjunctivitis)

STRUCTURES INVOLVED: Cornea, ^^conjunctiva^^

LATERALITY: Either unilateral or bilateral

HALLMARK SYMPTOMS: Positive venereal history

OTHER SYMPTOMS: Eyes tender, painful. Blurred vision due to ^^discharge^^, extremely rapid ^^onset^^--can be very alarming

HALLMARK SIGNS: Severe ^^purulent^^ discharge

OTHER SIGNS: severe conjunctival injection, ^^chemosis^^, ballooning of lids due to copious discharge, reduced visual acuity, swollen ^^pre-auricular nodes^^

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DIAGNOSTIC PROCEDURES: Do an immediate ^^Gram's stain^^ looking for Gram negative intracellular diplococci to confirm diagnosis.

TREATMENT: Rapid aggressive treatment is necessary. 1. Eye irrigation with saline qid until the ^^discharge^^ is eliminated. 2. Topical bacitracin or erythromycin ointment qid. 3. Treat systemically as for venereal GC (e.g. Ceftiaxone 1 g iv q 12h for at least three days--longer depending on clinical response). 4. Tetracycline or

erythromycin 250-500 mg po qid x 2-3 weeks (treatment for chlamydia, which may also be present).

PROGNOSIS: Varies with rapidity of appropriate treatment. Purulence usually calms in about 48 hours with proper treatment. The conjunctivitis may last 1-2 weeks.

CL CONSIDERATIONS: Discontinue contact lens wear until advised by optometry or ophthalmology

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Primary Source: Friedberg and Rapuano, Office and Emergency Room Diagnosis and Treatment of Eye Disease, Lippincott, Philadelphia: 1990
Secondary Source: SCCO, Therapeutic Management of Ocular Conditions, SCCO, Fullerton, CA: 1989

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~~inclusion conjunctivitis
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CONDITION: Chlamydial Inclusion Conjunctivitis

STRUCTURES INVOLVED: Cornea, ^^conjunctiva^^

LATERALITY: Either unilateral or bilateral

HALLMARK SYMPTOMS: Positive venereal history

OTHER SYMPTOMS: Eyes stuck together in the morning, ^^photophobia^^, scratchy or foreign body sensation, variable onset--can be acute to insidious.

HALLMARK SIGNS:

OTHER SIGNS: Conjunctival injection, ^^follicles^^ form especially in lower ^^palpebral conjunctiva^^, ^^papillae^^ especially in superior palpebral conjunctiva, ^^mucopurulent^^ ^^discharge^^, tender ^^pre-auricular nodes^^, superior corneal ^^infiltrates^^.

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DIAGNOSTIC PROCEDURES: ^^Wright's stain^^ may show increased ^^neutrophils^^ and ^^lymphocytes^^.

TREATMENT: Tetracycline or erythromycin 250-500 mg po qid for 3-6 weeks depending on clinical response. Erythromycin, tetracycline or sulfacetamide ointment 2-3 X day for 2-3 weeks.

PROGNOSIS: With appropriate treatment, usually lasts 1-3 weeks, depending on severity.

CL CONSIDERATIONS: Discontinue contact lens wear until advised by optometry or ophthalmology.

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Primary Source: Friedberg and Rapuano, Office and Emergency Room Diagnosis and Treatment of Eye Disease, Lippincott, Philadelphia: 1990

Secondary Source: SCCO, Therapeutic Management of Ocular Conditions, SCCO, Fullerton, CA: 1989

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~~corneal foreign body
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CONDITION: Corneal Foreign Body

STRUCTURES INVOLVED: Cornea, ^^conjunctiva^^, lids

LATERALITY: Usually unilateral

HALLMARK SYMPTOMS: History of a foreign body to the eye

OTHER SYMPTOMS: Scratchy or foreign body sensation, tearing, ^^photophobia^^, blurred vision.

HALLMARK SIGNS: Corneal foreign body, rust ring, or both.

OTHER SIGNS: Conjunctival injection, eyelid ^^edema^^, mild ^^anterior chamber^^ reaction (iritis), and superficial punctate keratitis. A small ^^infiltrate^^ may surround the foreign body, especially if the foreign body has been present in the eye for more than 24 hours.

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DIAGNOSTIC PROCEDURES: Consider the possibility of a penetrating foreign body especially if the foreign body arose from metal striking metal. Locate the foreign body using your Wood's lamp and fluorescein. ^^Evert^^ the eyelids and examine each conjunctival ^^fornix^^ for additional foreign bodies.

TREATMENT: Remove the corneal foreign body: Apply a topical anesthetic. Remove the foreign body with a foreign body spud or a 25 gauge needle under magnification (it may be necessary to recruit an assistant to hold the Wood's lamp or other magnifier). Instill a cycloplegic (cyclopentalate 2%, or homatropine 5%) and an antibiotic ointment (e.g. erythromycin). Pressure patch for 24 hours. Note: An ^^infiltrate^^ accompanied by a significant ^^anterior chamber^^ reaction should be treated with antibiotics more aggressively.

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PROGNOSIS: A. A small (< 1-2 mm diameter in size), clean, non-central epithelial defect present after foreign body removal: Remove the patch after 24 hours, and re-examine the cornea. If the eye is stable or improving, begin topical antibiotics for 3-4 days (e.g. sulfacetamide drops qid or erythromycin ointment 2-3 times a day). B. If the resulting epithelial defect is central or large (> 2mm in diameter), follow-up every 24 hours and consider more aggressive antibiotic treatment.

CL CONSIDERATIONS: Discontinue contact lens wear until full recovery is achieved--usually in about 1 week in uncomplicated cases.

Primary Source: Friedberg and Rapuano, Office and Emergency Room Diagnosis and Treatment of Eye Disease, Lippincott, Philadelphia: 1990
Secondary Source: SCCO, Therapeutic Management of Ocular Conditions, SCCO, Fullerton, CA: 1989

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~~subconjunctival hemorrhage
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CONDITION: Subconjunctival Hemorrhage

STRUCTURES INVOLVED: ^^Conjunctiva^^

LATERALITY: Usually unilateral

HALLMARK SYMPTOMS: Red eye, usually abrupt ^^onset^^.

OTHER SYMPTOMS: May have mild irritation.

HALLMARK SIGNS: Blood underneath conjunctiva, often in a sector of the eye. Following trauma, the entire view of the sclera may be obstructed by the blood.

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DIAGNOSTIC PROCEDURES: Try to determine etiology: Was it caused by eye rubbing, trauma, heavy lifting, valsalva, or by systemic disease such as hypertension or diabetes? Has the patient had a recent URI or cold (sneezing and coughing can be the cause of a subconjunctival hemorrhage)? In traumatic cases, rule out a ^^rupture of the globe^^. Check your patient's blood pressure. If the patient has a history of recurrent subconjunctival hemorrhages or a history of bleeding problems, refer him to your medical officer.

TREATMENT: Reassurance. Otherwise none required.
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PROGNOSIS: This condition usually recovers spontaneously within 1-3 weeks, depending on severity. Have your patient return if the blood does not fully resolve, or if they suffer a recurrence. Refer to SMO as indicated for hypertension or bleeding disorders.

CL CONSIDERATIONS: Discontinue contact lens wear until full recovery is achieved.

Primary Source: Friedberg and Rapuano, Office and Emergency Room Diagnosis and Treatment of Eye Disease, Lippincott, Philadelphia: 1990
Secondary Source: SCCO, Therapeutic Management of Ocular Conditions, SCCO, Fullerton, CA: 1989

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~~giant papillary conjunctivitis
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CONDITION: Contact Lens Induced Giant Papillary Conjunctivitis

STRUCTURES INVOLVED: ^^Conjunctiva^^

LATERALITY: Usually bilateral

HALLMARK SYMPTOMS:

OTHER SYMPTOMS: Itching, ^^mucoid^^ ^^discharge^^, decreased lens wearing time, increased lens awareness, excessive lens movement.

HALLMARK SIGNS: ^^Papillae^^ on the superior ^^tarsal conjunctiva^^.

OTHER SIGNS: Contact lens ^^deposits^^, high riding lens, drooping eyelids, mild conjunctival injection.

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DIAGNOSTIC PROCEDURES: ^^Evert^^ the upper eyelids to examine for ^^papillae^^. Sometimes, the papillae are more visible if ^^fluorescein^^ is instilled in the eye.

TREATMENT: Replace the contact lenses if there are significant ^^deposits^^. Reduce wearing time (switch extended wear patients to daily wear). Have patient clean and enzyme his lenses more carefully. Alternatively, discontinue contact lens wear, especially with severe cases.

PROGNOSIS: This condition is difficult to treat effectively, especially while underway. Refer to optometry when convenient for possible refit to gas permeable lenses or other treatment.

Primary Source: Friedberg and Rapuano, Office and Emergency Room Diagnosis and Treatment of Eye Disease, Lippincott, Philadelphia: 1990
Secondary Source: Efron and Holden, A Review of Some Common Contact Lens Complications, Optician 192:21-26;1986
~BORDER 1,2,22,78, CYAN
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MEDIC Hypertext Help System
~~superior limbic conjunctivitis
~SAMEAS superior limbic keratitis
~~superior limbic keratitis
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CONDITION: Contact Lens Induced Superior Limbic Kerato-Conjunctivitis

STRUCTURES INVOLVED: ^^Conjunctiva^^, Cornea

LATERALITY: Usually bilateral

HALLMARK SYMPTOMS:

OTHER SYMPTOMS: Itching/burning, increased lens awareness, slightly blurred vision, ^^photophobia^^.

HALLMARK SIGNS: Hyperemia of the superior ^^bulbar conjunctiva^^ just above the limbus.

OTHER SIGNS: Superior corneal ^^infiltrates^^, corneal and conjunctival staining, hazy appearance to superior peripheral cornea.

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DIAGNOSTIC PROCEDURES: ^^Fluorescein^^ dye may reveal punctate (pinpoint) staining of the superior 1/3 of the cornea.

TREATMENT: Cease lens wear until ^^inflammation^^ subsides. An ocular lubricant may provide some symptomatic relief. PROGNOSIS: This condition usually clears up 1-2 weeks after lens removal. If lens wear is then reintroduced, a recurrence is fairly likely. Refer to optometry when convenient for possible refit to gas permeable lenses or other treatment.

Primary Source: Efron and Holden, A Review of Some Common Contact Lens Complications, Optician 192:21-26;1986

Secondary Source: Friedberg and Rapuano, Office and Emergency Room Diagnosis and Treatment of Eye Disease, Lippincott, Philadelphia: 1990

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MEDIC Hypertext Help System
~~FLASH BURN
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CONDITION: Flash Burn

STRUCTURES INVOLVED: Cornea, ^^conjunctiva^^

LATERALITY: Usually bilateral

HALLMARK SYMPTOMS: Severe pain 6-12 hours after exposure to welding arc.

OTHER SYMPTOMS: ^^Photophobia^^

HALLMARK SIGNS:

OTHER SIGNS: Conjunctival injection and ^^chemosis^^

TREATMENT: Reassurance. Cycloplegia and mydriasys with Atropine 1%, 2 drops in each affected eye q 24h. Broad spectrum antibiotic ointment (Neosporin) as prophylaxis for secondary infection. Systemic analgesic (tylenol). If pain is severe, bilateral or alternate eye patching for 24 hr. Bed rest.

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PROGNOSIS: Expect complete recovery within 24-48 hours.

CL CONSIDERATIONS: Discontinue contact lens wear until 24h after complete corneal recovery.

Primary Source: Training Manual for Independent Duty Submarine Corpsmen
Secondary Source: Newell FW. Ophthalmology, Principles and Concepts. 4th ed. St Louis: CV Mosby, 1978.

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~~PNEUMOCOCCAL CORNEAL ULCER
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CONDITION: Pneumococcal (Acute Serpiginous) Corneal Ulcer

STRUCTURES INVOLVED: Cornea, ^^conjunctiva^^

LATERALITY: Usually unilateral

HALLMARK SYMPTOMS:

OTHER SYMPTOMS: Pain, blurred vision, ^^photophobia^^

HALLMARK SIGNS: Whitish gray ulceration of cornea, may be single or multiple sites, with overhanging margins, accompanied by hypopyon (pus in the anterior chamber). Usually secondary to trauma (e.g. ^^corneal abrasion^^) or extended contact lens wear.

OTHER SIGNS: Severe conjunctival injection, ^^chemosis^^, ^^weeping^^, hypopyon, reduced visual acuity

DIAGNOSTIC PROCEDURES:
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TREATMENT: Rapid aggressive treatment with local antibiotics (Sulfacetamide 10% 2 drops q2h during waking hours and neosporin ointment at bed time). Medevac as soon as possible.

PROGNOSIS: Varies with rapidity of appropriate treatment, location of ulcer, and virility of causative agent. May resolve with no permanent damage, may resolve with corneal scarring and associated

reduction in visual acuity, or in the worst case, the ulcer may perforate and leave the patient with a phthisic eye.

CL CONSIDERATIONS: Improper contact lens hygiene, the use of non-sterile contact lens solutions (home-made saline, tap water), over wear of extended wear contact lenses can predispose a patient to corneal ulceration. Contact lens wear is contraindicated if a patient develops a corneal ulcer unless directed by higher authority.

Primary Source: Training Manual for Independent Duty Submarine Corpsmen
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~~OCULAR FOREIGN BODY
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CONDITION: Ocular Foreign Body

STRUCTURES INVOLVED: Cornea, ^^Conjunctiva^^, Lids

LATERALITY: Usually Unilateral

HALLMARK SYMPTOMS: Acute onset of scratchy sensation in eye

OTHER SYMPTOMS: Pain, ^^photophobia^^, excessive tearing.

HALLMARK SIGNS: History of exposure to foreign body source, Foreign body tracking stain pattern on cornea.

OTHER SIGNS: ^^corneal abrasion^^, conjunctival injection, chemosis, ^^weeping^^, blepharospasm

DIAGNOSTIC PROCEDURES: Examine affected eye with white light and magnifier. If foreign body is not detected, instill fluorescein

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and inspect with UV light (woods lamp). ^^Evert^^ superior eye lid, examine tarsal conjunctival surfaces and conjunctival ^^fornix^^ of both superior and inferior lid.

TREATMENT: Topical anesthesia may be necessary depending on location of FB and severity of pain. Attempt to remove superficial FB with sterile saline irrigation. If unsuccessful, try sterile saline wetted cotton tipped applicator. If still unsuccessful, can attempt removal with sterile 26 gauge needle or spud. Re-examine with UV light for corneal staining (may need to re-instill Fluorescein). If no corneal staining, prescribe sulfacetamide 10%, 2 drops in affected eye q4h x24h. Re-examine in 24h or prn. If corneal staining is present, instill 2 drops Atropine 1% and broad spectrum antibiotic ointment (neosporin) in the affected eye, patch eye for 24h. Re-examine in 24h or prn. If foreign body is embedded, medevac as soon as possible.

PROGNOSIS: If FB is successfully removed, and the cornea is not compromised, recovery is usually immediate. ^^corneal abrasion^^ usually recovers within 24h if eye lids are immobilized by patching.

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CL CONSIDERATIONS: Occasionally, a soft contact lens problem can mimic a foreign body. Edge tears in soft lenses, rough or uneven edges in hard lenses, and ^^deposits^^ on either can produce a FB sensation. The lenses should be examined for deposits and defects. If found to be defective, lens wear should be discontinued unless suitable replacement lenses are available. If the lenses are deposited, they should be cleaned with surfactant and enzyme cleaner if

appropriate and re-inspected prior to reinsertion. In any case, lens wear should be discontinued until 24h after complete recovery.

Primary Source: Training Manual for Independent Duty Submarine Corpsmen
Secondary Source: Newell FW. Ophthalmology, Principles and Concepts. 4th ed. St Louis: CV Mosby, 1978.

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MEDIC Hypertext Help System
~~HERPES KERATITIS
~SAMEAS herpes simplex keratitis
~~HERPES SIMPLEX KERATITIS
~BACKGROUND BLUE
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CONDITION: Herpes Simplex Corneal Ulcer

STRUCTURES INVOLVED: Cornea, ^^conjunctiva^^

LATERALITY: Usually unilateral

HALLMARK SYMPTOMS:

OTHER SYMPTOMS: Pain, blurred vision, ^^Photophobia^^

HALLMARK SIGNS: ^^Dendritic^^ (branches like a tree) ulceration of cornea. (Note: Early in the course of a Herpes infection, only a few punctate opacities may appear which later coalesce into the typical branching pattern.) If untreated, a dense disciform lesion may result.

OTHER SIGNS: Conjunctival injection, history of previous episodes, history of cold sores. recent history of stress (e.g. emotional or physical stress, fever). Corneal anesthesia, reduced visual acuity.

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DIAGNOSTIC PROCEDURES: Instill ^^fluorescein^^ and examine with UV light. Fluorescein will stain only those vesicles which have ruptured, creating patchy areas of staining over the underlying gray dendritic ulcer. If the condition appears to be unilateral, you can help confirm a Herpes simplex diagnosis by testing for corrneal anesthesia (an ocular herpes infection generally causes reduced corneal sensitivity). ^^Test for corneal anesthesia^^ using a cotton tipped applicator. Pull part of the cotton swab off to form a small wisp of cotton. Have the patient look up while you gently touch the cotton wisp to the inferior portion of the cornea of the unaffected eye. Note the patients reaction. Then touch the cotton wisp in a similar manner to the inferior portion of the affected eye. Again note the reaction. Ask the patient which eye seemed to feel more irritation. In cases of Herpes Simplex, the affected cornea is usually much less sensitive than the unaffected eye.

TREATMENT: Prescribe antiviral ointment (Acyclovir) q2-4h, depending on severity, for the affected eye until resolved. Medevac as
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soon as possible.

PROGNOSIS: If treatment is effective, eye and vision will return to normal. Corneal scarring may occur leading to reduced visual acuity. Usually, patients with ocular herpes simplex will suffer recurrences especially when in stressful situations.

CL CONSIDERATIONS: Discontinue contact lens wear until directed otherwise by higher authority.

