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MEDIC - ABDOMINAL PAIN

A decision support program for the management of acute abdominal pain

USER'S MANUAL

by

LT Barclay G. Caras, MC, USNR
LCDR David G. Southerland, MC, USNR
Karen D. Fisherkeller

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Released by:

R. G. Walter, CAPT, DC, USN
Commanding Officer
Naval Submarine Medical Research Laboratory

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NAVAL SUBMARINE MEDICAL RESEARCH LABORATORY

NSMRL REPORT NO. 1146

Naval Medical Research and Development Command
Research Work Unit 62233N - MM33C30.002-5004

Approved and Released by

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Commanding Officer
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Approved for public release; distribution unlimited.

SUMMARY PAGE

THE PROBLEM:

To provide a user's manual for the Acute Abdominal Pain Diagnostic Program (ABDOMEN) for the user unfamiliar with computers.

THE FINDINGS:

The manual contains introductory information, a description of equipment needed, an overview of the different parts of the system, a tutorial, a list of treatment protocols, a list of definitions, and a sample data sheet.

APPLICATION:

This manual will enable a corpsman unfamiliar with computers to use the decision support program without the need for supplementary training.

ADMINISTRATIVE INFORMATION

This investigation was conducted under Naval Medical Research and Development Command Research Work Unit 62233N-MM33C30.002-5004. It was submitted for review on 28 August 1989, approved for publication on 11 October 1989, and has been designated as Naval Submarine Medical Research Laboratory Report No. 1146.

ABSTRACT

This user's manual is designed to accompany the MEDIC - ABDOMINAL PAIN PROGRAM for MS-DOS computers. The manual contains introductory information, a description of equipment needed, an overview of the different parts of the system, a tutorial, a list of the treatment protocols, a list of definitions, and a sample datasheet.

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APPENDIX A. TREATMENT PROTOCOLS

APPENDIX B. DATA SHEET DEFINITIONS

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1. INTRODUCTION

1.1 Historical Perspective

On board the submarine, you, the Independent Duty corpsman, are responsible for the diagnosis and treatment of patients who present with serious illness during the patrol. In most cases, patients can be managed safely aboard the submarine. However, for some life-threatening illnesses it is your responsibility to recommend evacuation of the patient to shore-based facilities. The decision to evacuate is potentially dangerous for the patient and costly in terms of the monetary expense of the evacuation and possible compromise of the submarine's mission. Your decision is complicated by limited laboratory facilities and by mission constraints which often prevent communication with shore-based facilities.

A computer based medical support system has been developed to assist you in the diagnosis and management of patients who present during the patrol. When completed, the system will consist of this program and programs for acute chest pain, dental complaints, ophthalmology, psychiatry, and trauma. Each program will provide you with diagnostic and treatment suggestions based on the signs and symptoms entered into the computer. The purpose of the system is to assist you in differentiating between cases that require MEDEVAC and those that may be managed aboard, and provide guidance for the treatment decisions made by you, the corpsman.

1.2 Theoretical Basis and Limitations of the Program

Unlike their human diagnostician counterparts, diagnostic computer programs cannot think. The conclusion reached by the computer is based on a statistical analysis. In fact, the computers diagnosis is expressed as a percentage probability. The program, by analyzing the presenting signs and symptoms, predicts the relative likelihood of six different diagnoses for males and eleven (including five GYN) diagnoses for females, based on a statistical analysis of records of real patients presenting for emergency care.

The diagnoses considered by the computer represent a specific subset of the diagnoses that the provider must consider when a patient presents with the complaint of abdominal pain. The program will provide assistance in identifying the most common dangerous causes of acute abdominal pain. The program may seem to overlook certain life-threatening disorders.

This program is written specifically for disorders that present with pain. Remember, a patient can present with a catastrophic G.I. bleed without the presence of pain. Always rule out bleeding independently of the programs usage. The program will be of limited value in evaluating patients with bleeding unless they also have abdominal pain that is of unclear etiology.

You, the corpsman, must rely on your clinical judgment and expertise both in deciding to use the program and in interpreting the results of the computer analysis. The program will tend to lump diagnoses into categories and lacks the ability to differentiate between diagnoses in a given category. Additionally, the computer cannot tell you that it "doesn't know" the answer, it will always make a diagnosis once a minimum number of responses have been entered. A wide experience of patient contacts went into the program's database, producing a diversity of presentations. However, just as some atypical presentations confound human providers, they may limit the computer's certainty. The computer's "confidence" in a given diagnosis is expressed as a percentage - see above and Section 4.

The definitions of terms listed on the history and physical pages (and Appendix B) are intended for use in the context of the program. In some cases, they may differ from the traditional usage or your training. Additionally, some terms may seem to be included in an inappropriate category. This is due to the nature of the statistical analysis performed by the program and the way it weighs different findings in relation to one another. Do not use Appendix B in place of a medical dictionary or a physical examination text. HOWEVER, it is important that you and the computer are "speaking the same language," so familiarize yourself with the program's terminology.

1.3 Treatment Protocols

The Abdominal Pain Program treatment protocols were written and subsequently revised based on the most current treatment recommendations. In all cases, every effort was made to write protocols that are reasonably within the capabilities of you, the Independent Duty Corpsman. When applicable, they are consistent with Force Medical instruction and higher authority. A thorough review of current Authorized Medical Allowance Lists (AMAL) for submarines and surface ships was conducted to insure the availability of recommended medications. Completed protocols were reviewed and edited by a General Surgeon and a Gynecologist familiar with the limitations of medical care at sea.

1.4 Purpose of the Manual

The purpose of this manual is to train you, the corpsman, in the use of the computer based abdominal pain medical support program. Use of the program is predicated on training for duty as an independent corpsmen and mastery of the knowledge and skills required to take a history and conduct an examination for the indicants used by the program. The manual is written for the person with little or no prior experience with computers. After reading the manual, the user should be able to use the program without the need for supplementary training.

The manual is divided into five sections. Section 1 describes the history and the theoretical basis of the computer based decision support system. Section 2 lists the hardware and software

requirements, the disk contents, how to load and start the program, and important keys. Section 3 discusses the diagnostic categories, when to use the program, and the abdominal pain data sheet. Section 4 describes actual use of the medical support program including a detailed description of each module: the diagnostic module, the training module, and the SF-600 generation module. The fifth section is a step by step tutorial, taking the user through a case from loading the program to reviewing the treatment protocol.

In addition, there are three appendices. Appendix A contains the treatment protocols and includes a discussion and differential diagnosis; Appendix B lists definitions of each term used on the datasheet; a reproduction of the abdominal pain data sheet is given in Appendix C. The text of Appendices A and B are also included in the program as the "DISPLAY TREATMENT" and the "HELP / ?" function respectively. It is important to read through the entire manual and to be familiar with all aspects of the abdominal pain program before using it clinically.

2. GETTING STARTED

2.1 Equipment Needed

To use the Abdominal Pain Medical Support Program as supplied, you must have an IBM PC or IBM PC-compatible system with the characteristics outlined below.

2.1.1 The Computer

The computer should be "IBM-compatible," and the operating system must be MS-DOS version 2.0 or higher, or a comparable version of PC-DOS.

The Abdominal Pain Medical Support Program will not run on the Zenith-100 series microcomputers (Z-100 and Z-120) unless a special circuit board has been installed. Note that while the Z-100 series will not run the program, the Z-100 PC series computers will. As a general guide, Zenith computers with movable or detachable keyboards are IBM compatible, while those which have the keyboard built in are not IBM compatible unless they have been modified.

2.1.2 Hard Drive

The program is designed to be installed onto a hard drive (fixed disk).

2.1.3 Graphics Capability

To run the program, the computer must have a color graphics adapter (CGA) or equivalent. (Note: Most enhanced graphics adapter (EGA) boards have a CGA mode.) A color monitor is not necessary.