Primary Source: Training Manual for Independent Duty Submarine Corpsmen

Secondary Source: Newell FW. Ophthalmology, Principles and Concepts. 4th ed. St Louis: CV Mosby, 1978.
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~~PSEUDOMONAS CORNEAL ULCER
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~COLOR WHITE

CONDITION: Pseudomonas Corneal Ulcer

STRUCTURES INVOLVED: Cornea, ^^conjunctiva^^

LATERALITY: Usually Unilateral

HALLMARK SYMPTOMS:

OTHER SYMPTOMS: Pain, Conjunctival injection, ^^Photophobia^^, Blurred vision

HALLMARK SIGNS: Blue-Green colored ^^discharge^^ at ulcer sight is pathognomonic

OTHER SIGNS: White Gray circumscribed corneal ulceration, injection, reduced visual acuity

DIAGNOSTIC PROCEDURES: ^^Fluorescein^^ Staining will help identify sight of ulcer. ^^Gram's stain^^ will reveal Gram negative rods.
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TREATMENT: Gentamicin Ophthalmic ointment q1h during the day, q2h at night if the ulcer is small and shallow (< 2 mm in size). If ulcer

is 2-5 mm in size, use Gentamicin drops q 15 minutes. In any case, medevac or refer as soon as possible--may cause corneal perforation and loss of an eye in as little as 48 hours.

PROGNOSIS: Depending on effectiveness of treatment, pseudomonas can result in minor corneal scarring to loss of vision and even loss of an eye. THIS DISEASE CAN RESULT IN CORNEAL PERFORATION AND LOSS OF AN EYE WITHIN 48 HOURS OF ONSET.

CL CONSIDERATIONS: Discontinue lens wear. Pseudomonas infections appear to be related to contact lens wear and particularly with mishandling of lenses (i.e. overwear, improper lens hygiene, etc.)

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Primary Source: Training Manual for Independent Duty Submarine Corpsmen
Secondary Source: Newell FW. Ophthalmology, Principles and Concepts. 4th ed. St Louis: CV Mosby, 1978.

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~~HYPHEMA
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CONDITION: Hyphema

STRUCTURES INVOLVED: ^^Anterior Chamber^^, iris, cornea

LATERALITY: Usually unilateral

HALLMARK SYMPTOMS:

OTHER SYMPTOMS: Pain may be present,

HALLMARK SIGNS: pooling of blood in the anterior chamber (between iris and cornea, usually inferior).

OTHER SIGNS: History of trauma or injury, (rarely, hyphema can occur with uveitis, or may be idiopathic) may cause increased ^^intraocular pressure^^ in affected eye, reduced visual acuity.

DIAGNOSTIC PROCEDURES: As a secondary glaucoma may result from hyphema, monitor IOP with ^^tonometer^^ if available.

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TREATMENT: Bed rest with head in 30 degree elevated position. Avoid activities which require excessive eye movement (e.g. reading) or that tend to increase blood pressure (exercise, lifting, etc.)

PROGNOSIS: If only a small amount of blood (less than 1/3 of the ^^anterior chamber^^ filled with blood) has leaked into anterior chamber, and IOP is unaffected, the condition will usually resolve within 1 to 2 weeks. If IOP increases significantly (greater than 30 mmHg), secondary glaucoma may result, leading to loss of vision. Because hyphema can be a sign of major intraocular trauma, the prudent IDC may choose to medevac all but the most clearly uncomplicated cases.

CL CONSIDERATIONS: Discontinue CL wear until condition is completely resolved.

Primary Source: Training Manual for Independent Duty Submarine Corpsmen

Secondary Source: 1. Duane TD, ed. Clinical Ophthalmology Philadel-

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phia: Harper and Row, 1981. 2. Newell FW. Ophthalmology, Principles and Concepts. 4th ed. St Louis: CV Mosby, 1978.
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~~TRAUMATIC IRITIS
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CONDITION: Traumatic Iritis

STRUCTURES INVOLVED: Iris, ^^Anterior Chamber^^, ^^Conjunctiva^^

LATERALITY: Usually Unilateral

HALLMARK SYMPTOMS:

OTHER SYMPTOMS: Pain, ^^photophobia^^, Blurred vision

HALLMARK SIGNS:

OTHER SIGNS: History of usually blunt trauma to eye, sluggish, miotic pupil in affected eye, possible slight clouding of aqueous humor of anterior chamber, ^^diffuse^^ injection of conjunctiva which may appear to increase around cornea (^^circumcorneal^^ injection), reduced visual acuity

DIAGNOSTIC PROCEDURES: 1. Examine the pupils carefully with a penlight. The affected eye will generally have a reduced and slow
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direct and consensual pupillary response to light. 2. In normal room light, the pupil of the affected eye is usually slightly smaller than the unaffected eye. 3. The patient may complain of pain in the affected eye when light is shined on the unaffected eye. 4. In a darkened room, examine the appearance of the contents of the ^^anterior chamber^^ of both eyes with white light directed from the side. The fluid in the anterior chamber of the affected eye may appear slightly cloudy relative to the unaffected eye.

TREATMENT: If the condition is mild, treatment with mydriatics (atropine) may be sufficient. In moderate and severe cases, topical steroids should be employed, but with appropriate caution. Systemic analgesics (tylenol) may be administered for pain. Unless the corpsman is convinced that no complicating factors associated with trauma are present (retinal detachment, macular ^^edema^^, ^^hyphema^^, etc.), the patient should be medevaced or referred as soon as possible.

PROGNOSIS: If traumatic iritis is uncomplicated, the patient
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will usually recover within one week.

CL CONSIDERATIONS: Discontinue contact lens wear until eye is fully recovered.

Primary Source: Training Manual for Independent Duty Submarine Corpsmen
Secondary Source: Duane TD, ed. Clinical Ophthalmology Philadelphia: Harper and Row, 1981.
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~~ACUTE IRITIS
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CONDITION: Acute (Non granulomatous) Uveitis (Iritis)

STRUCTURES INVOLVED: Iris, ^^Anterior Chamber^^, ^^Conjunctiva^^, Ciliary Body, Anterior Choroid.

LATERALITY: Usually unilateral

HALLMARK SYMPTOMS:

OTHER SYMPTOMS: Abrupt onset of moderate to severe pain, ^^photophobia^^, redness, and blurred vision.

HALLMARK SIGNS: Many cells and aqueous flare in anterior chamber

OTHER SIGNS: Pinpoint keratic precipitates, generalized retinal ^^edema^^, abrupt reduction in visual acuity, vitreous clouding, ciliary vessel injection, particularly ^^circumcorneal^^. Pupil may be mid-dilated and sluggish.

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DIAGNOSTIC PROCEDURES: In a darkened room, examine the appearance of the contents of the ^^anterior chamber^^ of both eyes with white light directed from the side. The fluid in the anterior chamber of the affected eye may appear slightly cloudy relative to the unaffected eye. Ophthalmoscopy may reveal vitreous clouding if the posterior uvea is involved.

TREATMENT: The iris should be immobilized by mydriatics (atropine). In addition, topical steroids should be employed, but with appropriate caution. Systemic steroids are the main treatment in cases of uveitis involving the posterior uvea. Systemic analgesics (tylenol) may be administered for pain. Unless the corpsman is convinced that no complicating factors are present and the case is extremely mild, the patient should be medevaced or referred as soon as possible.

PROGNOSIS: Acute uveitis is usually self limited (1 to 6 weeks) but is often recurrent.

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CL CONSIDERATIONS: Discontinue CL wear until otherwise advised by higher authority.

Primary Source: Training Manual for Independent Duty Submarine Corpsmen
Secondary Source: Newell FW. Ophthalmology, Principles and Concepts. 4th ed. St Louis: CV Mosby, 1978.

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MEDIC Hypertext Help System

~~CHRONIC IRITIS
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CONDITION: Chronic (Granulomatous) Uveitis (Iritis)

STRUCTURES INVOLVED: Iris, Conjunctiva, ^^Anterior Chamber^^, Ciliary Body, Anterior Choroid.

LATERALITY: Usually unilateral

HALLMARK SYMPTOMS:

OTHER SYMPTOMS: Gradual onset of blurred vision, slight or no pain or ^^photophobia^^, mild redness.

HALLMARK SIGNS: Large mutton fat keratic precipitates, iris nodules.

OTHER SIGNS: Mild ^^circumcorneal^^ injection of ciliary vessels, iris precipitates, little aqueous flare, vitreous clouding, choroidal inflammation.

DIAGNOSTIC PROCEDURES: Careful examination of posterior corneal

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surface (endothelium) with a penlight and magnifying loupe may reveal large (0.5 mm) white spots which are keratic precipitates. The iris may exhibit patchy atrophy and nodules. Fundus examination may reveal large areas of choroidal ^^edema^^ which appear as patches of white of gray areas surrounded by normal retina. The vitreous may appear cloudy.

TREATMENT: The iris should be immobilized by mydriatics (atropine). In addition topical steroids should be employed at frequent intervals, but with appropriate caution. If the posterior uvea is involved, systemic steroids are the main treatment. Because these cases are usually difficult to manage, the patient should be medevaced or referred as soon as possible.

PROGNOSIS: Chronic uveitis often runs a protracted course with exacerbations and remissions. Often retinal scarring occurs as a sequelae to posterior uveitis.

CL CONSIDERATIONS: Discontinue CL wear until otherwise advised by higher authority.

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~PRESS ANY KEY
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~COLOR WHITE

Primary Source: Training Manual for Independent Duty Submarine Corpsmen
Secondary Source: Newell FW. Ophthalmology, Principles and Concepts. 4th ed. St Louis: CV Mosby, 1978.

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~~ACUTE ANGLE CLOSURE GLAUCOMA
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CONDITION: Acute Angle Closure Glaucoma

STRUCTURES INVOLVED: Conjunctiva, Cornea, ^^Anterior Chamber^^, Iris

LATERALITY: Usually unilateral (Both eyes are involved, but usually one becomes symptomatic before the other)

HALLMARK SYMPTOMS: Severe Pain

OTHER SYMPTOMS: Blurred vision, halo's around lights, ^^photophobia^^, nausea, cephalgia, redness, tearing.

HALLMARK SIGNS: Increased ^^intraocular pressure^^ (greater than 30 mmHG), eye feels rock hard to digital palpation.

OTHER SIGNS: Mid-dilated unresponsive pupil in affected eye, circumcorneal injection of the ciliary vessels, edematous cornea (may appear "dull" or "steamy" or "fogged"), reduced visual acuity, usually occurs in hyperopes, profuse ^^weeping^^.

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DIAGNOSTIC PROCEDURES: 1. Measure intraocular pressure. Preferably, with a ^^tonometer^^, but ^^tactile tensions^^ may reveal a significant difference between the affected and unaffected eye, with the glaucomatous eye being significantly more firm than the normal eye.

TREATMENT: Osmotic agents may be used systemically to reduce intraocular pressure. Urea or mannitol can be administered i-Intravenously. Glycerol can be administered orally (if patient is already nauseas, oral glycerol may worsen the situation). 2. Pilocarpine ophthalmic solution should be administered to the affected eye, 1 drop q 5 minutes until the pupil becomes miotic. Diamox should be administered orally if available. Medevac or refer as soon as possible.

PROGNOSIS: If early treatment is successful, and the patient receives timely secondary care, there may be little permanent damage to the eye. If not successful, vision in the glaucomatous eye will be lost.
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CL CONSIDERATIONS: Remove contact lenses prior to treatment. Discontinue contact lens wear.

Primary Source: Training Manual for Independent Duty Submarine Corpsmen
Secondary Source: Newell FW. Ophthalmology, Principles and Concepts. 4th ed. St Louis: CV Mosby, 1978.
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~~RUPTURE OF THE GLOBE
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~COLOR WHITE

CONDITION: Rupture of the Globe

STRUCTURES INVOLVED: Cornea, ^^Conjunctiva^^, Sclera

LATERALITY: Usually Unilateral

HALLMARK SYMPTOMS: Blindness

OTHER SYMPTOMS: Pain,

HALLMARK SIGNS: History of blunt trauma, Phthisic (soft) eye

OTHER SIGNS: History consistent with severe trauma to eye, ^^hyphema^^, markedly reduced visual acuity (finger counting, light perception).

DIAGNOSTIC PROCEDURES: Very gently palpate eye digitally, a ruptured eye will lack elasticity.

TREATMENT: Systemic antibiotics, topical antibiotics, tetanus
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inoculation. Use eye shield on affected eye, patch fellow eye to reduce eye movements. Refer or Medevac immediately.

PROGNOSIS: Depends on extent of injury, but will generally result in some impairment of vision and possibly loss of vision.

CL CONSIDERATIONS: Carefully remove contact lens from both eyes unless it is overlying a laceration.

Primary Source: Training Manual for Independent Duty Submarine Corpsmen

Secondary Source: Newell FW. Ophthalmology, Principles and Concepts. 4th ed. St Louis: CV Mosby, 1978.

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~~PENETRATING INJURY TO THE EYE
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~COLOR WHITE

CONDITION: Penetrating injury to the eye

STRUCTURES INVOLVED: Anterior Segment

LATERALITY: Usually Unilateral

HALLMARK SYMPTOMS:

OTHER SYMPTOMS: Severe pain, anxiety, blurred vision

HALLMARK SIGNS: Consistent History

OTHER SIGNS: Dark pigment showing through sclera indicates scleral laceration with uveal prolapse, irregular shape to eye and cornea, contusions and lacerations to adenexa, generally little or no bleeding from eye, reduced visual acuity.

DIAGNOSTIC PROCEDURES:

TREATMENT: 1. If possible, do not remove projectile from eye if
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it is still present. 2. apply sterile dressing over eye without pressure. 3. If practical, place eye shield over bony orbit area to prevent further injury to the eye. 4. Patch fellow eye to reduce eye movement. 5. Medevac or refer immediately.

PROGNOSIS: Depending on the extent of the injury and the availability of adequate treatment, may result in minimal scarring and little vision loss to complete loss of the eye and severe scarring of the adenexa.

CL CONSIDERATIONS: If practical, remove contact lens from injured eye, but be extremely cautious (do not exert any pressure on the eye).

Primary Source: Training Manual for Independent Duty Submarine Corpsmen

Secondary Source:
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~~ORBITAL BLOWOUT FRACTURE
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~COLOR WHITE

CONDITION: Orbital Blowout Fracture

STRUCTURES INVOLVED: Orbit, eye

LATERALITY: Usually Unilateral

HALLMARK SYMPTOMS: ^^diplopia^^, especially on upgaze, following trauma to orbit and eye.

OTHER SYMPTOMS: Pain, Pain on eye movement,

HALLMARK SIGNS: History of trauma.

OTHER SIGNS: Enophthalmos, Orbital ^^edema^^, Ecchymosis, infraorbital
anesthesia.

DIAGNOSTIC PROCEDURES:

TREATMENT: 1. Broad Spectrum oral antibiotic (Keflex), 2. Oral analgesic prn, 3. cold compress for 24 hours followed thereafter
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by warm, 4. Warn patient to not blow his nose. 5. Refer or Medevac immediately.

PROGNOSIS: Varies greatly, depending on severity and degree of ocular involvement, and rapidity of ophthalmological treatment.

CL CONSIDERATIONS: Remove contact lenses.

Primary Source: Training Manual for Independent Duty Submarine Corpsmen
Secondary Source: Newell FW. Ophthalmology, Principles and Concepts. 4th ed. St Louis: CV Mosby, 1978.
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~~RETINAL DETACHMENT
~BACKGROUND BLUE
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CONDITION: Retinal Detachment

CONDITION: Retinal Detachment

STRUCTURES INVOLVED: Retina, Vitreous

LATERALITY: Usually Unilateral

HALLMARK SYMPTOMS: Gray curtain came up over my vision

OTHER SYMPTOMS: ^^Flashing lights^^, ^^metamophopsia^^, blurred vision, vitreous ^^floaters^^.

HALLMARK SIGNS: Tear or detachment of retina sometimes visible by ophthalmoscopy

OTHER SIGNS: Reduced visual acuity, high ^^myopia^^, history of trauma, Visual field defects.

DIAGNOSTIC PROCEDURES: 1. Ophthalmoscopic examination may reveal tear or detachment of retina, but detachments usually occur

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peripherally and are therefore difficult to see with the directophthalmoscope, even by an experienced examiner. 2. Confrontation visual fields may reveal a visual field defect (usually inferior visual field). 3. Vitreous humor may appear cloudy and debris laden on ophthalmoscopy.

TREATMENT: 1. Bed rest, patient should be essentially immobilized in supine position without a pillow. 2. Refer or medevac immediately.

PROGNOSIS: 1. Depending on extent of detachment and availability of definitive treatment, may cause little loss of vision or may cause total blindness.

Primary Source: Training Manual for Independent Duty Submarine Corpsmen

Secondary Source: Newell FW. Ophthalmology, Principles and Concepts. 4th ed. St Louis: CV Mosby, 1978.
~BORDER 1,2,22,78, CYAN
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MEDIC Hypertext Help System

~~SUBLUXATION OF THE LENS
~SAMEAS DISLOCATION OF THE LENS
~~DISLOCATION OF THE LENS
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CONDITION: Subluxation or dislocation of the lens

STRUCTURES INVOLVED: Lens, iris, ^^anterior chamber^^, vitreous cham- ber

LATERALITY: Usually unilateral

HALLMARK SYMPTOMS:

OTHER SYMPTOMS: Blurred vision, monocular ^^diplopia^^, pain particularly if associated with trauma.

HALLMARK SIGNS: Aboard Submarine, will generally be secondary to trauma.

OTHER SIGNS: Irregular shallowing of Anterior Chamber, dislocated lens may be visible through large (dilated) pupil, iris tremors especially with eye movement, reduced visual acuity.

DIAGNOSTIC PROCEDURES:
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TREATMENT: Refer or medevac for definitive treatment immediately

PROGNOSIS:

CL CONSIDERATIONS:

Primary Source: Training Manual for Independent Duty Submarine Corpsmen
Secondary Source: Newell FW. Ophthalmology, Principles and Concepts. 4th ed. St Louis: CV Mosby, 1978.

~~BACTERIAL CONJUNCTIVITIS
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CONDITION: Bacterial Conjunctivitis

STRUCTURES INVOLVED: ^^Conjunctiva^^, Cornea, lids

LATERALITY: Usually begins unilateral then becomes bilateral

HALLMARK SYMPTOMS: Mucous and ^^purulent^^ ^^discharge^^ (^^mucopurulent^^) with lid matting in AM

OTHER SYMPTOMS: Usually no pain, scratchy sensation when blinking, slightly blurred vision.