2.1.4 Memory Requirements

Most IBM compatible microcomputers now come with at least 512 kilobytes of random access memory (RAM). This is more than enough memory for using the program.

2.1.5 The Printer

The use of a printer is optional. Cases can be entered and stored without it. However, a printer is useful for making hard (printed) copies of written information displayed and for utilizing the SF-600 capability of the program.

2.2 Disk Contents

You will be supplied with at least one copy of the abdominal pain medical support program. This is the original disk. After installing the program, store this disk in a safe place and do not use it unless your working copy of the program becomes damaged.

2.3 Installing the Abdominal Pain Program

Follow the steps listed below to install the program on your hard drive.

Insert the original disk into external drive A. Type **"a:install"** and press "ENTER". A number of prompts will appear on the screen, enter the information requested.

"Enter the letter of the hard drive on which the program is to be installed: (D)". This indicates that the default drive is D. If you want the program installed on the drive D hard drive, press "ENTER". If you wish to designate another drive, enter the appropriate letter and press "ENTER".

"Enter the name of the subdirectory." The subdirectory is the location on the hard disk where the program is stored. We suggest you use the name "Abdomen", but you can name the subdirectory anything you want. Enter the name and press "ENTER" the subdirectory will automatically be created.

"Is the above information correct (Y/N)." Enter your response and press "ENTER". The program will now be installed onto the specified hard drive in the subdirectory you have named. "Installation complete" will be displayed.

2.4 Starting the Program from a Hard Drive

The program has been installed in such a way, that typing "Abdomen" from any directory or drive will start the program. Return to the DOS prompt (eg: C>) and type "Abdomen" and press "ENTER".

2.5 Disk Backup

A backup is a separately stored copy of all of the data on a disk.

2.5.1 Why Make Backups

Backups ensure that your programs and data are always available to you. If a disk surface is damaged, the information on the damaged portion of the disk may be lost. This damage can occur as a result of poor disk quality, rough handling, disk age, heavy use, electrical "glitches" in the power supply, or other events that subject a disk to strong physical or electromagnetic forces.

2.5.2 How to Make a Backup

To make a backup, you must first format a floppy disk. Follow the steps in your computer and DOS manuals. Label the disk "Abdominal pain - real case data - backup" or with any other appropriate label. Once you

have information stored on the disk, do not format it again as doing so will erase the data you have stored.

Place the formatted disk in the external drive (probably drive A) and type the command "Abdbkup" at the DOS prompt. "Copy Complete" will be displayed when the backup is complete.

Make backups frequently enough to avoid losing large amounts of data.

2.6 Important Keys

To use the program effectively, you must become familiar with several keys that are used often. The names of keys available for use are usually listed at the bottom of the display screen. The following is a short description of the use and possible locations for certain commonly used keys. If you cannot find the keys, consult your computer users manual for their location.

2.6.1 Question Mark Key

The question mark key, "?", is used to obtain help throughout the program. For example, pressing the question mark key while on one of the history or physical examination pages will give the definition for the sign or symptom highlighted by the cursor (highlighted bar).

2.6.2 Arrow Keys

The arrow keys are usually found on the numeric keypad at the right of the keyboard. To use these keys, you must first ensure that the numeric keypad lock key (NumLock) is set. The NumLock key toggles back and forth from using the keypad for the arrow and other special keys to using the keypad for entering numbers. Some computers do not have a numeric keypad. If this is the case, then consult your computer user's manual for information on the locations and labels of special keys.

2.6.3 Return/Enter Key

This is actually one key. On some computers it is labeled as "Return" and on others as "Enter". It is usually a large key just to the right of the conventional typewriter keyboard. This key is used to tell the computer that you are through typing and that the computer is to take the information just typed and use it in the program.

2.6.4 Tab Key

The Tab key is normally found in the same position as on a typewriter. The Tab key has a special function in the data entry section of the abdominal pain diagnostic program. When the key is pressed, the cursor will jump to the first item of the next question. If the cursor is on the last question of the display page, pressing the

tab key will move the cursor to the first question on the page.

2.6.5 Ctrl-Break Key

Ctrl-Break is accomplished by simultaneously pressing the Ctrl key and the Break key. The Ctrl-Break key is used to abort the running program. This is an indirect way of exiting the program. After pressing the Ctrl-Break key, you will be asked if you want to terminate a batch job. Reply by pressing the "N" key. The screen will be blanked and you will return to the MS-DOS prompt. The Ctrl-Break key should not be used routinely to exit the program.

2.6.6 Miscellaneous Keys

Several alphanumeric keys are also used as command keys. These are the letters "N", "P", and "X". These keys are used to move within a defined group of pages such as a treatment protocol.

The "P" key is used to take you to the previous page. If you are on the first page, you will be returned to the previous menu.

The "N" key is used to take you to the next page. If you are on the last page, you be returned to the previous menu.

The "X" key is used as an exit. It will return you to the previous menu.

3. GENERAL ASPECTS OF THE ABDOMINAL PAIN DECISION SUPPORT PROGRAM

3.1 Diagnostic Categories

The diagnostic program is not intended to diagnose all causes of acute abdominal pain. Instead the program helps you to diagnose five serious causes of abdominal pain in males aged 17 to 70: acute appendicitis (APPEND), renal colic (RCOLIC), perforated duodenal ulcer (PERFDU), cholecystitis (CHOLE), and small bowel obstruction (SMBOBS). In addition, a sixth category, nonspecific abdominal pain (NONSAP), is included to represent those entities which are non-surgical, not life-threatening, and, therefore, not reasons for medical evacuation. Five additional categories are included for female patients. These are: pelvic inflammatory disease (PID), urinary tract infection (UTI), ovarian cyst (OVCYST), ectopic pregnancy (ECTOPI), and incomplete abortion (INCAB). These categories encompass the vast majority of the causes of serious abdominal pain in the target population. A discussion of each diagnostic category is presented as part of the corresponding treatment protocol which can be displayed from within the program. The treatment protocols are also printed in Appendix A.

3.2 When to Use the Abdominal Pain Diagnostic Program

The computer aids you by storing information on the presentation of hundreds of cases of abdominal pain. It rapidly sorts data, and performs statistical analyses. However, the computer lacks the ability to think. It is the responsibility of you, the corpsman, to rely on your clinical judgment and expertise in deciding when to use the program and in making the final diagnosis.

The Abdominal Pain Diagnostic Program is intended for use with a population between the ages of 17 and 70 who are experiencing abdominal pain of less than 48 hours in duration. The program will only consider 37 questions in diagnosing the patient. Massive hematemesis or a stab wound to the abdomen would have great impact on your diagnosis and treatment of the patient, but these would not be considered by the program in making its diagnosis. Therefore, you must also rely on your clinical judgment and expertise in interpreting the results of the computer interaction just as you must interpret a pulse rate or mental status examination.

<u>You, the corpsman, must rely on your own clinical judgment and expertise both in deciding to use the program and in interpreting the results of the computer's analysis.</u>

3.3 Abdominal Pain Data Sheet

The abdominal pain data sheet provides the corpsman with a guide to use in performing the history and physical examination. The history portion of the data sheet is shown in Figure 3-1. Findings on the history and physical exam categories are used by the computer program to arrive at a diagnosis. When a patient presents with abdominal pain, the corpsman should first conduct a history and physical exam and record his findings on the abdominal pain data sheet. Later, the corpsman enters the case into the computer, transferring the information recorded on the data sheet into the computer. A full size reproduction of the abdominal pain data sheet is provided in Appendix C.

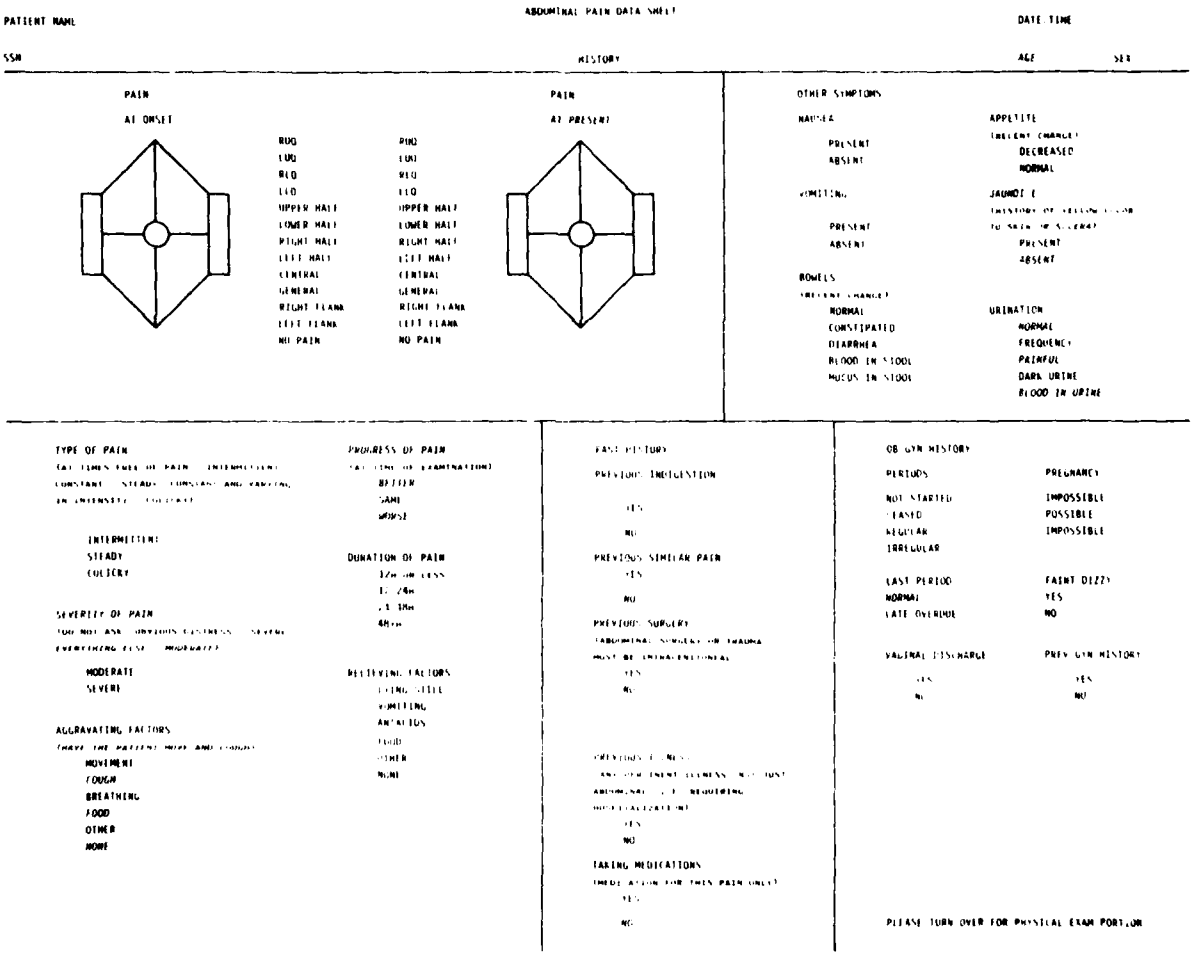

Figure 3-1 History Portion of the Abdominal Pain Data Sheet

3.4 Symptom Category Definitions

The accuracy of the diagnostic program is dependent on the accuracy of the data collected by you, the corpsman. You must adhere to standardized definitions and methods of data collection in completing the abdominal pain data sheet. All information that can be gathered must be evaluated and entered as specified in Appendix B. Definitions may also be accessed from within the diagnostic program.

The definitions listed in Appendix B are intended for use in the context of the program. In some cases they may differ from the traditional usage or your training. Additionally, some terms may seem to be included in an inappropriate category. This is due to the nature of the statistical analysis performed by the program and the way it weighs different findings in relation to one another. Do not use this section in place of a medical dictionary or a physical examination text. HOWEVER, it is important that you and the computer are "speaking the same language", so familiarize yourself with this section.

4. ABDOMINAL PAIN PROGRAM MODULES

The abdominal pain decision support program is divided into three primary modules: the main diagnostic module, the training module, and the SF-600 generation module. Each of these modules will be discussed in order.

4.1 Overview of the Main Diagnostic Module

This module contains the diagnostic program for evaluation of real and simulated cases. To load the abdominal pain diagnostic program follow the directions given in Section 2.4 - Starting the Program.

4.1.1 Customization Page

The first time you run the program you will be asked to enter the name of your boat, the boat's hull number, your name, and your SSN. This page will be displayed only if the information has not been previously entered. To continue to the next display page, follow the directions at the bottom of the display screen and press any key. Throughout the program, directions can usually be found at the bottom of the screen.

If the information displayed on the title page is incorrect, or you wish to change the name of the provider, exit the program and return to the MS-DOS screen. Type the following exactly as it appears between the quotes at the "A>" prompt: "del ship.dat" and press "ENTER". This will delete the previously entered information. When you restart the program it will again ask you for the identifying information. If you wish to change the input on your monitor enter "del abdgraph.dat" at the prompt.

4.1.2 The Title Page

Once the disk has been loaded and the "ABDOMEN" command given (see Section 2.4), the title page will appear on the screen (see Figure 4-1).

The Title Page contains the name of the diagnostic program and the address and phone number of the program developers. Please forward any problems or questions regarding the Abdominal Pain Diagnostic Program to:

Naval Submarine Medical Research Laboratory,
Naval Submarine Base New London, Box 900
Groton, CT 06349-5900.

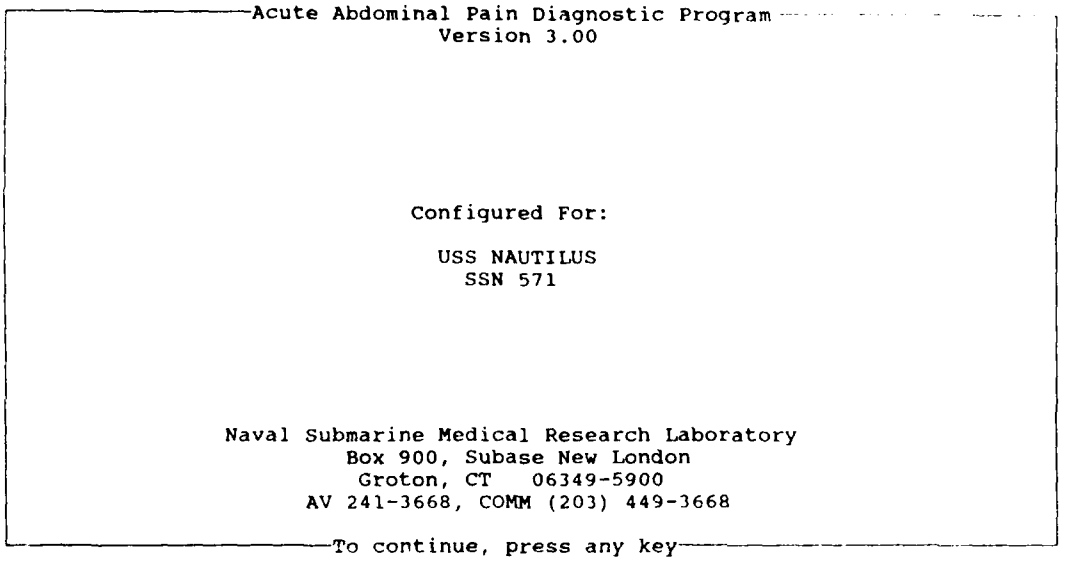

Figure 4-1 Title Page of the Abdominal Pain Diagnostic Program

Pressing any key, takes the user to the disclaimer page.