HALLMARK SIGNS: Mucopurulent ^^exudate^^

OTHER SIGNS: Conjunctival injection, slight chemosis, mucopurulent discharge, slightly reduced visual acuity

DIAGNOSTIC PROCEDURES: 1. ^^Gram's Stain^^ and ^^Wright's Stain^^ will help confirm bacterial etiology. 2. Culture and sensitivity if available.
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TREATMENT: Topical antibiotic solution (sulfacetamide ophthalmic solution, 2 drops in affected eye(s) qid until condition is resolved. If a copious ^^purulent^^ discharge is present, a Neisseria Gonorrhoeae infection must be considered). Instruct patient regarding proper hygiene to avoid spreading the disease to the fellow eye or to other crewmembers.

PROGNOSIS: Have pt return q 24h until resolved. Condition should improve within 24 to 48 hours after onset of treatment and should abate in about one week. A poor clinical response within 48-72 hours indicates that either the bacterium is insensitive to the antibiotic or the cause is not bacterial.

CL CONSIDERATIONS: Discontinue contact lens wear. As the contact lens may act as a repository for the bacterial agent, the patient should not resume lens wear until directed by higher authority. Do not assume that chemical lens disinfection will eliminate the pathogen.

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~COLOR WHITE

Primary Source: Training Manual for Independent Duty Submarine Corpsmen
Secondary Source: Newell FW. Ophthalmology, Principles and Concepts. 4th ed. St Louis: CV Mosby, 1978.

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MEDIC Hypertext Help System

~~VIRAL CONJUNCTIVITIS
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CONDITION: Viral Conjunctivitis

STRUCTURES INVOLVED: ^^Conjunctiva^^, Cornea

LATERALITY: Usually starts unilateral then becomes bilateral

HALLMARK SYMPTOMS:

OTHER SYMPTOMS: ^^Weeping^^, scratchy sensation, slightly blurred vi- sion, ^^photophobia^^.

HALLMARK SIGNS: Above sx. accompanied by preauricular adenopathy is indicative of a viral etiology. Above sx with cervical adenopathy and pharyngitis is indicative of acute pharyngoconjunctival fever, also viral.

OTHER SIGNS: Watery discharge, little or no ^^purulent^^ or ^^mucoid^^ ^^discharge^^, conjunctival injection, chemosis, patchy corneal epithelial defects may be seen with staining, reduced visual acuity.

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DIAGNOSTIC PROCEDURES: Fluorescein stain may reveal corneal involvement which is often present in viral conjunctivitis caused by the adenoviruses.

TREATMENT: Generally, viral conjunctivitis is self limited, and requires no specific treatment. Vasoconstrictors may help alleviate symptoms. Sulfacetamide may be prescribed to help prevent secondary bacterial infection.

PROGNOSIS: Have pt return q 24h until resolved. Condition should begin to improve within a week after onset and should abate within about two or three weeks.

CL CONSIDERATIONS: Discontinue contact lens wear. As the contact lens may act as a repository for the virus, the patient should

not resume lens wear until directed by higher authority. Do not assume that chemical lens disinfection will eliminate the pathogen.

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~COLOR WHITE

Primary Source: Training Manual for Independent Duty Submarine Corpsmen
Secondary Source: Newell FW. Ophthalmology, Principles and Concepts. 4th ed. St Louis: CV Mosby, 1978.

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MEDIC Hypertext Help System

~~ALLERGIC CONJUNCTIVITIS
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~COLOR WHITE

CONDITION: Allergic Conjunctivitis

STRUCTURES INVOLVED: ^^Conjunctiva^^, Lids

LATERALITY: Usually Bilateral

HALLMARK SYMPTOMS: Itching, usually severe

OTHER SYMPTOMS: Stringy ^^discharge^^, ^^weeping^^.

HALLMARK SIGNS: Generalized swelling e.g. Conjunctival ^^edema^^ (chemosis), lid edema.

OTHER SIGNS: History of allergic conditions (Hay Fever), minimal stringy, white discharge may be present, conjunctival concretions may be present in chronic cases.

DIAGNOSTIC PROCEDURES: ^^Wright's stain^^ of conjunctival scraping may reveal increased ^^eosinophils^^ indicating a allergic response.

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TREATMENT: Environmental comforters, vasoconstrictors, and cold compresses may help alleviate some symptoms. Oral and topical antihistamines may help. Instruct patient to avoid rubbing eyes. In severe cases topical steroids may be used for very brief periods--be extremely cautious with steroids.

PROGNOSIS: Usually self limited, seasonal and chronic

CL CONSIDERATIONS: Discontinue contact lens wear and refer for evaluation of desirability of contact lens wear.

Primary Source: Training Manual for Independent Duty Submarine Corpsmen
Secondary Source: Newell FW. Ophthalmology, Principles and Concepts. 4th ed. St Louis: CV Mosby, 1978.

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MEDIC Hypertext Help System

~~CHALAZION
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~COLOR WHITE

CONDITION: Chalazion

STRUCTURES INVOLVED: Upper lid

LATERALITY: Usually Unilateral

HALLMARK SYMPTOMS: Hard lump in upper lid which grows very slowly.

OTHER SYMPTOMS: Blurred vision, irritation.

HALLMARK SIGNS:

OTHER SIGNS: Indurated mass in upper lid which is usually oblong with the long axis running vertically, Possible palpebral conjunctival injection and chemosis but generally little acute inflammatory response, slightly reduced acuity.

DIAGNOSTIC PROCEDURES: Palpate the lesion, if not painful and mass is felt to be internal, it probably is a chalazion.

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TREATMENT: Hot compress to affected area for 20 minutes qid for 4 days to soften material and hasten expulsion. If mass remains after treatment, refer at first convenience for surgical removal.

PROGNOSIS: A true chalazion is a lipogranuloma of one of the meibomian glands which probably will not respond to treatment with hot compresses. A hordeolum, which is an acute inflammation will either respond to hot compress treatment by draining or may become granulomatous thereby developing into a chalazion.

CL CONSIDERATIONS: In general, discontinue contact lens wear while under treatment. If the patient is wearing soft contact lenses and the chalazion is not interfering with lens, he may continue to wear the lens. Hard or gas permeable lenses should be discontinued until the condition is fully resolved.

Primary Source: Training Manual for Independent Duty Submarine Corpsmen
Secondary Source: Newell FW. Ophthalmology, Principles and Con-
~BORDER 1,2,22,78, CYAN
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MEDIC Hypertext Help System
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cepts. 4th ed. St Louis: CV Mosby, 1978.
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MEDIC Hypertext Help System

~~HORDEOLUM
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CONDITION: Hordeolum

STRUCTURES INVOLVED: Lid, upper or lower

LATERALITY: Usually Unilateral

HALLMARK SYMPTOMS:

OTHER SYMPTOMS: Pain, tenderness, lump in eyelid,

HALLMARK SIGNS:

OTHER SIGNS: Red, ^^indurated^^ mass in upper or lower eyelid, usually at the lid margin. The lesion usually produces pus.

DIAGNOSTIC PROCEDURES: Palpate the lesion, if tender and mass is felt to be near the lid margin, it probably is a hordeolum.
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TREATMENT: Hot compress for 20 minutes qid for 4 days. A hordeolum will usually drain within this time period. Topical antibiotics may be administered (sulfacetamide 10% 2 drops qid) to prevent spread of infection to adjacent glands or follicles.

PROGNOSIS: Usually will respond to treatment within 96 hours. If not, consider differential diagnosis with ^^chalazion^^ and refer as necessary.

CL CONSIDERATIONS: Discontinue contact lens wear until condition is resolved.

Primary Source: Training Manual for Independent Duty Submarine Corpsmen
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~~BLEPHARITIS
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~COLOR WHITE

CONDITION: Blepharitis

STRUCTURES INVOLVED: Lid, upper and lower, ^^conjunctiva^^

LATERALITY: Usually bilateral

HALLMARK SYMPTOMS:

OTHER SYMPTOMS: Chronic irritation, itching, burning, scaling

HALLMARK SIGNS: Exfoliation of skin along margins of lids, particularly upper lids.

OTHER SIGNS: Redness of lid margins, possibly accompanied with slight lid edema. Loss of eye lashes, white eye lashes. Usually associated with dandruff or seborrhea of the scalp.

DIAGNOSTIC PROCEDURES:
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TREATMENT: Lid scrubs with cotton tipped applicator and diluted mild (baby) shampoo. In more severe cases, sulfacetamide solution or ointment may be applied to the lid margins bid. Dandruff shampoo for scalp, if indicated.

PROGNOSIS: This is a chronic condition that is almost never cured. When convenient, refer troublesome cases.

CL CONSIDERATIONS: A contact lens may exacerbate the symptoms of this condition. If the condition is moderate to severe, the patient should not wear lenses.

Primary Source: Training Manual for Independent Duty Submarine Corpsmen
Secondary Source: Newell FW. Ophthalmology, Principles and Concepts. 4th ed. St Louis: CV Mosby, 1978.

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MEDIC Hypertext Help System

~~TRIGEMINAL
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TRIGEMINAL

Because the cornea has so many sensory inputs to the trigeminal nerve, it is extremely sensitive to pain. Thus, whenever a patient complains of pain, scratchiness, or irritation, a careful examination of the cornea is indicated.

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MEDIC Hypertext Help System
~BORDER 4,10,10,70, CYAN
~~IRRITATION
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~CLS

~COLOR WHITE

IRRITATION

While patients often complain that their eyes feel "irritated," a more descriptive complaint is needed by the program to help make a diagnosis. Most patients can define irritation more accurately if encouraged by the examiner. Ask them what they mean by irritation: pain; itching; a scratchy sensation; tiredness; etc.

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MEDIC Hypertext Help System
~BORDER 4,10,12,70, CYAN
~~visual disturbance
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Visual Disturbance

DEFINITION: An interference with the ability to see normally, including ^^blurred vision^^, ^^diplopia^^, and ^^photopsia^^.

BACKGROUND: A visual disturbance symptom usually indicates a problem with the ocular media (cornea, lens, aqueous and vitreous humor) or with the neural elements of the eye and visual pathway (retina, optic nerve, and higher visual centers). For more information on specific types of visual disturbance, see the help screens on ^^double vision^^, ^^distorted vision^^, ^^flashing lights^^, ^^floaters^^, and ^^halos around lights^^.

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~CURSET 2, 5
MEDIC Hypertext Help System
~BORDER 5,10,9,70, CYAN
~BORDER 11,10,20,70, CYAN
~~blurred vision
~SAMEAS decreased vision
~~decreased vision
~SAMEAS blurred or decreased vision
~~blurred or decreased vision
~BACKGROUND BLUE
~CLS

~COLOR WHITE

Blurred or Decreased Vision

DEFINITION: An interference with the ability to see fine detail such as small print. Details become "fuzzy" and difficult to resolve.

BACKGROUND: Blurred vision can be either constant or intermittent. Constant blurring of the vision is usually caused by uncorrected or undercorrected ^^refractive error^^, but can also be caused by disturbances in the ocular media such as reduced clarity of the lens or cornea. Intermittent blurred vision can be caused by exudative material in the tear film, fatigue of the visual system, and sometimes vascular or neurologic abnormalities.

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MEDIC Hypertext Help System
~BORDER 5,10,9,70, CYAN
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~~double vision
~SAMEAS diplopia
~~diplopia
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Double Vision

DEFINITION: Also known as diplopia, double vision is a condition where one perceives two images of a single object. Diplopia can be monocular or binocular.

BACKGROUND: In monocular diplopia, double vision persists even when the uninvolved eye is occluded. Common causes of monocular diplopia include: ^^refractive error^^; corneal opacity or irregularity; and cataract. Less common causes include: ^^dislocated natural lens^^; extra pupillary openings; and ^^retinal detachment^^. In binocular diplopia, double vision is eliminated when either eye is occluded. It is commonly caused by decompensated phorias, and sometimes by neurologic abnormalities.

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~~distorted vision
~SAMEAS metamorphopsia
~~metamorphopsia
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Distorted Vision

DEFINITION: Also known as metamorphopsia, distorted vision is a disorder where images appear distorted in shape or size.

BACKGROUND: Metamorphopsia is most commonly caused by ^^refractive error^^, retinal disease such as central serous retinopathy, or corneal irregularities. Less common causes include: cataract; topical eye drops, especially miotics such as pilocarpine; migraine head aches where the symptoms are transient; and central nervous system abnormalities.

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~CURSET 2, 5

MEDIC Hypertext Help System
~BORDER 5,10,9,70, CYAN
~BORDER 11,10,19,70, CYAN
~~flashing lights
~SAMEAS photopsia
~~photopsia
~BACKGROUND BLUE
~CLS

~COLOR WHITE

Flashes of light

DEFINITION: Also known as photopsia, flashes of light refers to the inappropriate perception of light flashes or lightning bolts by the visual system.

BACKGROUND: Photopsia is most commonly caused by ^^retinal breaks or detachments^^, ^^vitreous detachment^^, migraine syndrome, or rapid eye movement (especially in darkness). Less common causes include disorders of the central nervous system and active retinal pathology.

~BORDER 2,2,21,78, CYAN
~Color CYAN
~CURSET 2, 5
MEDIC Hypertext Help System
~BORDER 5,10,9,70, CYAN
~BORDER 11,10,17,70, CYAN
~~floaters
~BACKGROUND BLUE
~CLS

~COLOR WHITE

Floaters

DEFINITION: Also known as muscae volitantes (Latin for flitting flies), floaters are perceived as spots or specks floating before the eyes.

BACKGROUND: Floaters are usually caused by particles suspended in the normally clear vitreous humor. They can be transient or long-standing. Long-standing or permanent floaters may be caused by ^^vitreous detachment^^, posterioruveitis, or vitreous hemorrhage.

Sometimes, long-standing or new vitreous floaters may indicate ^^retinal detachment^^. Transient floaters may occur with migraine syndrome.

~BORDER 2,2,21,78, CYAN
~Color CYAN
~CURSET 2, 5
MEDIC Hypertext Help System
~BORDER 5,10,9,70, CYAN
~BORDER 11,10,19,70, CYAN
~~halos
~SAMEAS halos around lights
~~halos around lights
~BACKGROUND BLUE
~CLS

~COLOR WHITE

Halos around lights

DEFINITION: Halos around lights refers to the perception of an abnormal ring of glare when one looks toward a bright light source.

BACKGROUND: The perception of halos generally arises from severe corneal ^^edema^^ or an opacity of the natural lens. If corneal edema is the cause, it should be visible to the examiner as a hazy or dull appearance to the entire cornea. Generalized corneal edema can occur with ^^acute angle closure glaucoma^^ or with a number of less common corneal disorders.

~BORDER 2,2,21,78, CYAN
~Color CYAN
~CURSET 2, 5
MEDIC Hypertext Help System
~BORDER 5,10,9,70, CYAN
~BORDER 11,10,19,70, CYAN
~~associated history of ocular trauma
~SAMEAS trauma
~~trauma
~BACKGROUND BLUE
~CLS

~COLOR WHITE

History of trauma

DEFINITION: Ocular trauma, in the context of this program, refers to blunt or penetrating trauma to the eye, orbit or head which you feel might be contributing to your patient's current condition.

BACKGROUND: Blunt trauma may cause a number of injuries to the eye including: ^^traumatic iritis^^; ^^retinal detachment^^; ^^dislocation of the lens^^; comotio retinae; ^^hyphema^^; and secondary glaucoma. In cases of blunt ocular trauma, the examiner must be watchful for signs and symptoms such as ^^photopsia^^, ^^metamorphopsia^^, ^^floaters^^, pupillary abnormalities, and ^^diplopia^^.
Press <ENTER> to continue

~BORDER 2,2,21,78, CYAN
~Color CYAN
~CURSET 2, 5
MEDIC Hypertext Help System
~BORDER 5,10,10,70, CYAN
~BORDER 11,10,20,70, CYAN
~PRESS ANY KEY
~BACKGROUND BLUE
~CLS

~COLOR WHITE

History of trauma

BACKGROUND: Penetrating trauma where a foreign object actually penetrates or is suspected of penetrating the eye will generally result in a medevac.

~BORDER 2,2,21,78, CYAN
~Color CYAN
~CURSET 2, 5
MEDIC Hypertext Help System
~BORDER 7,10,11,70, CYAN
~~high myopia ~
SAMEAS myopia
~~myopia
~BACKGROUND BLUE
~CLS

~COLOR WHITE

High Myopia

DEFINITION: High myopia is a condition where the axial length of the eye is too long for the optics of the eye. For the purposes of this program, high myopia is defined as refractive error exceeding -3.00 diopters (e.g. -4.00D). For more discussion about the nature of myopia, see the screen on ^^refractive error^^.

BACKGROUND: Because myopic eyes are generally larger than average, their retinas tend to be stretched compared to non-myopic eyes. This stretching of the retina is thought to increase the likelihood of ^^retinal breaks^^ and ^^vitreous detachments^^.

~BORDER 2,2,21,78, CYAN
~Color CYAN
~CURSET 2, 5
MEDIC Hypertext Help System
~BORDER 5,10,12,70, CYAN
~BORDER 13,10,19,70, CYAN
~~high hyperopia
~SAMEAS hyperopia
~~hyperopia
~BACKGROUND BLUE
~CLS

~COLOR WHITE

High Hyperopia

DEFINITION: High hyperopia is a condition where the axial length of the eye is too short for the optics of the eye. For the purposes of this program, high hyperopia is defined as refractive error exceeding +3.00 diopters (e.g. +4.00D). For more discussion about the nature of hyperopia, see the screen on ^^refractive error^^.

BACKGROUND: Because hyperopic eyes are generally smaller than average, their anterior chamber angles tend to be smaller than non-hyperopic eyes. Narrow chamber angles are thought to increase the likelihood of ^^acute angle closure glaucoma^^.

~BORDER 2,2,21,78, CYAN
~Color CYAN
~CURSET 2, 5

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MEDIC Hypertext Help System
~BORDER 5,10,12,70, CYAN
~BORDER 13,10,19,70, CYAN
~~indurated
~BACKGROUND BLUE
~CLS

~COLOR WHITE
```

Indurated

DEFINITION: An abnormally hard spot or place. In the context of this program, induration is only concerned with hard or firm masses of the eyelids which might be indicative of a ^^hordeolum^^ or ^^chalazion^^.