4.1.3 The Disclaimer Page

This page is displayed after the title page. The disclaimer page is a very brief summary of the program including a statement which once again emphasizes that your judgment takes precedence over the computer's diagnosis when any doubt exists. Read this page before going on.

4.1.3.1 Privacy Act Statement

Some information stored automatically by the program is subject to the Privacy Act of 1974. Just as with a Health Record, you are bound to safeguard privileged patient information stored on disk from unauthorized or unnecessary disclosure.

4.1.4 The Main Options Page

The Main Options page provides a menu giving the user 9 program options (see Figure 4-2).

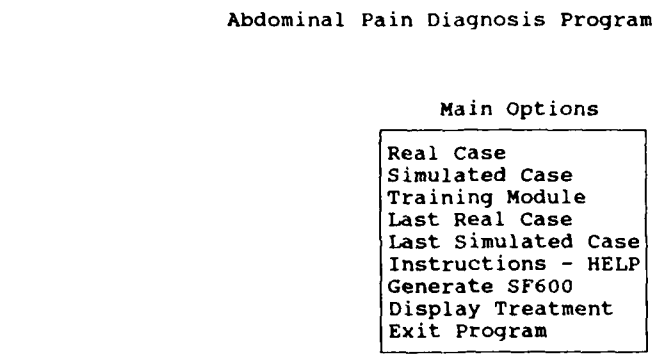

Figure 4-2 Main Options Page

4.1.4.1 Real Case

This option is selected when the user wants to enter the signs and symptoms and obtain a computer-based diagnosis for an actual patient. Real cases are stored on the disk in a way so that they can be printed in a narrative form on a SF-600.

4.1.4.2 Simulated Case

The simulated case option should only be used for training purposes. It allows the user to make up history and physical exam findings and to see how changes in symptom entries affect the computer diagnosis. Both real and simulated cases entered into the computer are stored on the disk, but only real cases are stored in a way that allows SF-600 medical record entries to be printed.

4.1.4.3 Training Program

The training program presents patient narratives. Based on the narrative, you will complete a data sheet, enter the findings, make a diagnosis, and compares your diagnosis to the computer derived diagnosis. Additionally, the findings you enter are compared to the computers information on the case and scored for accuracy.

4.1.4.4 Last Real Case

Selection of this option will result in the retrieval of the last real case entered by you into the computer. This option will allow you to review the signs and symptoms for the last case. Also, if you are performing serial exams, you can update a copy of the last exam instead of having to re-enter the entire case each time. Be sure to update the date and time when performing serial exams (see Section 4.1.5.4). Real cases prior to the last real case cannot be retrieved except as part of the SF-600 generation module.

4.1.4.5 Last Simulated Case

This option retrieves the last simulated case entered by you into the computer. Simulated cases prior to the last simulated case cannot be retrieved by the user.

4.1.4.6 Instructions HELP

The instructions consist of three pages of general background information on computer-assisted diagnosis of abdominal pain.

4.1.4.7 Generate SF-600

Select this option to run the SF-600 generation program. This program creates patient medical narratives based on the signs and symptoms entered for real cases. It is discussed in detail in Section 4.3 - Overview of the SF-600 Generation Module.

4.1.4.8 Display Treatments

This option provides a menu of the treatment protocols for each of the six diagnostic categories (seven in the gynecological database). Select the category of interest, and the treatment protocol will be displayed. The Display Treatments menu option is also available from the Diagnostic Summary Page.

4.1.4.9 Exit Program

Select this option to end your interaction with the computer. Use of the program should always end with selection of either this option or the End Interaction option on the Diagnostic Summary Page. Ending your interaction with the program in any other way risks both the loss of case data and damage to, or loss of, the program.

4.1.5 Data Entry Options Page (Real Case Example)

In order to enter a real case, use the arrow keys to move the cursor to the REAL CASE option and push the "ENTER" key. Once this option is selected the computer requests the patient's sex, age, social security number, and confirmation of the date and time of the exam. If you enter an age which is outside the limits of the program (less than 17 or greater than 79), the program warns you and asks you to re-enter the patient's age. If either the date or time of the examination is in error, you should make appropriate corrections.

Next, you proceed to the Data Entry Options Page (Figure 4-3). The options are: GO TO HISTORY PAGES, GO TO PHYSICAL EXAM PAGES, MAKE DIAGNOSIS, GO TO SSN/AGE/TIME PAGE.

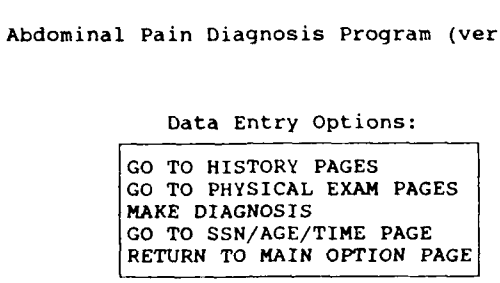

Figure 4-3 Data Entry Options Page

4.1.5.1 Go to History Pages

You select this option to proceed to the history section of the abdominal pain data sheet. There are four history pages (five for female patients) which replicate the paper and pencil form of the abdominal pain data sheet. The second page of the history section is shown in Figure 4-4. In entering symptom data, follow the instructions in the following sections: Data Entry; Moving the Cursor; Proceeding to Next or Previous History Pages; Correcting Errors; and Definition of Symptom Categories.

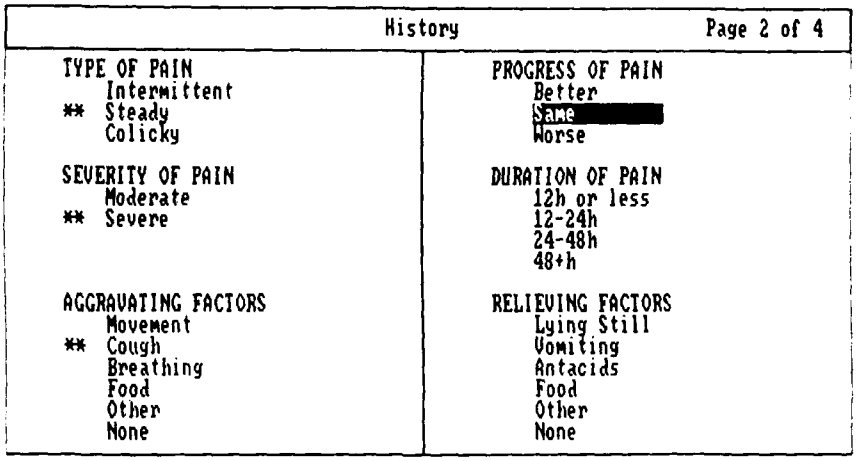

Figure 4-4 Data Sheet Page from the History Section

Data Entry: To enter history symptoms into the computer, move the highlighted bar (the CURSOR) to the desired response and press the "ENTER" key. Symptoms that have been entered into the computer are marked with a double asterisk. Data need not be entered sequentially. You can move back and forth between categories on one page or from page to page.

Moving the Cursor: The position of the cursor is controlled by the arrow keys (UP, DOWN, LEFT, RIGHT), by a corresponding letter key ((U)P, (D)OWN, (L)EFT, (R)IGHT), and by the "TAB" key. The arrow and letter keys move the cursor through each response in the specified direction. The "TAB" key moves the cursor to the initial response of the next category.

Proceeding to Next or Previous Pages: Press 'P' to return to the (P)revious page. Press 'N' to proceed to the (N)ext display page. Pressing 'P' or 'N' while on the first or last data sheet pages respectively will return the user to the previous menu.

Correcting Errors: Errors made in data entry can be corrected in one of two ways.

1. If the responses within a symptom category are mutually exclusive (only one answer is logically possible), move the cursor to the desired response and press the "ENTER" key. The symptom entered in error is removed and the desired response is starred.

2. Any symptom can be removed by placing the cursor on it and pressing "ENTER". The asterisk marking the response will vanish and the entry has been omitted. Use this method for categories where more than one response is possible.

Definition of Symptom Categories: Detailed definition of symptom categories can be obtained by placing the cursor on the symptom in question and pressing the '?' key. The definition of the symptom category will be displayed. An example is shown in Figure 4-5. Pressing any key from within the definition section will return the user to the data page.

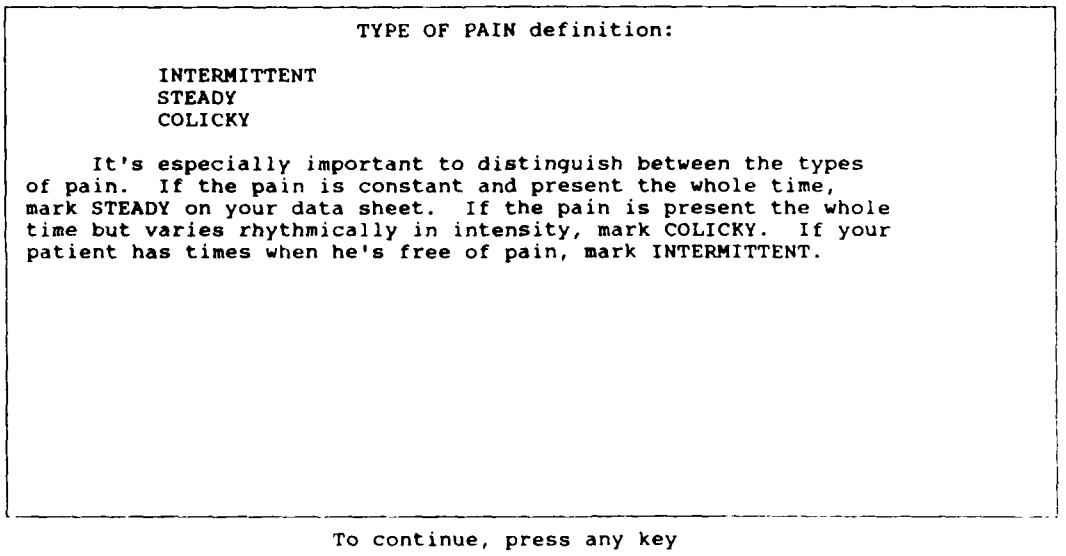

Figure 4-5 Symptom Category Definition for Type of Pain.

4.1.5.2 Go to Physical Exam Pages

You select this option on the Data Entry Option page to proceed to the physical exam section of the abdominal pain data sheet. There are 4 pages of physical exam findings that correspond to the physical exam portion of the data sheet. The first page of the physical exam section is shown in Figure 4-6. Follow the same rules as outlined for entering the history data.

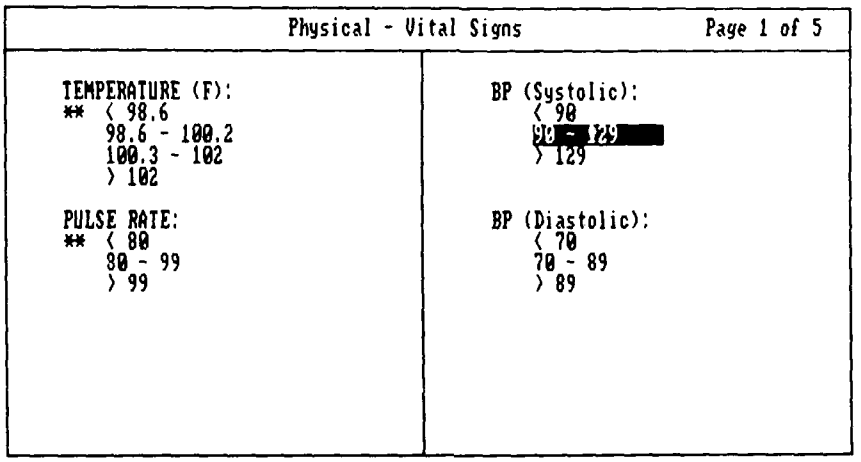

Figure 4-6 Data Sheet Page from the Physical Exam Section

4.1.5.3 Make a Diagnosis

You select this option to obtain a computer-generated diagnosis based on the symptom information entered into the computer. A minimum number of items must be completed for the program to work. If that number is not supplied, you are asked to enter more history and physical exam data. If the minimum number of items has been entered, the program proceeds to the Corpsman's Diagnosis page (see Section 4.1.6). If the patient is female, you will first have to select between the General Abdominal Database and the Gynecological Database. The computer will indicate that either, the Gynecological Database is "especially suitable", or that the pain appears to be "non-gynecological", based on the presenting history and exam. In both cases there will be a "SELECT DATABASE" menu, shown in Figure 4-7, prior to the Corpsman's Diagnosis page (see Section 4.1.6.1).

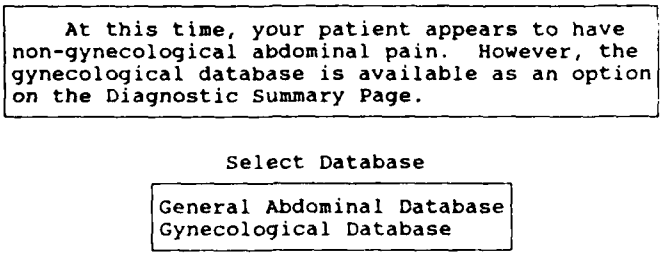

Figure 4-7 The Database Selection Menu

4.1.5.4 Go to SSN/Age/Time Page

Select this option to change the age, sex or SSN of the patient, or update the date or time of the evaluation of the patient.

4.1.5.5 Return to Main Options Page

Choose this response to return to the Main Option Page.

4.1.6 Corpsman's Diagnosis Page

The Corpsman's Diagnosis Page (Figure 4-8) asks you to enter the abdominal pain diagnosis which you believe to be most likely. You are asked to enter your diagnosis whenever you enter a new case or make changes to a previous case. You select from the six male or seven female diagnoses or "other". If "other" is selected, the program asks for the diagnosis to be typed in.

Corpsman's Diagnosis Entry Page

Your Diagnosis

APPENDICITIS
NON-SPECIFIC ABDOMINAL PAIN
RENAL COLIC
PERFORATED DUODENAL ULCER
CHOLECYSTITIS
SMALL BOWEL OBSTRUCTION
OTHER

Use the arrow keys to move the cursor to the desired position. Push RETURN to select the desired response or '?' for more information.

Figure 4-8 Corpsman's Diagnosis Page (General Database)

The computer will compare the diagnosis provided by you to the computer derived diagnosis. The computer tells you whether or not it agrees with your diagnosis. If the computer and corpsman are in agreement, the program proceeds to the Diagnostic Summary Page. If not, the computer displays key answers which support the computer diagnosis, and it asks you if you want to review or change any of your symptom entries. If you want to make changes, you enter 'Y' (for YES) and are returned to the previous menu where changes can be made to the history, physical exam or the SSN/Age/Time. If you don't want to review your entries or make any changes, then type 'N' (for NO) and continue on to the Diagnostic Summary Page. This procedure was put in the program to remind you, again, that you alone are responsible for the diagnosis. Agreement between the symptoms and signs you record and your diagnosis is checked to warn you of any possible inconsistencies between your data and your conclusion.