```
~BORDER 2,2,21,78, CYAN
~Color CYAN
~CURSET 2, 5
MEDIC Hypertext Help System
~BORDER 5,10,10,70, CYAN
~~erythema

~BACKGROUND BLUE
~CLS

~COLOR WHITE
```

Erythema

DEFINITION: Indicates a flush on the skin caused by congestion of the capillaries which may result from a variety of causes. Erythema is one of the classical signs of ^^inflammation^^.

```
~BORDER 2,2,21,78, CYAN
~Color CYAN
~CURSET 2, 5
MEDIC Hypertext Help System
~BORDER 5,10,10,70, CYAN
~~inflammation
~BACKGROUND BLUE
~CLS

~COLOR WHITE
```

Inflammation

DEFINITION: A localized protective process caused by injury to tissues which serves to destroy, dilute, or wall off both the injurious agent and the affected tissue.

BACKGROUND: The classical signs of inflammation include pain (dolor), ^^redness^^ (rubor), heat (calor), ^^swelling^^ (tumor), and loss of function (functio laesa).

~BORDER 2,2,21,78, CYAN
~Color CYAN
~CURSET 2, 5
MEDIC Hypertext Help System
~BORDER 5,10,10,70, CYAN
~BORDER 11,10,15,70, CYAN
~~chemosis
~SAMEAS edema
~~swelling
~SAMEAS edema
~~edema
~BACKGROUND BLUE
~CLS

~COLOR WHITE

Edema

DEFINITION: The presence of abnormally large amounts of fluid in the intercellular tissue spaces of the body. Edema of the ^^conjunctiva^^ is referred to as chemosis.

BACKGROUND: Edema, one of the classical signs of ^^inflammation^^, can occur in virtually all ocular tissues from the lids to the retina. Generally, edema results in visible swelling of the affected tissue throughout the eye except for corneal edema which causes a grayish cast to the normally clear cornea.

~BORDER 2,2,21,78, CYAN
~Color CYAN
~CURSET 2, 5
MEDIC Hypertext Help System
~BORDER 5,10,10,70, CYAN
~BORDER 11,10,18,70, CYAN
~~eczematous

~BACKGROUND BLUE
~CLS

~COLOR WHITE

Eczema

DEFINITION: Involving primarily the epidermis of the eye lids, eczema is characterized by scaling, crusting, redness, exudation, and swelling around the lid margins.

BACKGROUND: Eczematous flaking along the lid margins, which is indicative of ^^blepharitis^^, is a common finding even in asymptomatic patients. In severe cases, the ^^conjunctiva^^ and even the cornea can become involved. Be aware, however, that chronic blepharitis often coexists with other more acute and more serious conditions.

~BORDER 2,2,21,78, CYAN
~Color CYAN
~CURSET 2, 5
MEDIC Hypertext Help System
~BORDER 5,10,9,70, CYAN
~BORDER 11,10,18,70, CYAN
~~tender
~SAMEAS tenderness
~~non-tender
~SAMEAS tenderness
~~tenderness
~BACKGROUND BLUE
~CLS

~COLOR WHITE

Tenderness

DEFINITION: An abnormal painful sensation in response to touch or pressure.

BACKGROUND: Tenderness is used by this program to help differentiate between a ^^chalazion^^ and a ^^hordeolum^^. Because a hordeolum is generally an acute inflammatory response to a blocked eyelid gland, it will usually be painful or tender. A chalazion, which is a generally a chronic condition, is usually non-tender and not painful.

~BORDER 2,2,21,78, CYAN
~Color CYAN
~CURSET 2, 5
MEDIC Hypertext Help System
~BORDER 5,10,8,70, CYAN
~BORDER 11,10,19,70, CYAN
~~conjunctiva
~BACKGROUND BLUE
~CLS

~COLOR WHITE

Conjunctiva

DEFINITION: A highly vascularized but normally transparent membrane which lines the eyelids (palpebral conjunctiva) and covers the exposed surface of the sclera or white of the eye (bulbar conjunctiva).

BACKGROUND: Because it is part of the eye's front line defense, the conjunctiva responds to virtually all eye diseases affecting the anterior segment.

FOR MORE INFORMATION SELECT: ^^Ocular Anatomy Diagram^^ ^^Conjunctival Anatomy Diagram^^ ^^Redness^^ ^^Inflammation^^ ^^Papillae^^ ^^Edema^^ ^^Follicles^^

~BORDER 2,2,22,78, CYAN
~Color CYAN
~CURSET 2, 5
MEDIC Hypertext Help System
~BORDER 5,10,10,70, CYAN
~BORDER 11,10,15,70, CYAN
~BORDER 16,10,21,70, CYAN
~~injection
~SAMEAS redness
~~conjunctival redness
~SAMEAS redness
~~redness
~BACKGROUND BLUE
~CLS

~COLOR WHITE

Redness

DEFINITION: In the context of this program, redness refers to any condition where the ^^conjunctiva^^ appears red or pink from any cause including dilation of blood vessels (^^erythema^^) and ^^subconjunctival hemorrhage^^.

BACKGROUND: If you indicate that the conjunctiva is red, the program will ask you to further define the location (^^diffuse^^, ^^circumcorneal^^, or ^^sectorial^^) and severity of the redness.

~BORDER 2,2,22,78, CYAN
~Color CYAN
~CURSET 2, 5
MEDIC Hypertext Help System
~BORDER 5,10,10,70, CYAN
~BORDER 11,10,16,70, CYAN
~~follicles
~BACKGROUND BLUE
~CLS

~COLOR WHITE

Follicles

DEFINITION: Conjunctival follicles are small (0.5 to 1mm), yellow-white elevations of lymphoid tissue that generally occur in the ^^fornix conjunctiva^^.

BACKGROUND: Unless a follicular response is severe, it will probably be invisible to the naked eye. It is important to differentiate follicles from ^^papillae^^. Conjunctival follicles usually indicate an acute viral infection.

~BORDER 2,2,22,78, CYAN
~Color CYAN
~CURSET 2, 5
MEDIC Hypertext Help System
~BORDER 5,10,9,70, CYAN
~BORDER 11,10,17,70, CYAN
~~papillae
~BACKGROUND BLUE
~CLS

~COLOR WHITE

Papillae

DEFINITION: Conjunctival papillae are usually small (0.1 to 0.2mm), red elevations of vascular tissue that generally occur in the ^^tarsal conjunctiva^^.

BACKGROUND: Unless a papillary response is severe, it will probably be invisible to the naked eye, although papillae can be quite large in exaggerated responses. Fluorescein dye can be used to accentuate the appearance of papillae. It is important to differentiate papillae from ^^follicles^^. Conjunctival papillae usually indicate an allergic reaction or a bacterial infection.

~BORDER 2,2,22,78, CYAN
~Color CYAN
~CURSET 2, 5
MEDIC Hypertext Help System
~BORDER 5,10,9,70, CYAN
~BORDER 11,10,19,70, CYAN
~~diffuse
~BACKGROUND BLUE
~CLS

~COLOR WHITE

Diffuse

DEFINITION: Diffuse refers to the property of being widely spread or scattered.

~BORDER 2,2,22,78, CYAN
~Color CYAN
~CURSET 2, 5
MEDIC Hypertext Help System
~BORDER 5,10,8,70, CYAN
~~circumcorneal
~BACKGROUND BLUE
~CLS

~COLOR WHITE

Circumcorneal Injection

DEFINITION: Circumcorneal injection is a condition where blood vessels adjacent to the cornea become congested, forming a ring of injection around the cornea.

BACKGROUND: Circumcorneal injection is generally indicative of ^^inflammation^^ of the iris or cornea. It usually occurs in conditions like iritis or ^^acute angle closure glaucoma^^.

~BORDER 2,2,22,78, CYAN
~Color CYAN
~CURSET 2, 5
MEDIC Hypertext Help System
~BORDER 5,10,10,70, CYAN
~BORDER 11,10,16,70, CYAN
~~sectorial
~BACKGROUND BLUE
~CLS

~COLOR WHITE

Sectorial

DEFINITION: In the context of this program, sectorial ^^redness^^ refers to injection or pooling of blood that is limited to only a part of the ^^conjunctiva^^.

~BORDER 2,2,22,78, CYAN
~Color CYAN
~CURSET 2, 5
MEDIC Hypertext Help System
~BORDER 5,10,10,70, CYAN
~~conjunctival fornix
~SAMEAS fornix conjunctiva
~~fornix
~SAMEAS fornix conjunctiva
~~fornix conjunctiva
~BACKGROUND BLUE
~CLS

~COLOR WHITE

Fornix Conjunctiva

DEFINITION: The fornicies of the ^^conjunctiva^^ are the areas where the conjunctiva reflects back from the globe to the lids forming pockets above and below the eye.

BACKGROUND: The conjunctival fornicies prevent foreign bodies and contact lenses from dislodging behind

the eye. For more information, see ^^Conjunctival Anatomy Diagram^^.

~BORDER 2,2,22,78, CYAN
~Color CYAN
~CURSET 2, 5
MEDIC Hypertext Help System
~BORDER 5,10,9,70, CYAN
~BORDER 11,10,15,70, CYAN
~~weeping
~SAMEAS excessive tearing
~~excessive tearing
~BACKGROUND BLUE
~CLS

~COLOR WHITE

Excessive Tearing

DEFINITION: Excessive tearing, also known as weeping or epiphora, is caused by excessive production of tears by the lacrimal gland, usually in response to corneal stimulation.

BACKGROUND: Excessive tearing usually occurs with problems that affect the cornea, conjunctiva, or both. It is fairly common with ^^corneal abrasion^^s, viral and allergic conditions, but can also occur with blockage of the tear drainage apparatus.

~BORDER 2,2,22,78, CYAN
~Color CYAN
~CURSET 2, 5
MEDIC Hypertext Help System
~BORDER 5,10,9,70, CYAN
~BORDER 11,10,17,70, CYAN
~~stringy
~BACKGROUND BLUE
~CLS

~COLOR WHITE

Stringy Discharge

DEFINITION: A stringy or ropey ^^discharge^^ is usually found in the inferior ^^conjunctival fornix^^. It is usually

white or yellow in color and appears like strands of string running parallel to the fold of the ^^conjunctiva^^.

BACKGROUND: A stingy discharge is generally indicative of ^^allergic conjunctivitis^^ but may occasionally occur with ^^viral conjunctivitis^^.

~BORDER 2,2,22,78, CYAN
~Color CYAN
~CURSET 2, 5
MEDIC Hypertext Help System
~BORDER 5,10,10,70, CYAN
~BORDER 11,10,15,70, CYAN
~~mucoid
~BACKGROUND BLUE
~CLS

~COLOR WHITE

Mucoid Discharge

DEFINITION: A mucoid ^^discharge^^ is usually found in the inferior ^^conjunctiva^^. It is yellowish in color and has a consistency similar to honey.

BACKGROUND: A mucoid discharge without ^^purulence^^ is generally indicative of ^^viral conjunctivitis^^ but may occasionally occur with ^^bacterial conjunctivitis^^.

~BORDER 2,2,22,78, CYAN
~Color CYAN
~CURSET 2, 5
MEDIC Hypertext Help System
~BORDER 5,10,9,70, CYAN
~BORDER 11,10,15,70, CYAN
~~mucopurulent
~BACKGROUND BLUE
~CLS

~COLOR WHITE

Mucopurulent Discharge

DEFINITION: A mucopurulent ^^discharge^^ is usually found in the inferior ^^conjunctiva^^. It is yellow to white

in color and is a combination of ^^mucoid^^ and ^^purulent^^ material.

BACKGROUND: A mucopurulent discharge is generally indicative of ^^bacterial conjunctivitis^^.

~BORDER 2,2,22,78, CYAN
~Color CYAN
~CURSET 2, 5
MEDIC Hypertext Help System
~BORDER 5,10,10,70, CYAN
~BORDER 11,10,14,70, CYAN
~~purulent
~BACKGROUND BLUE
~CLS

~COLOR WHITE

Purulent Discharge

DEFINITION: A purulent ^^discharge^^ is usually found in the inferior ^^conjunctiva^^. It is white or creme colored and is a composed primarily of white blood cells.

BACKGROUND: A purulent discharge is generally indicative of ^^bacterial conjunctivitis^^. If a great deal of purulence is present, be sure to consider ^^hyperacute conjunctivitis^^ (gonococcal).

~BORDER 2,2,22,78, CYAN
~Color CYAN
~CURSET 2, 5
MEDIC Hypertext Help System
~BORDER 5,10,10,70, CYAN
~BORDER 11,10,16,70, CYAN
~~intraocular pressure
~BACKGROUND BLUE
~CLS

~COLOR WHITE

Intraocular Pressure

DEFINITION: The globe is filled with fluids which cause an intraocular pressure (IOP) which is greater than theatmospheric pressure. The pressure is produced by

aqueous production by the ciliary body which exceeds aqueous outflow.

BACKGROUND: Normal IOP is between 7 and 22 mmHG. High IOP may be indicative of ^^acute angle closure glaucoma^^. Sometimes IOP may be low in an eye suffering from iritis. If you need instructions on the ^^Schiotz tonometer^^, use .

~BORDER 2,2,22,78, CYAN
~Color CYAN
~CURSET 2, 5
MEDIC Hypertext Help System
~BORDER 5,10,10,70, CYAN
~BORDER 11,10,17,70, CYAN
~~tactile tensions
~BACKGROUND BLUE
~CLS

~COLOR WHITE

Tactile Tensions

DEFINITION: Tactile tension measurement is a method of estimating the ^^intraocular pressure^^ of the eyes by pressing with your thumbs on the patient's closed eyes.

METHOD: Have your patient look downward and close his eyes. Then press firmly (not excessively) on his upper eyelids with your thumbs. Do both eyes at the same time. The real value of this test is in determining whether one eye has a significantly different pressure than its fellow.

~BORDER 2,2,22,78, CYAN
~Color CYAN
~CURSET 2, 5
MEDIC Hypertext Help System
~BORDER 5,10,9,70, CYAN
~BORDER 11,10,17,70, CYAN
~~visual field examination
~BACKGROUND BLUE
~CLS

~COLOR WHITE

Visual Fields

To measure visual fields, seat yourself directly across from your patient. Be sure that both of your heads are at the same height and that you are about one meter apart. Have your patient close or cover his left eye first. Then close your right eye. Instruct your patient to look directly into your open (left) eye at all times. This insures accurate fixation. Next, hold your hands between yourself and your patient such that your hands are 0.5 meters from you and 0.5 meters from your patient. Then hold up one or two fingers on each hand and ask your patient how many fingers he sees. Check the patient's visual field in all directions. Use your own visual field as a check to determine whether your patient's visual field is normal. Then repeat for the fellow eye.

~BORDER 2,2,22,78, CYAN
~Color CYAN
~CURSET 2, 5
MEDIC Hypertext Help System
~BORDER 5,10,21,70, CYAN
~~general constriction of visual field
~BACKGROUND BLUE
~CLS

~COLOR WHITE

Constriction of the Visual Field

DEFINITION: A general constriction of the visual field of an eye occurs when the field is reduced in more or less all directions.

BACKGROUND: A generalized constriction of the visual field may be indicative of one of the glaucomas but can also occur with retinitis pigmentosa, chronic papilledema, central retinal artery occlusion with macular sparing, and other conditions.

~BORDER 2,2,22,78, CYAN
~Color CYAN
~CURSET 2, 5 MEDIC Hypertext Help System
~BORDER 5,10,9,70, CYAN
~BORDER 11,10,17,70, CYAN
~~sectorial defect
~BACKGROUND BLUE

~CLS

~COLOR WHITE

Sectorial Field Defect

DEFINITION: A sectorial field defect, also known as an altitudinal field defect, is characterized by a blind area in a part or sector of the visual field.

BACKGROUND: A sectorial field defect may occur with ^^retinal detachment^^, ischemic optic neuropathy, branch artery or vein occlusion, or less commonly with glaucoma, optic nerve or chiasmal lesions, and optic nerve coloboma.

~BORDER 2,2,22,78, CYAN
~Color CYAN
~CURSET 2, 5
MEDIC Hypertext Help System
~BORDER 5,10,9,70, CYAN
~BORDER 11,10,17,70, CYAN
~~pre-auricular nodes
~BACKGROUND BLUE
~CLS

~COLOR WHITE

Pre-Auricular Nodes

DEFINITION: The pre-auricular lymph nodes are located on either side of the face about one centimeter anterior and one centimeter below the ear lobe.

METHOD: Palpate the nodes with your fingers to see if they are enlarged (palpable). Ask your patient if he senses any tenderness while you apply light pressure to the nodes. Appropriate findings for the chart include normal, ^^palpable and tender^^, and ^^palpable and non-tender^^.

~BORDER 2,2,22,78, CYAN
~Color CYAN
~CURSET 2, 5
MEDIC Hypertext Help System
~BORDER 5,10,9,70, CYAN
~BORDER 11,10,17,70, CYAN

~~palpable and non-tender
~BACKGROUND BLUE
~CLS

~COLOR WHITE

Palpable and Non-Tender Nodes

DEFINITION: Palpable and non-tender nodes are enlarged (palpable) ^^pre-auricular nodes^^ that are not sensitive to touch (non-tender).