4.1.6.1 Gynecological Database

If you choose the gynecological database, you will choose your diagnosis from another list (see Figure 4-9). The lists for general and gynecological diagnoses both include appendicitis and non-specific abdominal pain. Appendicitis is included because it is the most common cause of acute abdominal pain to require MEDEVAC and because most gynecological pain will be in the lower abdomen.

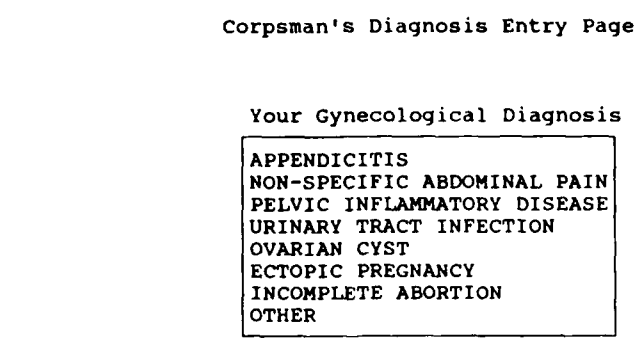

Figure 4-9 Corpsman's Diagnosis Page (Gynecological Database)

4.1.7 Diagnostic Summary Page

Figure 4-10 is the Diagnostic Summary Page. The graph on the left shows the computed probability for each diagnostic category. The tallest bar corresponds to the most likely diagnosis. The program is "most sure" of the diagnosis when the probability is greater than 90% and "less certain" when the diagnosis is less than 90%. To help you keep this in mind, a line is drawn across the graph at the 90% level.

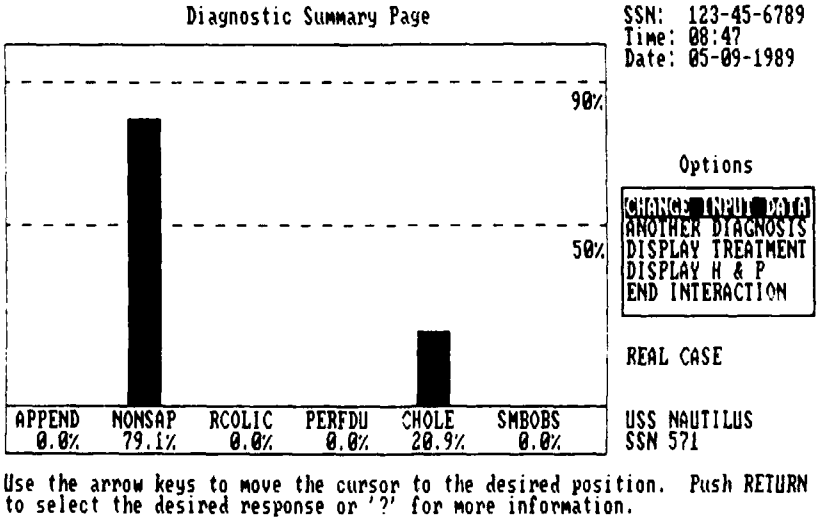

Figure 4-10 Diagnostic Summary Page

The date and time of the exam are listed in the upper right hand corner. If the case is real, the patient's SSN will also be listed there. The type of case, real or simulated, is shown in the lower right hand corner along with the name of the vessel.

On the right side of the diagnostic summary page are 5 options available to the corpsman. These are:

4.1.7.1 Change Input Data

Select this option to review or change any symptom entries relating to the present case. You can make changes to the history, physical exam, or SSN/Age/Time portions of the present case.

4.1.7.2 Another Diagnosis

Select this option to enter another case, either real or simulated. The case just entered will be saved, and the data display pages will be cleared. The program returns to the main option page described in section 4.1.4 (see Figure 4-2).

4.1.7.3 Display Treatment Protocols

Select this option to access a treatment protocol. Treatment protocols exist for each of the six abdominal pain diagnoses: Appendicitis, Non-specific Abdominal Pain, Renal Colic, Perforated Duodenal Ulcer, Cholecystitis, and Small Bowel Obstruction. Additionally, the gynecological diagnoses include: Pelvic Inflammatory Disease, Urinary Tract Infection, Ovarian Cyst, Ectopic Pregnancy, and Incomplete Abortion. Each treatment protocol consists of 5 sections: Discussion; Differential Diagnosis; Treatment; Usual Course with Treatment; and Complications and Their Management. The protocols are brief, practical, and take into consideration the medications available for use on board the submarine. They have been reviewed by hospital-based internists and Submarine Qualified medical officers. Other Navy approved references should be used to supplement these protocols when indicated.

Hard copies of the entire protocol or any section of it can be obtained by pressing the "PRINT SCREEN" (PRTSC) key when the desired section is displayed on the computer screen. Treatment protocols for the diseases are included in Appendix A for easy reference.

4.1.7.4 Display H & P

Select this response to list on the screen the history and physical exam indicants for this case. A history summary is given on one page (Figure 4-10) and physical exam findings are given on another page. If a printer is connected to the computer, a hard copy of the indicant entries can be obtained (while they are displayed on the computer screen) by pressing the PRTSC key. After the symptom listing is completed, the program returns to the Diagnostic Summary Page.

```
History Summary (Real case)          SSN: 123-45-6789          08:25  05-09-1989

MALE
AGE 20-29
PAIN ONSET RUQ
PAIN NOW RUQ
PAIN INTERMITTENT
PAIN IS MODERATE
MOVEMENT AGGRAVATES
PROGRESS - BETTER
DURATION <12 HRS
LYING STILL RELIEVES
NAUSEA PRESENT
BOWELS NORMAL
APPETITE DECREASED
JAUNDICE PRESENT
URINATION NORMAL
PREVIOUS INDIGESTION
PREV. SIMILAR PAIN
PREV. ABD. SURGERY
PREVIOUS ILLNESS(es)

Enter (P)revious, (N)ext, e(X)it, or (?) for help.
```

Figure 4-11 History Summary

4.1.7.5 End Interaction

Select this option to exit the program and end your interaction with the computer. You will return to the operating system of the computer so that you may run other programs.

4.1.7.6 Display Abdominal/Gynecological Diagnoses

This will appear as the last option for female patients. Regardless of which database you have selected, you may now switch back and forth between the Diagnostic Summary Page for each. Each database will assign a different value for Non-Specific Abdominal Pain. It is not unusual to see a very high probability for NONSAP on the Abdominal Diagnostic Summary Page and a low probability on the Gynecological Diagnostic Summary Page.

4.2 Overview of the Training Module

The training program presents patient narratives. Based on the narrative, you complete the paper and pencil form of the abdominal pain data sheet, enter the symptom findings into the computer and arrive at a computer derived diagnosis. The program scores your accuracy in abstracting data from the patient narrative. No permanent record is maintained of your performance on the training program.

4.2.1 Case Narrative

4.2.1.1 Easy Case Narrative

You may choose from 50 easy case narratives. The cases do not change, so case 1 will always have the same narrative from session to session. This allows you to return to a specific case narrative at a later time. The narratives are presented in a straightforward manner. After selecting the number of the desired case, you will be shown a page of the history and another page of the physical findings. You may toggle back and forth from one to another. You should fill out the data sheet while viewing the history and physical, or you may elect to print the display pages using the "PRINT SCREEN" key.

4.2.1.2 Harder Case Narrative

There are 50 hard case narratives. These are also constant from session to session. The history and physical findings are worded in a more sophisticated fashion, with a more advanced vocabulary, thereby presenting a greater challenge to you.