BACKGROUND: When the pre-auricular nodes are enlarged but non-tender, the following conditions may be indicated: pharyngoconjunctival fever, chlamydial conjunctivitis, Newcastle conjunctivitis or an infection by enterovirus 70.

~BORDER 2,2,22,78, CYAN
~Color CYAN
~CURSET 2, 5
MEDIC Hypertext Help System
~BORDER 5,10,9,70, CYAN
~BORDER 11,10,17,70, CYAN
~~palpable and tender
~BACKGROUND BLUE
~CLS

~COLOR WHITE

Palpable and Tender Nodes

DEFINITION: Palpable and tender nodes are enlarged (palpable) ^^pre-auricular nodes^^ that are sensitive to touch (tender).

BACKGROUND: When the pre-auricular nodes are enlarged and tender, a number of conditions may be indicated: epidemic keratoconjunctivitis, ^^herpes keratitis^^ preseptal cellulitis, or one of the infectious granulomatous diseases.

~BORDER 2,2,22,78, CYAN
~Color CYAN
~CURSET 2, 5
MEDIC Hypertext Help System
~BORDER 5,10,9,70, CYAN

~BORDER 11,10,17,70, CYAN
~~localized edematous area
~BACKGROUND BLUE
~CLS

~COLOR WHITE

Localized Corneal Edema

DEFINITION: Localized corneal ^^edema^^ is characterized by a white or grayish patch in the cornea with fuzzy, ^^diffuse^^ borders. Without a microscope, edema may be difficult to distinguish from ^^infiltrates^^.

BACKGROUND: Localized corneal edema may be indicative of a severe ^^corneal abrasion^^, a ^^corneal foreign body^^, or a corneal ulcer. It generally indicates that the cornea has been compromised fairly severely, so the patient should be followed carefully.

~BORDER 2,2,22,78, CYAN
~Color CYAN
~CURSET 2, 5
MEDIC Hypertext Help System
~BORDER 5,10,10,70, CYAN
~BORDER 11,10,17,70, CYAN
~~infiltrate
~SAMEAS infiltrates
~~infiltrates
~IMAGE(INFILTV.PCX -K'\N' -M18)
~BACKGROUND BLUE
~CLS

~COLOR WHITE

Corneal Infiltrates

DEFINITION: Corneal infiltrate(s) are collections of white blood cells in the deeper layers of the cornea. They look like white or grayish spot(s) with well defined borders. Without a microscope, infiltrates may be difficult to distinguish from ^^localized corneal edema^^.

BACKGROUND: A corneal infiltrate visible to the naked eye or with a hand magnifier would generally indicate a corneal ulcer. Microscopic infiltrates occur with some

viral conditions such as epidemic keratoconjunctivitis and may also result from long term contact lens wear.

~BORDER 2,2,22,78, CYAN
~Color CYAN
~CURSET 2, 5
MEDIC Hypertext Help System
~BORDER 5,10,11,70, CYAN
~BORDER 12,10,18,70, CYAN
~~discharge
~SAMEAS exudate
~~exudate
~BACKGROUND BLUE
~CLS

~COLOR WHITE

Discharge (Exudate)

DEFINITION: A discharge or exudate is material, such as fluid, cells, or cellular debris, which has escaped from blood vessels and has been deposited in tissues or on tissue surfaces, usually as a result of ^^inflammation^^.

~BORDER 2,2,22,78, CYAN
~Color CYAN
~CURSET 2, 5
MEDIC Hypertext Help System
~BORDER 5,10,11,70, CYAN
~~gram's stain
~BACKGROUND BLUE
~CLS

~COLOR WHITE

Gram's Stain

DEFINITION: An empirical staining procedure developed by Gram in which microorganisms are stained with crystal violet. Organisms that retain the stain are said to be Gram positive, and those that do not retain the stain are said to be Gram negative.

~BORDER 2,2,22,78, CYAN
~Color CYAN
~CURSET 2, 5
MEDIC Hypertext Help System

~BORDER 5,10,11,70, CYAN
~~wright's stain
~BACKGROUND BLUE
~CLS

~COLOR WHITE

Wright's Stain

DEFINITION: A mixture of eosin and methylene blue used for demonstrating blood corpuscles and malarial parsites.

~BORDER 2,2,22,78, CYAN
~Color CYAN
~CURSET 2, 5
MEDIC Hypertext Help System
~BORDER 5,10,8,70, CYAN
~~fluorescein
~SAMEAS fluorescein staining
~~fluorescein staining
~BACKGROUND BLUE
~CLS

~COLOR WHITE

Fluorescein

DEFINITION: Fluorescein is a soluble orange dye which can be used to reveal corneal lesions in the eye. It appears bright green under ultra violet light.

BACKGROUND: Fluorescein dye should be used whenever corneal involvement is suspected. When viewing a staining pattern, be sure to have your patient blink frequently; mucous globules stain readily, but they will move with blinking, allowing you to distinguish them from true corneal staining. Fluorescein staining of the conjunctiva is generally of little importance.

~BORDER 2,2,22,78, CYAN
~Color CYAN
~CURSET 2, 5
MEDIC Hypertext Help System
~BORDER 5,10,9,70, CYAN
~BORDER 11,10,19,70, CYAN
~~contact lens care solutions

~BACKGROUND BLUE
~CLS

~COLOR WHITE

Contact Lens Solutions

DEFINITION: A variety of contact lens care products are available. They fall into five general classes: (1) daily cleaning solutions; (2) weekly (usually enzyme) cleaning products; (3) Disinfecting solutions; (4) rinsing solutions (saline); and (5) rewetting solutions.

BACKGROUND: At a minimum, every contact lens wearer should be using a daily cleaning solution and a disinfecting solution every time they remove a lens from their eyes.

~BORDER 2,2,22,78, CYAN
~Color CYAN
~CURSET 2, 5
MEDIC Hypertext Help System
~BORDER 5,10,12,70, CYAN
~BORDER 13,10,18,70, CYAN
~~preservatives
~BACKGROUND BLUE
~CLS

~COLOR WHITE

Solution Preservatives

DEFINITION: Most contact lens care solutions contain one or more agents that function as preservatives to inhibit growth of microorganisms.

BACKGROUND: Some preservatives are frequently implicated in cases of contact lens ^^solution allergy^^ or sensitivity. They are: chlorhexidine, thymerosol, and the sorbic acid group. They have generally been replaced by less troublesome preservatives, but the older solutions are still available and in use by some patients.

~BORDER 2,2,22,78, CYAN
~Color CYAN
~CURSET 2, 5
MEDIC Hypertext Help System

~BORDER 5,10,9,70, CYAN
~BORDER 11,10,18,70, CYAN
~~contact lens deposits
~SAMEAS deposits
~~deposits
~BACKGROUND BLUE
~CLS

~COLOR WHITE

Contact Lens Deposits

DEFINITION: A number of materials can deposit on the surface of a contact lens. Protein is the most common, but lipids and minerals are also often present.

BACKGROUND: Protein deposits will give the lens a hazy appearance under white light and magnification. Lipid deposits sometimes look like bumps of clear jelly on the surface of the lens. Mineral deposits usually appear to be hard white spots on the lens surface. The best way to deal with lens deposits is to replace the lens.

~BORDER 2,2,22,78, CYAN
~Color CYAN
~CURSET 2, 5
MEDIC Hypertext Help System
~BORDER 5,10,9,70, CYAN
~BORDER 11,10,18,70, CYAN
~~damaged edge
~BACKGROUND BLUE
~CLS

~COLOR WHITE

Damaged Contact Lens Edge

DEFINITION: Soft contact lenses are susceptible to edge tears which are visible under ^^careful examination^^. An edge tear generally causes vague symptoms of discomfort.

BACKGROUND: A damaged contact lens edge is diagnosed by direct examination of the contact lens. If an edge irregularity is detected, the only solution is to replace the contact lens or to discontinue contact lens

wear until a replacement contact lens is available. The patient should be instructed in proper handling methods.

~BORDER 2,2,22,78, CYAN
~Color CYAN
~CURSET 2, 5
MEDIC Hypertext Help System
~BORDER 5,10,9,70, CYAN
~BORDER 11,10,18,70, CYAN
~~inverted lens
~BACKGROUND BLUE
~CLS

~COLOR WHITE

Inverted Contact Lens

DEFINITION: Soft contact lenses can be turned inside out. ^^Careful examination^^ of the lens will reveal an inverted lens as the edges will flare slightly outward.

BACKGROUND: An inverted contact lens is diagnosed by direct examination of the contact lens. If a lens is inverted, it may move excessively on the eye causing slightly blurred vision and mild discomfort. Usually, one can simply reinvert the lens and return to normal lens wear if no other problems are present.

~BORDER 2,2,22,78, CYAN
~Color CYAN
~CURSET 2, 5
MEDIC Hypertext Help System
~BORDER 5,10,9,70, CYAN
~BORDER 11,10,18,70, CYAN
~~anterior chamber
~BACKGROUND BLUE
~CLS

~COLOR WHITE

Anterior Chamber

DEFINITION: The anterior chamber is the space bounded by the iris, posteriorly, and the cornea anteriorly. It is filled with ^^aqueous humor^^. For more information, see the ^^ocular anatomy diagram^^.
~BORDER 2,2,22,78, CYAN

~Color CYAN
~CURSET 2, 5
MEDIC Hypertext Help System
~BORDER 5,10,10,70, CYAN
~~aqueous humor
~BACKGROUND BLUE
~CLS

~COLOR WHITE

Aqueous Humor

DEFINITION: Aqueous humor fills the ^^anterior chamber^^. It is constantly produced by the ciliary body and drained by the aqueous outflow apparatus.

BACKGROUND: In some internal eye infections, such as iritis, the normally clear aqueous humor can become somewhat cloudy, as white blood cells and blood proteins escape from blood vessels with ^^inflammation^^. Also, ^^acute angle closure glaucoma^^ can result if the aqueous outflow apparatus is blocked.

~BORDER 2,2,22,78, CYAN
~Color CYAN
~CURSET 2, 5
MEDIC Hypertext Help System
~BORDER 5,10,9,70, CYAN
~BORDER 11,10,18,70, CYAN
~~subluxated lens
~BACKGROUND BLUE
~CLS

~COLOR WHITE

Subluxated Lens

DEFINITION: Also known as a dislocated lens, a subluxated lens is a displaced crystalline lens that at least partially remains within pupillary opening.

BACKGROUND: Trauma is the most common cause of a subluxated lens, but lens dislocation can occur with some rare systemic conditions, such as Marfan's syndrome. Usually, the patient would complain of monocular ^^diplopia^^. Any case of subluxation

should be treated like ^^retinal detachment^^ and medevaced immediately.

~BORDER 2,2,22,78, CYAN
~Color CYAN
~CURSET 2, 5
MEDIC Hypertext Help System
~BORDER 5,10,9,70, CYAN
~BORDER 11,10,19,70, CYAN
~~vitreous detachment
~BACKGROUND BLUE
~CLS

~COLOR WHITE

Vitreous Detachment

DEFINITION: Vitreous body separated from its normal attachments, due to shrinkage from degenerative or inflammatory conditions, trauma, ^^myopia^^, or senility.

BACKGROUND: While a vitreous detachment is generally a benign condition, there is no way to differentiate a vitreous detachment from a^^retinal detachment^^ with the equipment available on a submarine. Thus, all cases of vitreous detachment should be treated as though they are ^^retinal detachment^^s and medevaced immediately.

~BORDER 2,2,22,78, CYAN
~Color CYAN
~CURSET 2, 5
MEDIC Hypertext Help System
~BORDER 5,10,9,70, CYAN
~BORDER 11,10,19,70, CYAN
~~onset
~BACKGROUND BLUE
~CLS

~COLOR WHITE

Onset

DEFINITION: Onset refers to the characteristics of the beginning of symptomology.

BACKGROUND: Sudden onset implies that symptomology began and developed abruptly, over a time course of hours, not days. Acute onset means that symptoms developed over a period of several hours to several days. A chronic onset occurs when symptoms have developed very slowly or when the condition has been present for a long time.

~BORDER 2,2,22,78, CYAN
~Color CYAN
~CURSET 2, 5
MEDIC Hypertext Help System
~BORDER 5,10,8,70, CYAN
~BORDER 11,10,19,70, CYAN
~~Test for corneal anesthesia
~SAMEAS corneal sensitivity test
~~corneal sensitivity measurement
~SAMEAS corneal sensitivity test
~~corneal sensitivity test
~IMAGE(CORNSNSV.pcx -K'\N' -M18)
~BACKGROUND BLUE
~CLS

~COLOR WHITE

Corneal Sensitivity Test

REVIEW METHOD: To measure corneal sensitivity, make a cotton wisp from a cotton tipped applicator by pulling some of the cotton swab from each of two applicators. The goal is to create two applicators each with a single fiber of cotton extending from the tip.

~BORDER 2,2,22,78, CYAN
~Color CYAN
~CURSET 2, 5
MEDIC Hypertext Help System
~BORDER 5,10,11,73, CYAN
~PRESS ANY KEY
~BACKGROUND BLUE
~CLS

~COLOR WHITE

Corneal Sensitivity Test

Next, have your patient look upward and lightly touch the cotton wisp to the right inferior cornea and note your patient's reaction. Repeat for the left eye using the second applicator. With this test you are trying to determine whether there is a significant difference in corneal sensitivity between the two eyes.

~BORDER 2,2,22,78, CYAN
~Color CYAN
~CURSET 2, 5
MEDIC Hypertext Help System
~BORDER 5,10,12,73, CYAN
~~refractive error
~Image(VISIONV.pcx -K'\N' -M18)
~BACKGROUND BLUE
~CLS

~COLOR WHITE

Refractive Error

A pinhole can be used to help differentiate blurred vision caused by refractive error from blurring caused by other factors. Make a 2mm hole in a piece of thin cardboard with a pin or needle. Have the patient read the eye chart while looking through the pinhole. If his vision improves through the pinhole, then at least some of the blurred vision is caused by under corrected refractive error.

~BORDER 2,2,22,78, CYAN
~Color CYAN
~CURSET 2, 5
MEDIC Hypertext Help System
~BORDER 5,10,14,70, CYAN
~~neutrophils
~BACKGROUND BLUE
~CLS

~COLOR WHITE

Neutrophils

DEFINITION: A granular leukocyte having a nucleus with three to five lobes connected by slender threads of chromatin, and cytoplasm containing fine inconspicuous

granules. Also known as polymorphonucleocytes (PMN), polynuclear, or neutrophilic leukocytes.

~BORDER 2,2,22,78, CYAN
~Color CYAN
~CURSET 2, 5
MEDIC Hypertext Help System
~BORDER 5,10,11,70, CYAN
~~eosinophils
~BACKGROUND BLUE
~CLS

~COLOR WHITE

Eosinophils

DEFINITION: A granular leukocyte having a nucleus with two lobes connected by a slender thread of chromatin, and cytoplasm containing coarse, round granules that are uniform in size.

~BORDER 2,2,22,78, CYAN
~Color CYAN
~CURSET 2, 5
MEDIC Hypertext Help System
~BORDER 5,10,10,70, CYAN
~~lymphocytes
~BACKGROUND BLUE
~CLS

~COLOR WHITE

Lymphocytes

DEFINITION: A mononuclear leukocyte with a deeply staining nucleus containing dense chromatin, and a pale blue staining cytoplasm.

~BORDER 2,2,22,78, CYAN
~Color CYAN
~CURSET 2, 5
MEDIC Hypertext Help System
~BORDER 5,10,9,70, CYAN
~~monocytes
~BACKGROUND BLUE
~CLS

~COLOR WHITE

Monocytes

DEFINITION: A mononuclear phagocytic leukocyte with an ovoid or kidney shaped nucleus containing lacey, linear chromatin, and abundant blue-gray cytoplasm filled with fine reddish granules.

~BORDER 2,2,22,78, CYAN
~Color CYAN
~CURSET 2, 5
MEDIC Hypertext Help System
~BORDER 5,10,10,70, CYAN
~~evert
~SAMEAS eversion
~~eyelid eversion
~SAMEAS eversion
~~eversion
~BACKGROUND BLUE
~CLS

~COLOR WHITE

Lid Eversion

METHOD: Grasp the upper lashes and pull them away from the globe. Next, apply pressure on the superior part of the upper eyelid with a cotton tipped applicator while flipping the inferior part of the lid over the applicator. Eversion can be maintained by light pressure of the thumb over the lashes. The lid will return to its normal position when the patient looks upward and blinks his eyes.

Press <ENTER> for more

~BORDER 2,2,22,78, CYAN
~Color CYAN
~CURSET 2, 5
MEDIC Hypertext Help System
~BORDER 5,10,14,70, CYAN
~PRESS ANY KEY
~IMAGE(EversioV.pcx -K'\N' -M18)
~BACKGROUND BLUE
~CLS