4.2.2 Enter Data

After completing the data sheet, choose this option to enter your findings. You will be taken to the Data Entry Options Page where you can enter history and physical exam data. After entering symptom findings and a diagnosis for the case, the Training Diagnostic Summary Page will be displayed. This page is identical to the Diagnostic Summary Page except in two regards. First, a score is displayed in the upper right quadrant. This score reflects the accuracy of the data entered for the case. It is based on both the number of items missed as well as the number of incorrect items. Second, missed and incorrect findings can be displayed by selecting the option SHOW MISSED ITEMS from the menu on this page. If too many items are missed when entering the case, the user will be notified and will not be able to go on to the Diagnostic Summary Page until some correction are made.

4.2.3 Exit Training Program

This option exits the training module and returns the user to the Main Options Page.

4.3 Overview of the SF-600 Generation Module

The SF-600 generation module allows you to print the medical record entry for the patient whose data you entered into the program. The output of the program is in the form of a "S-O-A-P" note except that the letters "S", "O", "A", and "P" are not used. The date and time on the SF-600 will correspond to the date and time when the case was entered into the diagnostic module. The name and hull number of the vessel will be printed on the first line of the entry.

4.3.1 Output

The medical record entry can be sent to any one of three locations. It can be sent to the display screen, to a file where you can modify it with a word processing program, or directly to a printer. If you are sending the output to a printer, the computer assumes that the printer is using the actual SF-600 form, and so it will ask you if the printing is to begin on the front or back of the SF-600. You should always insert the form into the printer so that printing begins at the top of either the front or back page of the form. Otherwise, the computer will be unable to determine how many lines are to be printed on a particular side. Single spacing is used if the output is sent to the screen or to a file. If the output is sent to the printer, double spacing is used.

Be sure that you align the top edge of the page with the top edge of the printer head as you do with any printer form.

4.3.2 Selection of a Real Case

Only cases that have been saved as real cases can be used in the SF-600 Generation Module. A list of the real cases will be displayed by SSN, date, and time of exam. Use the arrow keys to move the cursor to the desired case and press the "ENTER" key to select it.

4.3.3 Modifying Vital Sign Values

Since the vital signs are entered into the program as ranges, you are given the option of entering actual values for these findings. If you would prefer to have the range printed, press the "ENTER" key by the appropriate item. If you do not want to have the item listed on the medical narrative, enter the letter "X" by the item.

4.3.4 Additional Information for Selected Items

You are given the opportunity to add to some of the categories in the history and physical examination sections. This allows for a more complete description of items for which "other" is offered as an alternative, e.g. relieving factors, aggravating factors. You are also given the opportunity to comment on previous abdominal surgery, previous major illness, current medications. As for Vital Signs, you may omit the response (enter 'X') or use the default response press

"ENTER" given in the diagnostic module.

4.3.5 Additional Information for History or Physical Exam

You are given the opportunity to enter additional information for both the history and physical examination. You enter the information in a free text form at the end of the respective sections of the medical entry. The computer will prompt you at the appropriate times to enter this information if you so desire.

4.3.6 Final Diagnosis

Enter the final diagnosis to be recorded on the SF-600. Either type it in or choose to have the computer enter its diagnosis.

4.3.7 Treatment Plan

There are two options for entering the patient's treatment plan. You can enter it line by line or you can use a plan which is already stored in a file on the disk. The second method allows you to store standardized plans for illnesses on the disk and then access these plans for printing on the medical entry. To create and store standardized plans on the disk, you will need to use a word processing program. Instructions on this procedure are beyond the scope of this manual.

4.3.8 Changing the Printer Format

If the medical record entry is not reproduced correctly on your printer, you will probably need to modify the file SETUP.DAT (a DOS command typed verbatim at the "A>" prompt) where the printer parameters are kept. This is an ASCII file so you should be able to modify the parameters with any word processor or text editor that is available for your computer such as the one included with MS-DOS. To make changes in the parameters, exit the Abdominal Pain Diagnostic Program by selecting the Exit Program option on the Main Option Page (4.1.4.8) or the End Interaction option on the Diagnostic Summary Page (4.1.7.5). Then, follow the instructions accompanying your word processor program or text editor to edit the file SETUP.DAT. A sample SETUP.DAT file is:

```
0
0
0
0
44
56
66
```

The first line (0) is the setting of the left margin on the front page of the SF-600. The second line (0) is the left margin on the back page. The third line (0) is the number of lines in the top margin of the front page, and the fourth line (0) is the same number for the back

page. The fifth line (44) is the bottom margin of the front page, and the sixth line (56) is the bottom margin of the back page. The last line (66) is the number of characters across the page.

You may need to experiment to determine which settings work best with your printer. Be sure to check the revision number on the SF-600 form. There are a number of different revisions available and the size of the form may vary.

5. ABDOMINAL PAIN DIAGNOSTIC PROGRAM TUTORIAL

5.1 Running a Real Case

In this section, we will "walk through" entering a real case into the computer. It is assumed that you have read the overview in the previous chapters and installed the program onto the hard drive. If not, do so now.

First you start the program. Type "ABDOMEN" at the prompt and press "ENTER" to begin the program. If you have never used the program before, you should be asked several questions about your monitor, your unit and your name. Your responses are necessary to print the SF-600. If you have used the program before, you will skip the customization page and proceed to the Title Page, where your unit's name should be displayed. If it is incorrect, follow the directions in the section on the customization page (4.1.1) to change it.

Follow the instructions shown on the screen, "press any key", until you reach the disclaimer page. Read this page before proceeding. Again press any key to continue to the "MAIN OPTIONS:" page. The menu displayed here is the root menu for the program. All the modules of the Abdominal Pain Diagnostic Program are accessed from here. In our example, we want to enter a real case, so press "ENTER" to select the "REAL CASE" option, since it is already marked by the cursor. Use of the cursor control keys (arrow keys) will move the cursor to highlight the desired option, the "ENTER" key executes that option.

At the next screen you will be asked to enter the patient's sex, Social Security Number, and age. For our example, the patient's SSN is 123-45-6789, and his age is 23. After you have entered the above information, the computer will display a date and time for verification. The date and time should be the current date and time assuming they were entered correctly when the computer was first turned on. If either is incorrect, type in the date and time that the exam was conducted pressing "ENTER" after typing each. You will then be asked whether the information displayed is correct. If it is, type "Y", if not, type "N" and repeat the above steps.

The "DATA ENTRY OPTION:" page is now displayed. From here you will make selections to enter the patient's history and physical exam findings. Also, you may return to the page where the patient's SSN, age, and time of exam were entered to make corrections.

The cursor is highlighting the "GO TO HISTORY PAGES" option, so press "ENTER" at this time. There are four history pages for male patients and five for females, the fifth being for additional gynecological history. Each page is numbered in the top right hand corner of the display. Page five will not be displayed for males. The layout of the questions is consistent with that of the data sheet. You can use the arrow keys and the "TAB" key to move the cursor in the

appropriate direction within and between the symptom categories on each page. Use the down arrow to highlight "RUQ" and press "ENTER". A pair of asterisks will appear by the selection and the RUQ region of the abdomen will be painted. Press "ENTER" again and note that the asterisks disappear, and the abdomen is cleared. Press "TAB" to move the cursor to the first response of each question on the page. Try it now. Type the "N" key (for "next page") to take you to page 2. Type the "P" key (for "previous page"). You should now be back on page one. Type "?" to see the definition of the question above the cursor.

Now that you have used the keys, answer every question on the history pages. You can make up answers for this example. When entering a real case, if you do not have a piece of information, leave it blank. For example, do not answer "ABSENT" if you do not know, this would alter the diagnosis. When you have answered the questions on the last page, type "N" and you will automatically return to the "DATA ENTRY OPTIONS:" page.

On the "DATA ENTRY OPTIONS:" page, press the down arrow once to move the cursor to the selection "GO TO PHYSICAL EXAM PAGES" and press "ENTER".