```
~COLOR WHITE
```

Lid Eversion

BACKGROUND: Eyelid eversion is indicated in cases of suspected foreign bodies, "lost" contact lenses, and with certain anterior segment infections.

```
~BORDER 2,2,22,78, CYAN
~Color CYAN
~CURSET 2, 5
MEDIC Hypertext Help System
~BORDER 5,10,9,70, CYAN
~~dendritic
~IMAGE(dendritV.pcx -K'\N' -M18)
~BACKGROUND BLUE
~CLS

~COLOR WHITE
```

Dendritic Keratitis

BACKGROUND: Dendritic keratitis nearly always indicates Herpes simplex keratitis. Some other conditions can produce dendritic corneal lesions, however. These include: Herpes zoster virus, recurrent corneal erosion, and contact lens related pseudodendrites.

```
~BORDER 2,2,22,78, CYAN
~Color CYAN
~CURSET 2, 5
MEDIC Hypertext Help System
~BORDER 5,10,11,70, CYAN
~~tarsal
~SAMEAS palpebral conjunctiva
~~tarsal conjunctiva
~SAMEAS palpebral conjunctiva
~~palpebral conjunctiva
~BACKGROUND BLUE
~CLS

~COLOR WHITE
```

Palpebral Conjunctiva

DEFINITION: The palpebral or tarsal ^^conjunctiva^^ is that part of the conjunctiva that lines the inner surfaces

of the eyelids. To examine the superior tarsal conjunctiva, you must ^^evert^^ the eyelids.

~BORDER 2,2,22,78, CYAN
~Color CYAN
~CURSET 2, 5
MEDIC Hypertext Help System
~BORDER 5,10,10,70, CYAN
~~bulbar
~SAMEAS bulbar conjunctiva
~~bulbar conjunctiva
~BACKGROUND BLUE
~CLS

~COLOR WHITE

Bulbar Conjunctiva

DEFINITION: The bulbar ^^conjunctiva^^ is that part of the conjunctiva that covers the front of the globe or white of the eye.

~BORDER 2,2,22,78, CYAN
~Color CYAN
~CURSET 2, 5
MEDIC Hypertext Help System
~BORDER 5,10,9,70, CYAN
~~foreign body tracking
~IMAGE(FBTRACKV.PCX -K'\N' -M18)
~BACKGROUND BLUE
~CLS

~COLOR WHITE

Foreign Body Tracking Stain

BACKGROUND: A ^^fluorescein^^ staining pattern that looks like a zig-zag line on the cornea is indicative of a foreign body trapped on the inside surface of the upper lid. Such a finding necessitates ^^eyelid eversion^^ to help rule out a foreign body.

~BORDER 2,2,22,78, CYAN
~Color CYAN
~CURSET 2, 5
MEDIC Hypertext Help System
~BORDER 5,10,11,70, CYAN

~~inspect the lenses
~SAMEAS contact lens examination
~~Carefully examine both contact lenses
~SAMEAS contact lens examination
~~careful examination
~SAMEAS contact lens examination
~~contact lens examination
~BACKGROUND BLUE
~CLS

~COLOR WHITE

Contact Lens Examination

METHOD: With the equipment available on a submarine, a contact lens examination can only be done with the lens removed from the eye. Always begin with the right lens first, and follow with the left lens to avoid mixing the lenses. Place the right lens on your fingertip and view it from various angles through the magnifier of the Wood's lamp (if available). Examine the edges carefully for irregularities or tears. Also look at the contour of the lens edge to help determine if the lens is right-side-out. Next, look carefully at the front and back surfaces of the lens. Look for deposits and surface irregularities. Repeat the process for the left lens.

~BORDER 2,2,22,78, CYAN
~Color CYAN
~CURSET 2, 5
MEDIC Hypertext Help System
~BORDER 5,10,18,70, CYAN
~~Ocular Anatomy Diagram
~IMAGE(ANATOMYV.PCX -K'\N' -M18)
~BACKGROUND BLUE
~CLS

~COLOR WHITE

Press <Esc> to return to program

~BORDER 2,2,22,78, CYAN
~Color CYAN

~CURSET 2, 5
MEDIC Hypertext Help System
~BORDER 5,10,12,70, CYAN
~~Conjunctival Anatomy Diagram
~IMAGE(CONJV.PCX -K'\N' -M18)
~BACKGROUND BLUE
~CLS

~COLOR WHITE

Press <Esc> to return to program

~BORDER 2,2,22,78, CYAN
~Color CYAN
~CURSET 2, 5
MEDIC Hypertext Help System
~BORDER 5,10,12,70, CYAN
~~Schiotz tonometer
~IMAGE(SCHIOTZV.PCX -K'\N' -M18)
~BACKGROUND BLUE
~CLS

~COLOR WHITE

Schiotz Tonometry

METHOD: Have your patient lay down comfortably on his back. Instill one or two drops of local anesthetic in each eye. While the anesthetic is taking effect (about 1 minute), prepare the tonometer: Place the 7.5 gm weight on the plunger and ensure that the instrument is sterile. Hold your patients eyelids open with one hand and carefully lower the tonometer plunger-plate onto the eye until the needle stabilizes. Use the table provided with the tonometer to convert the scale reading to a pressure reading in mmHg. Alternatively, you can use the ^^Schiotz Conversion Table^^ available by pressing <F1> and <Enter>.

~BORDER 2,2,22,78, CYAN
~Color CYAN
~CURSET 2, 5
MEDIC Hypertext Help System
~BORDER 5,10,18,70, CYAN

~~Schiotz Conversion Table
~BACKGROUND BLUE
~CLS
~COLOR WHITE

Schiotz Conversion Table
for 7.5 gm. load

Scale Reading	Pressure (mmHg)
0.0	59.1
0.5	54.2
1.0	49.8
1.5	45.8
2.0	42.1
2.5	38.8
3.0	35.8
3.5	33.0
4.0	30.4
4.5	28.0
5.0	25.8
5.5	23.8
6.0	21.9
6.5	20.1

Continued

~BORDER 1,2,22,78, CYAN
~Color CYAN
~CURSET 1, 5
MEDIC Hypertext Help System
~PRESS ANY KEY
~BACKGROUND BLUE
~CLS
~COLOR WHITE

Schiotz Conversion Table
for 7.5 gm. load

Scale Reading	Pressure (mmHg)
7.0	18.5
7.5	17.0
8.0	15.6
8.5	14.3
9.0	13.1
9.5	12.0
10.0	10.9

10.5	10.0
11.0	9.0
11.5	8.3
12.0	7.5
12.5	6.8
13.0	6.2

~BORDER 1,2,22,78, CYAN
~Color CYAN
~CURSET 1, 5
MEDIC Hypertext Help System

Appendix E

Shell Configure, Command, and Rule Files

SHELL.CFG File

```
FORWARD
NOBACKWARD
NOTITLE
SCR=RE7.SCR
NOQUESTIONS
QUIT=JUNK
QUIT_EXIT
```

SHELL.CMD File

```
ASK Q1
IF [X]0
 EXIT
ENDIF
```

Subject:
shell for redeye program

Author: J.S. Newacheck

Uses all applicable rules in data derivations.

Probability System: 0 (false) or 1 (true)

DISPLAY THRESHOLD: 1
QUALIFIERS:

1 this rule is
true
false

Name: always true
Used in rule(s): 0001

2 the custom screen will
be shown
not be shown

Name: custom screen
Default value = 1
Used in rule(s): (0001) 0002

3 The program will
halt rule execution and exit to dos
not halt execution but, instead confuse the user and the programmer

Name: 1
Used in rule(s): (0002)

CHOICES:
VARIABLES:
1 X
EXIT VARIABLE
Numeric variable
Initialized to 1.000000
Used in rule(s): (0002)*

RULES:

RULE NUMBER: 1 (bob)
IF:
    this rule is true

THEN:
    the custom screen will be shown

RULE NUMBER: 2
IF:
    the custom screen will be shown

THEN:
    The program will halt rule execution and exit to dos
 and [X] IS GIVEN THE VALUE

Appendix F

VGA Files (Figs 1-12)
EGA Files (Figs 13-24)

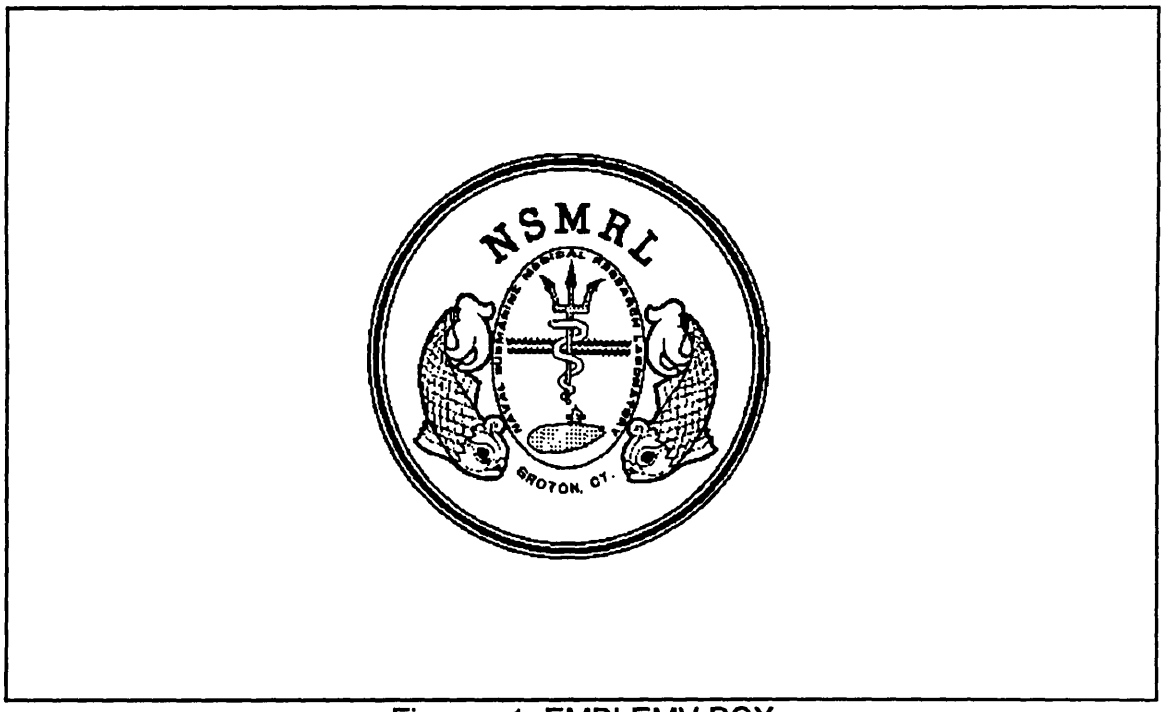


Figure - 1. EMBLEMV.PCX

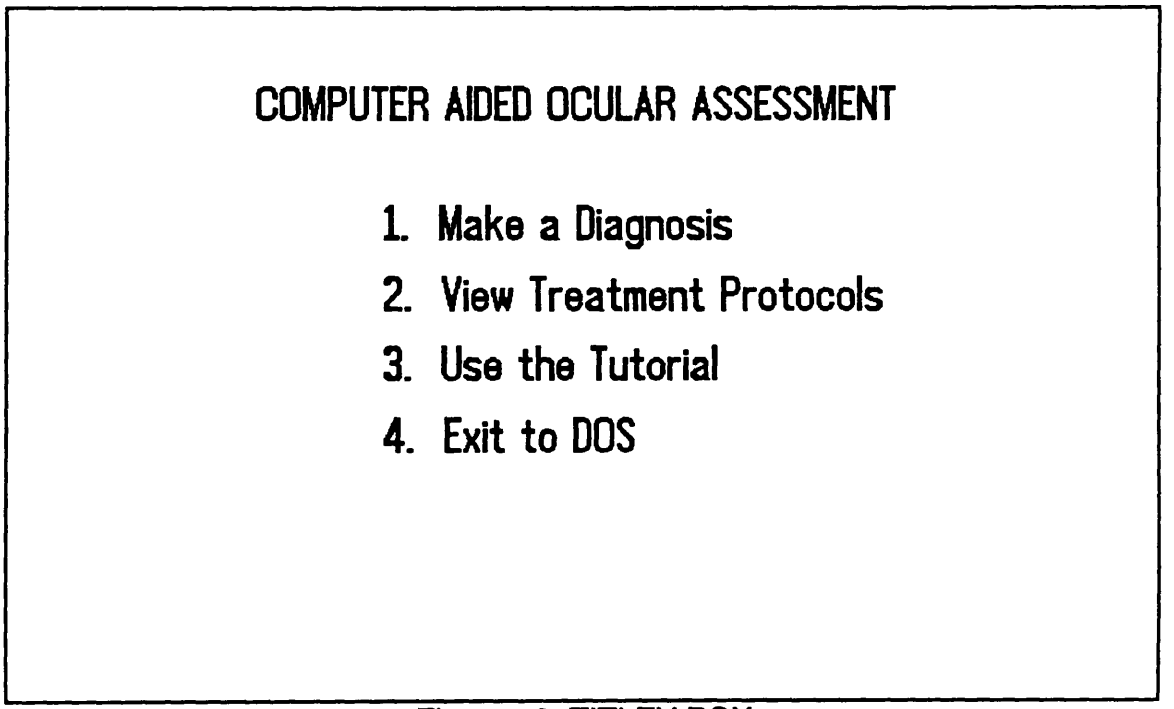
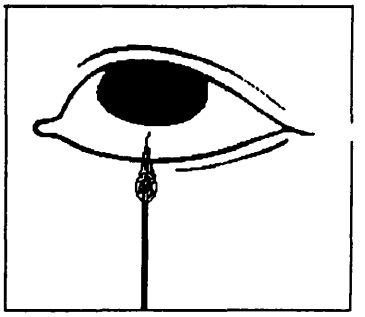


Figure - 2. TITLEV.PCX

Corneal Sensitivity Measurement



1. Pull and twist the tip of a cotton tipped applicator to form a fine strand of cotton fiber.

2. Have your patient look upward. Try to keep the applicator out of your patient's view as you gently touch the fiber tip to the inferior cornea of the unaffected eye. Note your patient's response. Repeat the procedure for the affected eye.

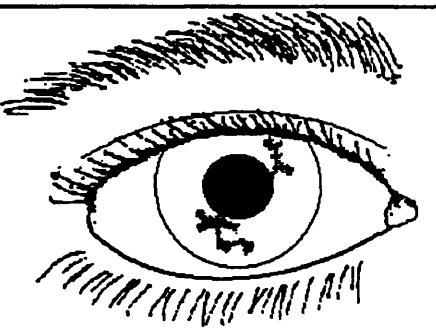
3. Ask your patient to compare the sensation between his two eyes. Herpes simplex usually causes reduced sensitivity in the affected eye.

Press <Enter> to continue

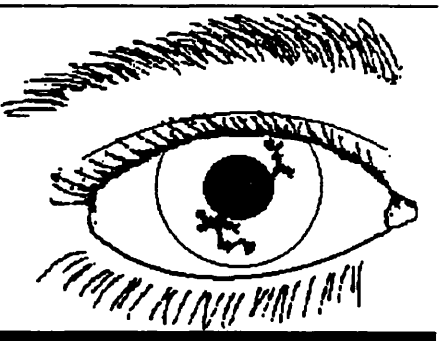
Figure - 3. CORNSNSV.PCX

Dendritic Keratitis

The figure to the right shows a classic dendritic lesion characteristic of herpes simplex. Note the branching pattern of the lesion. A herpetic lesion generally appears clean (i.e. no purulent or mucoid discharge) and is fairly superficial, affecting only the corneal epithelium.



In this figure, the same lesion has been stained with fluorescein dye. The dye enhances the visibility of the lesion in the latter stages of herpes keratitis. Because the herpes virus affects the sensory neurons of the cornea, corneal sensitivity is often reduced in an eye with an active herpes infection. A corneal sensitivity test can be performed to demonstrate reduced corneal sensitivity.



Press <Enter> to continue:

Figure - 4. DENDRITV.PCX

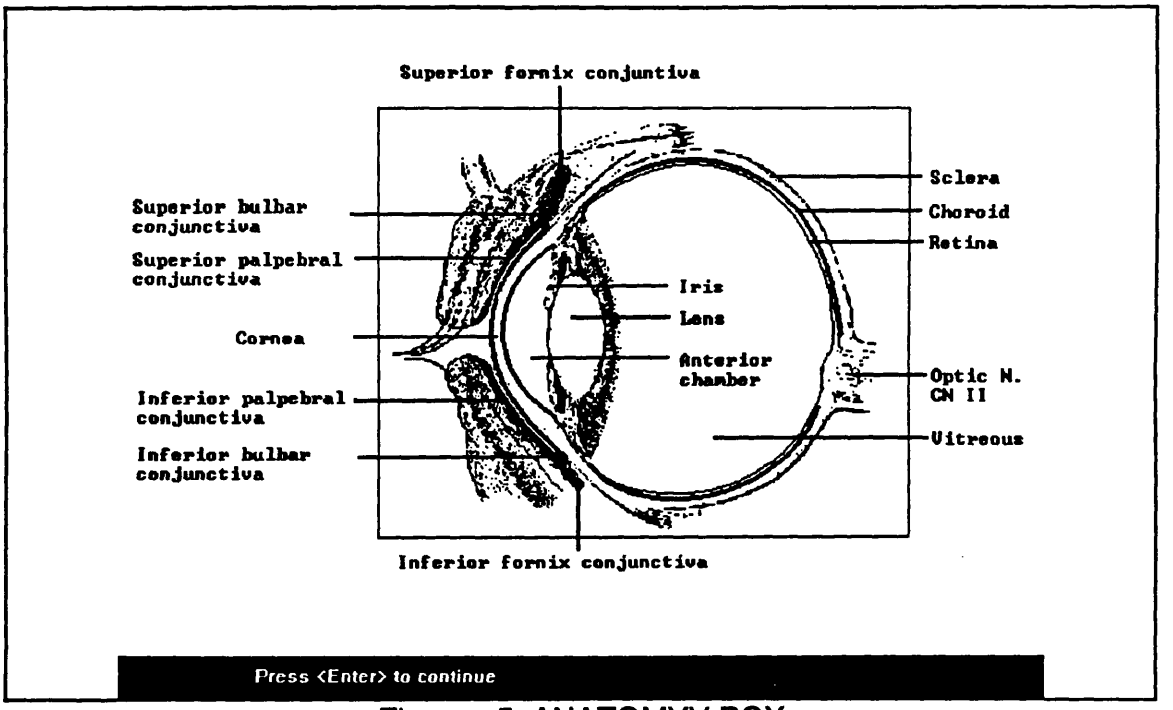
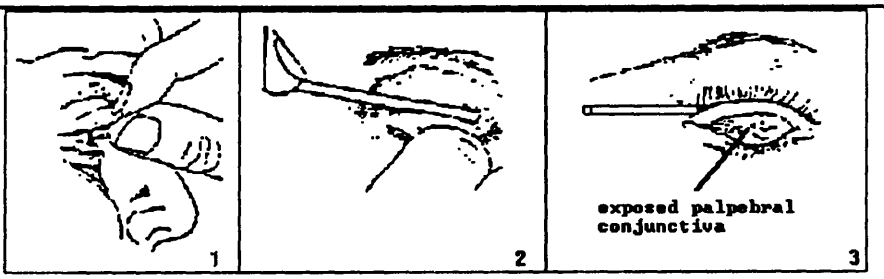


Figure - 5. ANATOMYV.PCX



1. Have your patient look downward; grasp the upper lashes and pull the upper lid away from the globe
2. Use a cotton tipped applicator to apply pressure along the superior part of the lid
3. Flip the upper lid over the applicator, exposing the under surface of the lid

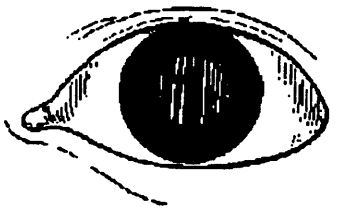
Press <Enter> to continue

Figure - 6. EVERSIOV.PCX

Foreign Body Tracking Stain

A zig-zag staining pattern, such as the one shown to the right, usually indicates a foreign body under the upper eyelid. As the lid moves up and down with each blink, and the eye moves left and right, the foreign body is dragged across the cornea, causing this characteristic staining pattern.

After the foreign body is located and removed, treatment for the corneal abrasion is indicated.

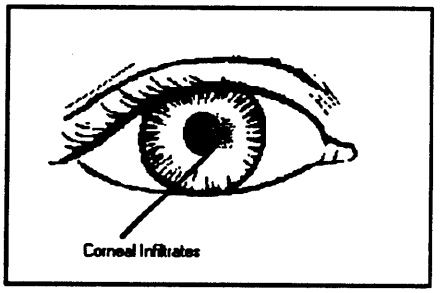


Press <Enter> to continue:

Figure - 7. FBTRACKV.PCX

Corneal Infiltrate

Corneal Infiltrates represent the migration of white blood cells into the cornea. They can be scattered throughout the cornea in which case they are almost impossible to see without he aid of a microscope. Infiltrates can also coalesce in one part of the cornea as shown in the picture to the right. This type of corneal infiltration is often visible to the naked eye. It is also the most worrysome, as it may be indicative of overlying corneal ulceration. If a coalesced corneal infiltrate is accompanied by fluorescein staining at the same location, corneal ulcer is a likely diagnosis. Even without overlying staining, a coalesced infiltrate must be treated aggressively with antibiotics.



Press <Enter> to continue:

Figure - 8. INFILTV.PCX

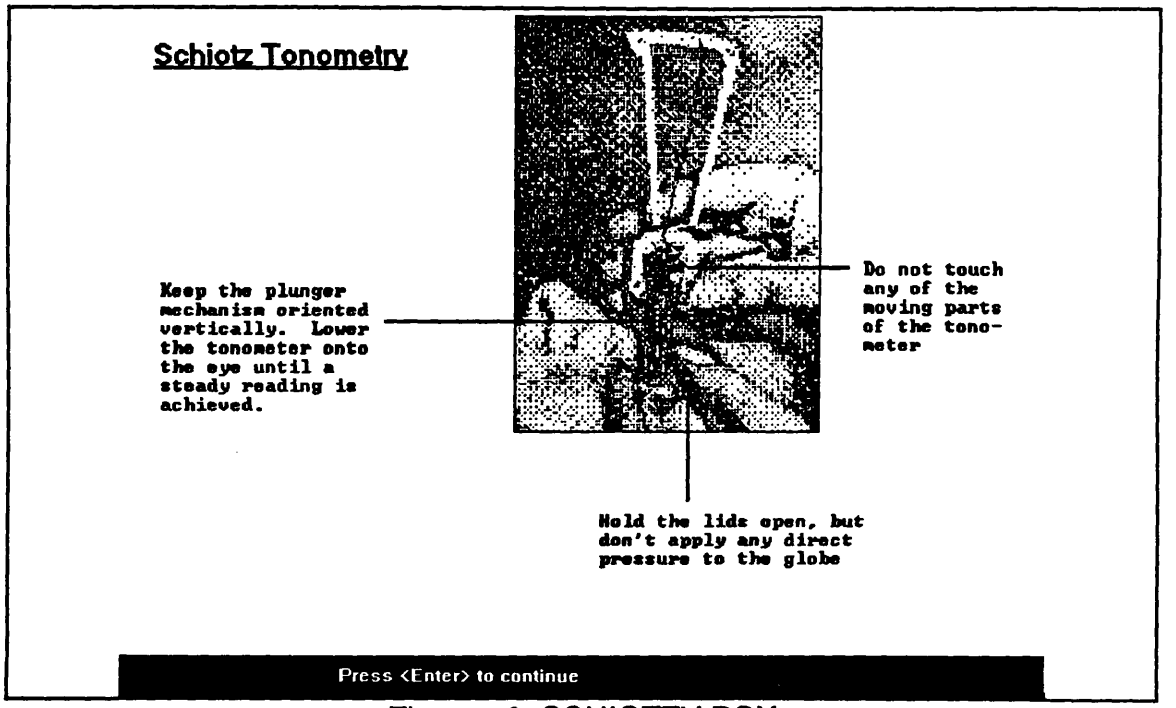


Figure - 9. SCHIOTZV.PCX

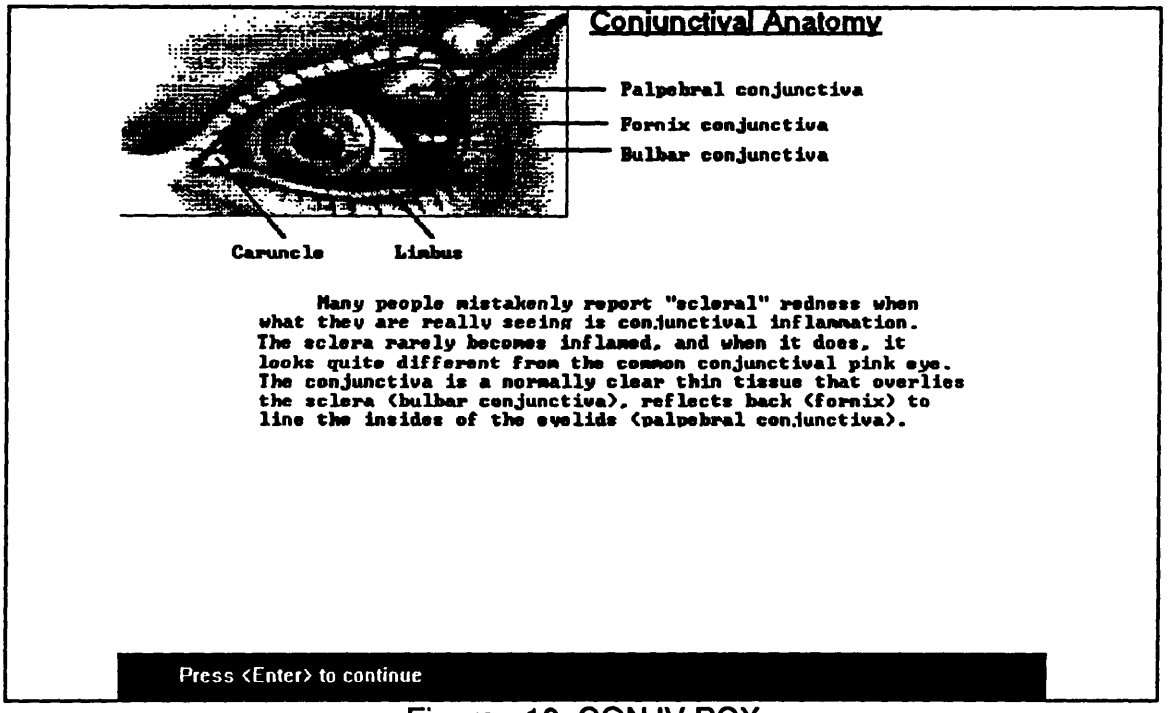


Figure - 10. CONJV.PCX

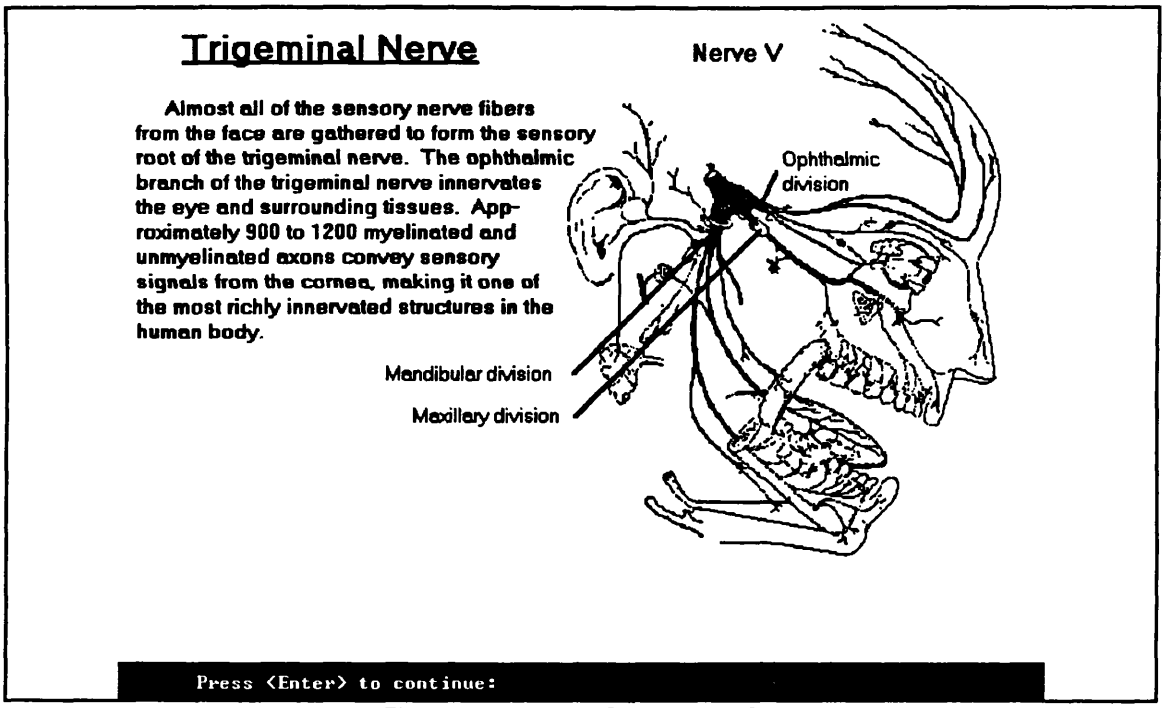


Figure - 11. TRIGEMV2.PCX

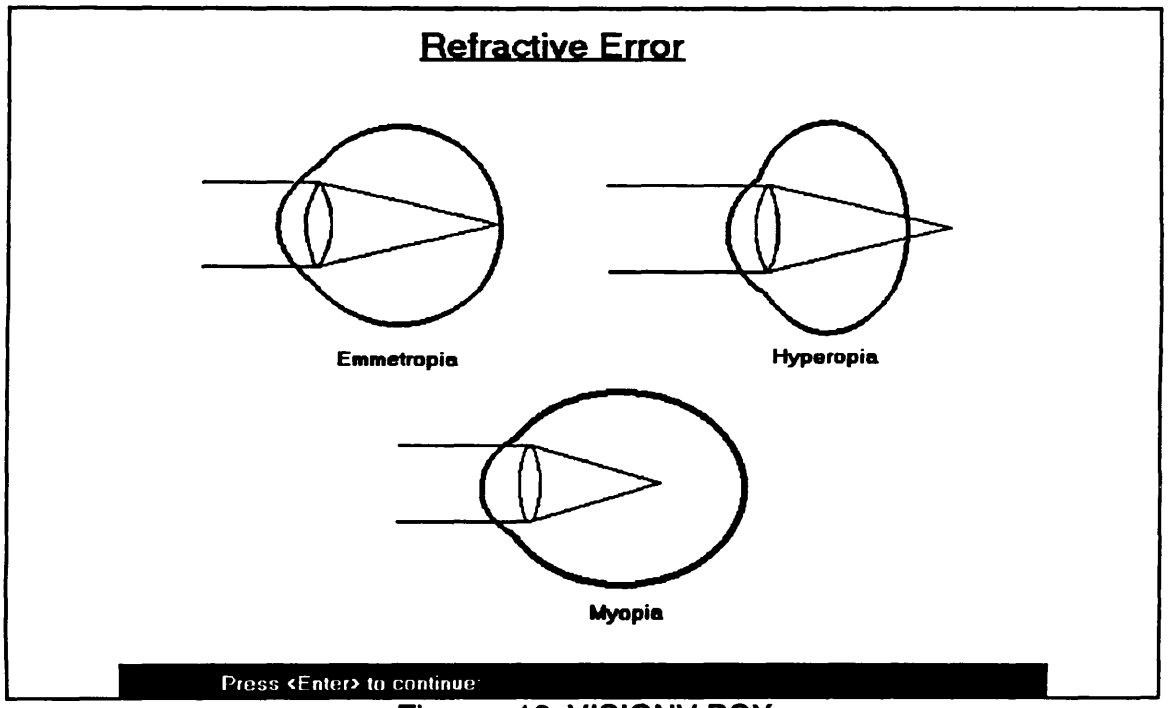


Figure - 12. VISIONV.PCX

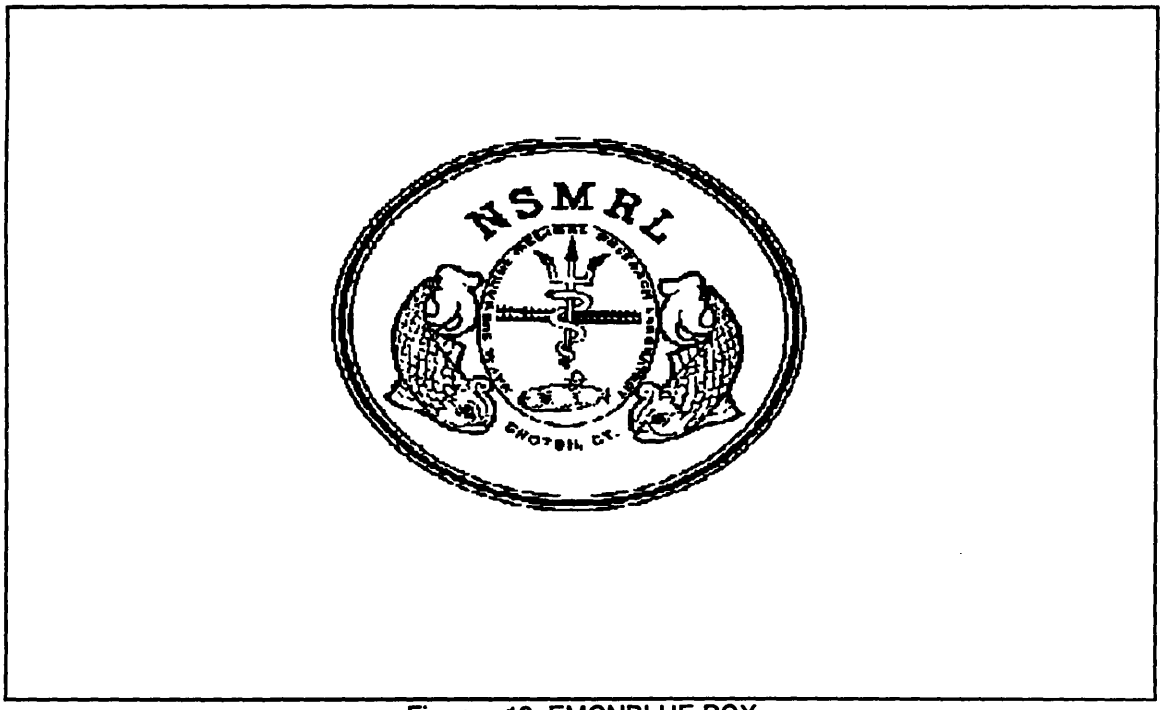


Figure - 13. EMCNBLUE.PCX

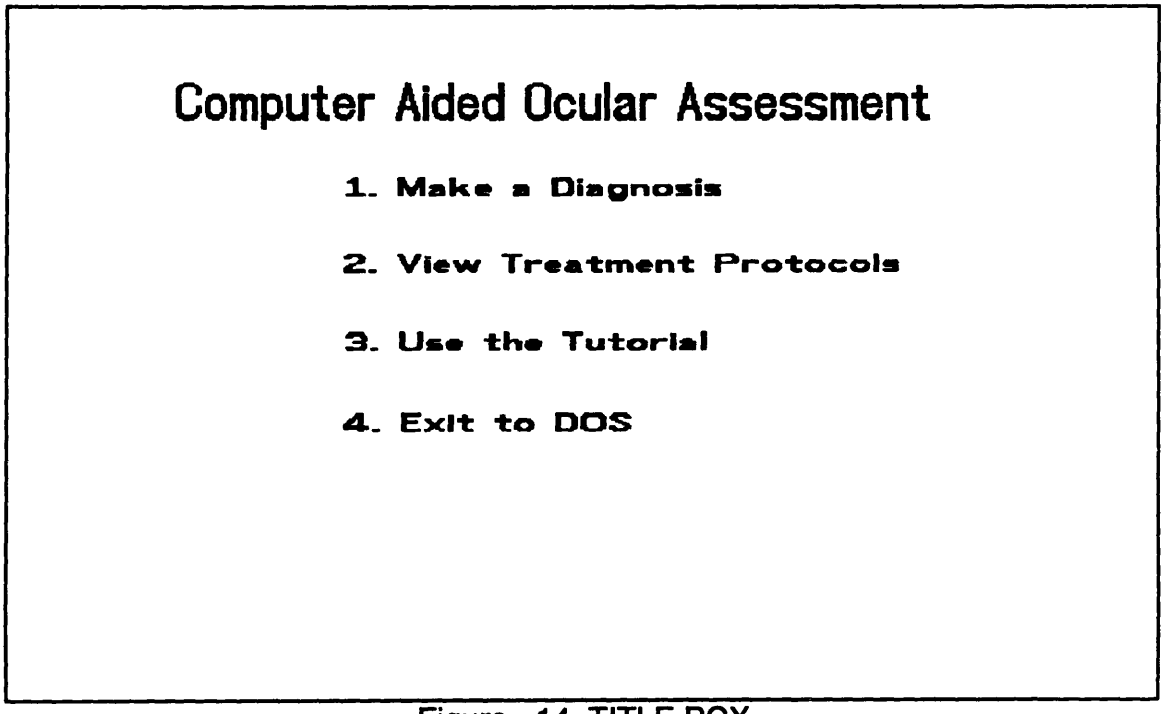


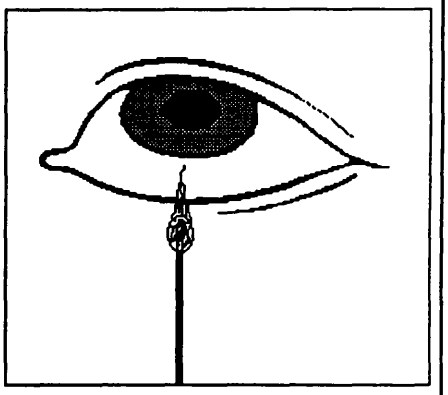
Figure - 14. TITLE.PCX

Corneal Sensitivity Measurement

1. Pull and twist the tip of a cotton tipped applicator to form a fine strand of cotton fiber.

2. Have your patient look upward. Try to keep the applicator out of your patient's view as you gently touch the fiber tip to the inferior cornea of the unaffected eye. Note your patient's response. Repeat the procedure for the affected eye.

3. Ask your patient to compare the sensation between his two eyes. Herpes simplex usually causes reduced sensitivity in the affected eye.



Press <Enter> to continue

Figure - 15. CORNSNS.PCX

Dendridic Keratitis

The classic sign of a recurrent herpes simplex infection of the eye is dendridic keratitis. This type of keratitis is characterized by a branching pattern with club shaped end bulbs. Fluorescein stains the affected parts of the cornea, highlighting the dendritic pattern. Sometimes atypical staining patterns occur with ocular herpes infections. These include geographic or map-like patterns and superficial punctate (pinpoint) keratitis.

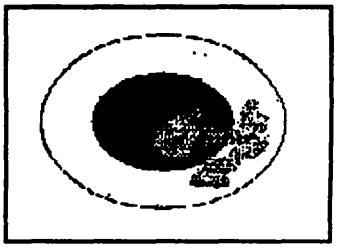


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Figure - 16. DENDRIT.PCX

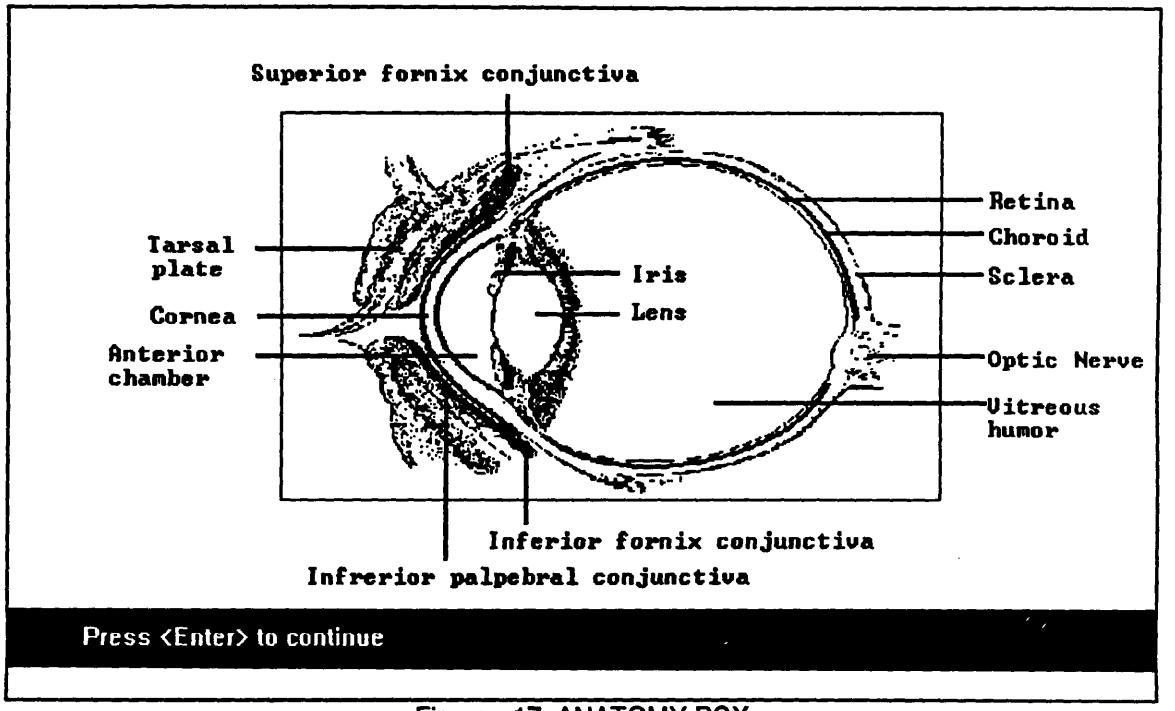
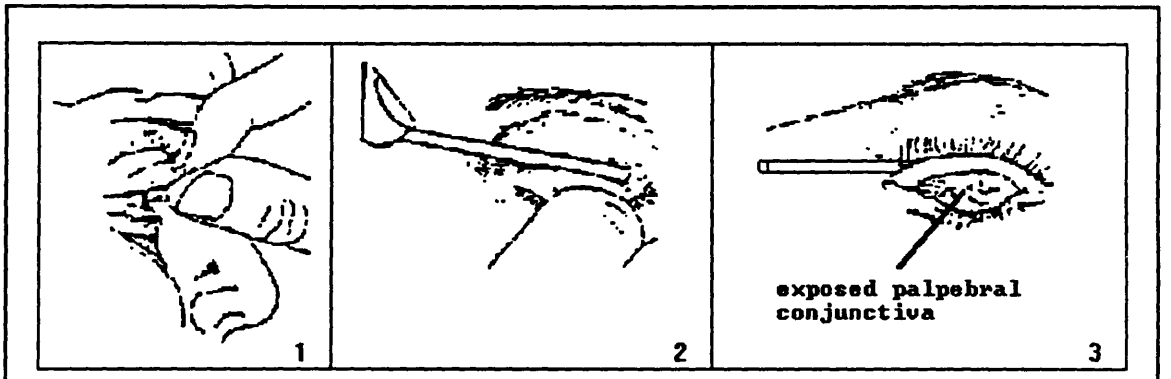


Figure - 17. ANATOMY.PCX



1. Have your patient look downward; grasp the upper lashes and pull the upper lid away from the globe
2. Use a cotton tipped applicator to apply pressure along the superior part of the lid
3. Flip the upper lid over the applicator, exposing the under surface of the lid

Press <Enter> to continue

Figure - 18. EVERSION.PCX

Foreign Body Tracking Stain

A zig-zag staining pattern, such as the one shown to the right, usually indicates a foreign body under the upper eyelid. As the lid moves up and down with each blink, and the eye moves left and right, the foreign body is dragged across the cornea, causing this characteristic staining pattern.

After the foreign body is located and removed, treatment for the corneal abrasion is indicated.

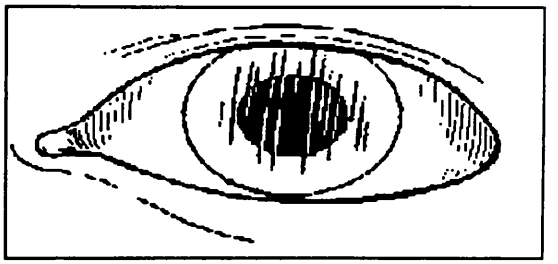


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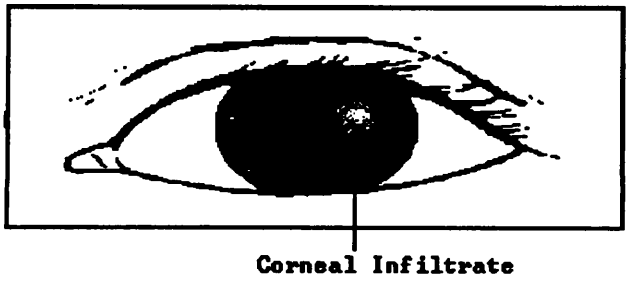
Figure - 19. FBTRACK.PCX

Corneal Infiltrates



Corneal Infiltrate

Corneal infiltrates can occur anywhere on the cornea. Because they are often indicators of corneal ulceration, they must be treated with great care, especially in the isolated submarine environment.

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Figure - 20. INFILT.PCX

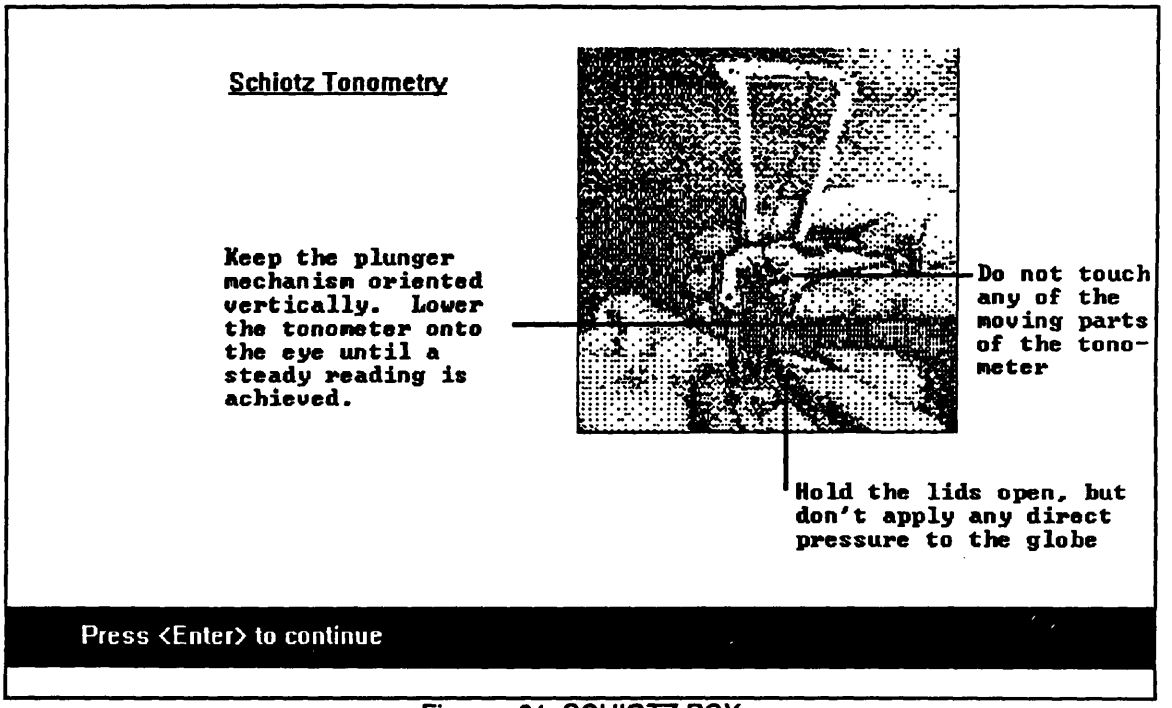

Figure - 21. SCHIOTZ.PCX

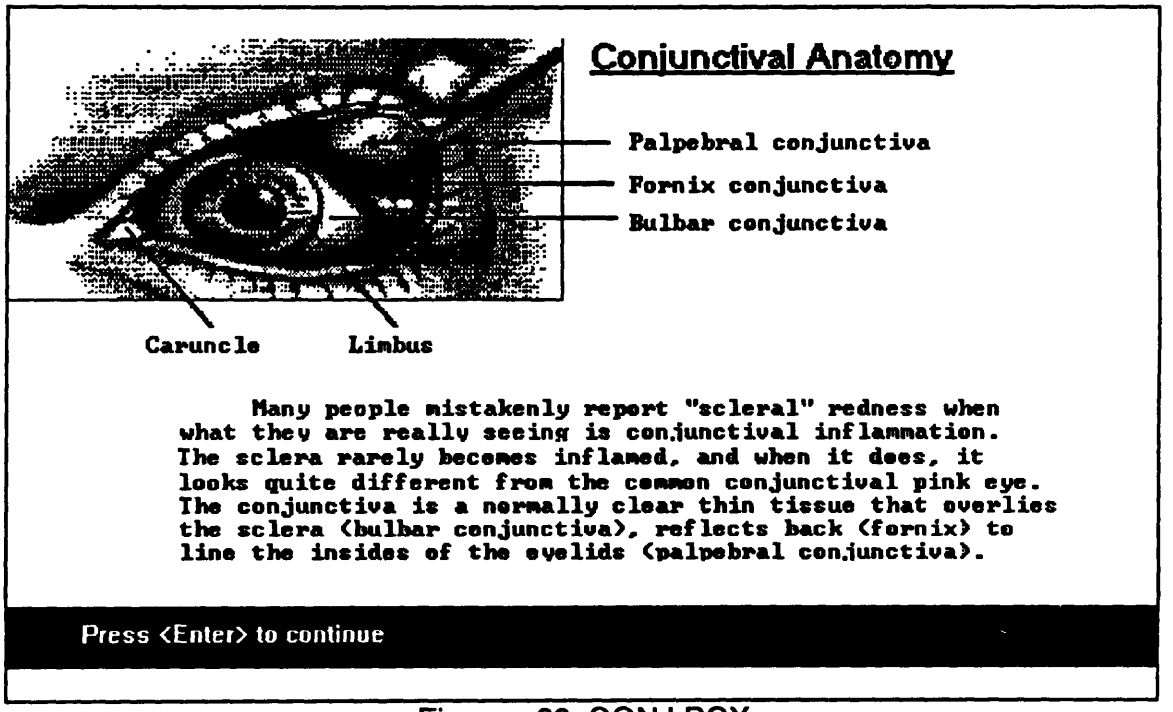

Figure - 22. CONJ.PCX

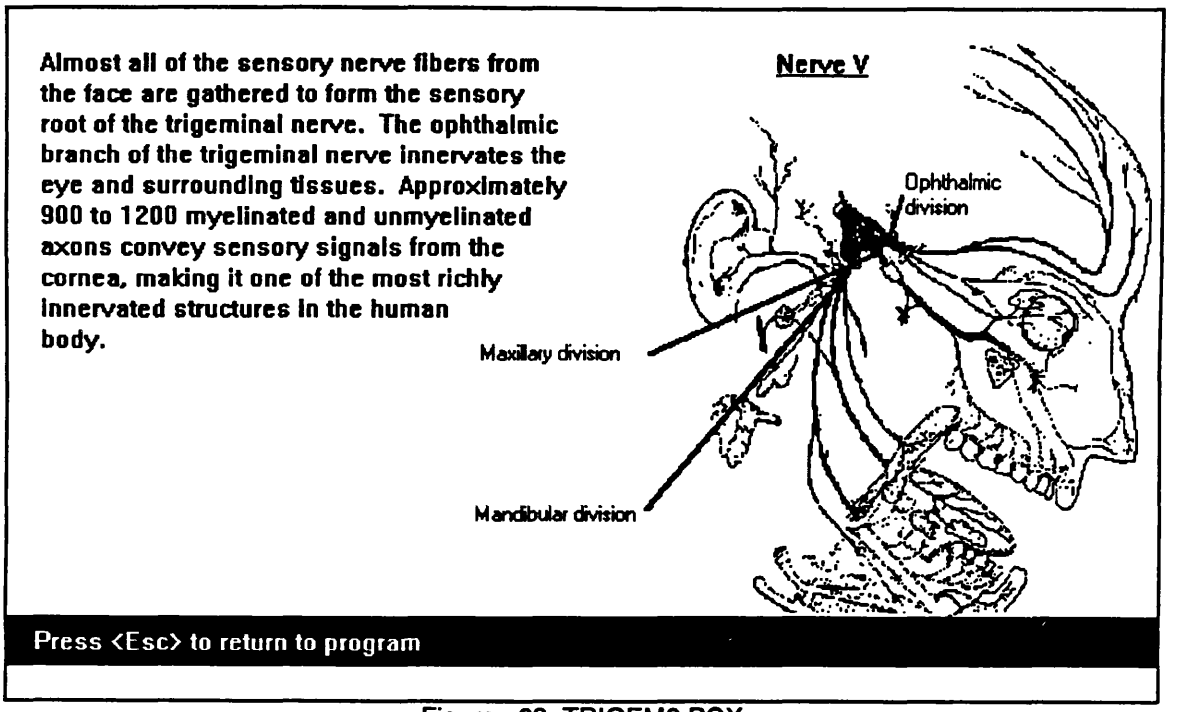

Figure - 23. TRIGEM2.PCX

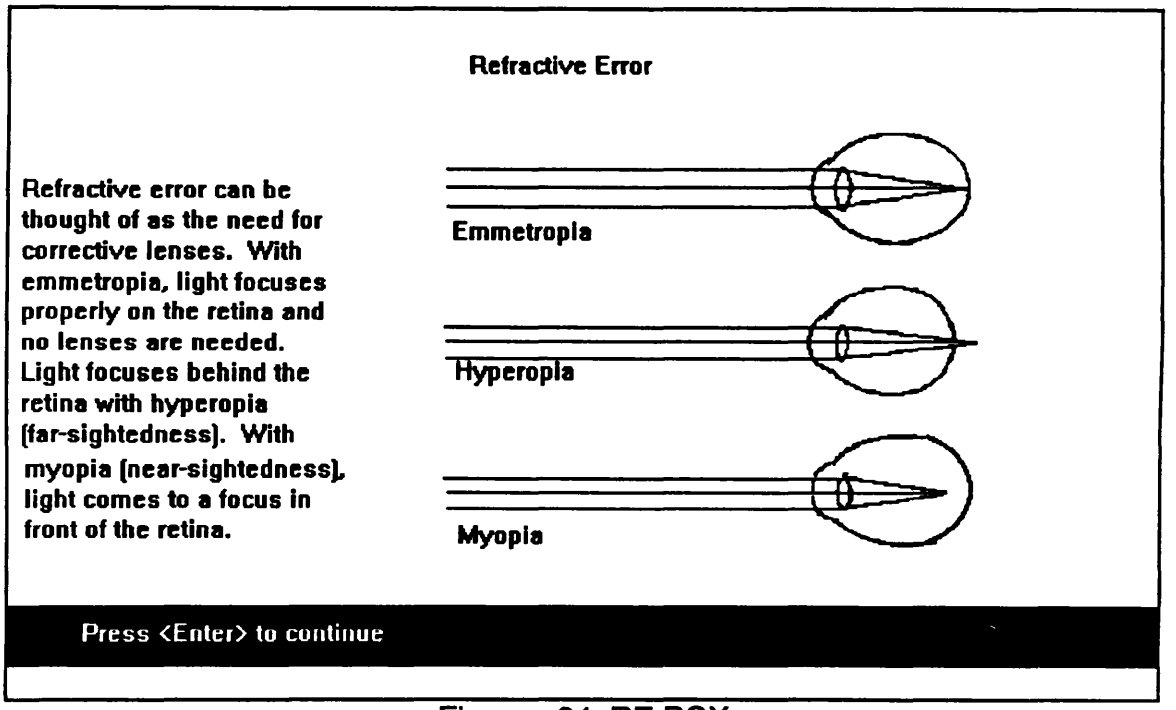

Figure - 24. RE.PCX

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Computer Aided Ocular Assessment (CAOA) is a computer program designed to aid submarine Independent Duty Corpsmen with the diagnosis and treatment of eye disease. This manual serves as a programmer's reference for the program. It provides complete documentation of all of the program's source code. In addition, selected portions of the code are thoroughly explained.

Expertise with the Exsys Professional expert system development package is required to use this manual effectively.

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