You are now on page one of the five physical examination pages. Using the same keys (arrows; TAB; N; P; ENTER) as before, answer all of the questions on each of the five pages and return to the "DATA ENTRY OPTIONS:" page by typing "N" when you have completed the last page. For female patients, notice that a section has been added to the end of page five for entering the results of the vaginal examination.

For male patients, now that all questions have been answered, the computer can make it's diagnosis. Press the down arrow twice to select "MAKE DIAGNOSIS" and then press "ENTER". The "CORPSMAN'S DIAGNOSIS" page will then be displayed.

For female patients, you will have to choose between the General Abdominal Database and the Gynecological Database. If the information entered fits the program's criteria for the presentation of gynecological disorders, after selecting "MAKE DIAGNOSIS" a message will be displayed informing you:

> "the gynecological database is available and may be especially suitable for this case."

Pressing any key will produce another menu page "SELECT DATABASE". You now choose one of the two databases. Each database has its own list of diagnoses; both include Appendicitis and Non-Specific Abdominal Pain (NONSAP). If the presentation does not fit the program's criteria for a gynecological disorder, a message will appear stating:

> "...your patient appears to have non-gynecological abdominal pain. However, the gynecological database is available..."

Again you proceed by selecting between general and gynecological diagnoses.

Except as noted below, you now proceed the same way for male and female patients. Before the computer will display the computed diagnosis, you must first enter your diagnosis for the patient by selecting the appropriate response from those on the list shown on the display screen. After you enter your diagnosis, the computer will compare it with the computed diagnosis. If the two diagnoses are the same, the program moves to the "DIAGNOSTIC SUMMARY PAGE". If the two diagnoses disagree, the computer will give a list of items that play an important part in differentiating between the two diagnoses. You should review the list carefully to be sure that your entries were recorded properly. Pressing any key will take you to the "DIAGNOSTIC SUMMARY PAGE".

The "DIAGNOSTIC SUMMARY PAGE" will display a graphic representation of the probabilities for the various diseases considered by the program. Those probabilities above the 90% line are most likely. To the right of the screen is displayed the patient's SSN along with the date and the time of the examination. The statement "REAL CASE" and the ship's name and hull number will be listed in the lower right hand corner.

Press the down arrow three times to select the item "DISPLAY H & P" and then press "ENTER". You will be shown a summary listing of the history responses on one page and the physical examination responses on the next page. You can obtain a hard copy of these two pages by pressing the "PRTSC" ("PRINT SCREEN") key. Return to the "DIAGNOSTIC SUMMARY PAGE" by typing "N" or "X" while on the "PHYSICAL SUMMARY" page.

Next, press the down arrow key twice to select the response "DISPLAY TREATMENT" and press "ENTER". The "TREATMENT SUMMARY" menu will be displayed. You may review the treatment for one of the diseases listed by using the arrow keys to move the cursor to the desired entry and pressing "ENTER". For our example, select "APPENDICITIS". The first page of the treatment summary for appendicitis will be displayed. Notice that the bottom right hand corner contains the current page number and the total number of pages in the summary. Each treatment protocol is comprised of a discussion, differential diagnosis, treatment plan with specific drug regimens as indicated, probable course with treatment, and possible complications and their management. Type "N" to move to the next page in the section, type "P" to move to the previous page, and "X" to exit from the section back to the "TREATMENT SUMMARY" menu. Type "X" at this time. Move the cursor to the last response entitled "EXIT THIS DISPLAY" and press "ENTER" to return to the "DIAGNOSTIC SUMMARY PAGE".

For female patients, the last menu option on the "DIAGNOSTIC SUMMARY PAGE" is either "DISPLAY GYN DX'ES" or "DISPLAY ABD DX'ES"

depending on whether you are using the Abdominal or the Gynecological Database respectively. This allows you to switch back and forth between the two databases and consider all the diagnoses regardless of which database you chose to begin with. When a gynecological diagnosis is displayed as being highly probable, the probability of "NONSAP" will be correspondingly low. However, when you switch to the abdominal diagnoses, you will note that the probability of "NONSAP" jumps up to near that displayed for the original gynecological diagnosis. It is, therefore, a good practice, if you choose the "GENERAL ABDOMINAL DATABASE" and note a high probability for "NONSAP", to review the gynecological diagnoses carefully.

If you desire to make changes or update the history or physical, select "CHANGE INPUT DATA". The case is stored on the disk, and you will be returned to the "DATA ENTRY OPTIONS:" page where you can then modify your responses. Select "ANOTHER DIAGNOSIS" on the "DIAGNOSTIC SUMMARY PAGE" to store the current case on the disk, clear the responses made in the computer's memory and return to the "MAIN OPTIONS:" page where you may either run the SF-600 generation program or enter data on a new patient. If you have finished with the program, select "END INTERACTION" to store the current case on the disk and return the computer to MS-DOS. Remove the floppy disk if you have been using one, and turn off the computer.

5.2 Running a Simulated Case

To enter a simulated case, select the "SIMULATED CASE" option on the "Main options:" page. This option allows you to enter your own 'made up' history and physical exam findings into the computer. Simulated cases which are entered into the computer are stored on the computer disk, but only the last one is accessible by the user. They cannot be printed out on a SF-600. Since you use this option for self-guided instruction, you should complete a data sheet with a particular disorder in mind before you use the computer.

Once the simulated case option is selected, the computer requests the patient's sex, age, and confirmation of date and time of the exam. With a simulated case, the program does not request a social security number, but instead assigns the number 000-00-0000. Instructions for data entry and making a diagnosis are the same for simulated and real cases. Enter a simulated case as you would a real one (see section 5.1). The "DIAGNOSTIC SUMMARY PAGE" for simulated and real cases differ only in that the phrase "SIMULATED CASE" is displayed instead of "REAL CASE" in the lower right hand corner.

5.3 Using the Training Module

The training program presents fifty case histories with "easy" and "hard" narratives for each for a total of one-hundred cases. The easy narrative presents the information in a straight-forward manner. The hard narrative presents the same information in a more complex way.

To run the Training Module, select "TRAINING MODULE" from the "MAIN OPTIONS:" menu. You will now be shown the "TRAINING OPTIONS" menu. Select the "EASY CASE NARRATIVE" option. Enter "1" to select case number 1. You will then be shown the history narrative for case 1. After reading the narrative, fill out the abdominal pain data sheet and proceed to the physical page by typing "N". Read the physical narrative and fill out the remainder of the data sheet. Now type "N" to return to the "TRAINING OPTIONS" menu and select "ENTER DATA". Type "Y" to confirm that the case you are entering is case number 1. Now enter the patient's age. Notice that an SSN, date and time for the exam are automatically supplied. You will then be taken to the "DATA ENTRY OPTIONS:" menu for the training module. From here, enter the information from the data sheet as you would for a real or simulated case.

When you have answered all the history and physical questions, select "MAKE DIAGNOSIS" from the training module "DATA ENTRY OPTIONS:" menu. If your responses differ greatly from those for that training case, you will not be able to proceed to the "DIAGNOSTIC SUMMARY PAGE". Instead you will be told that you missed too many responses and asked to confirm the case number. In that instance, review the narrative and change your responses when they differ from the narrative and select "MAKE DIAGNOSIS" again. As with a real or a simulated case, you must enter your diagnosis before the computer will display its own. When the "DIAGNOSTIC SUMMARY PAGE" is displayed, your score, the phrase "TRAINING CASE", the case number, and a new menu option, "SHOW MISSED ITEMS", are added to the usual summary data.

Your score is derived from the number of responses you entered correctly from the narrative divided by the total number of correct responses. Your diagnosis is not considered in deriving the score. Now select "SHOW MISSED ITEMS". This option allows you to view those responses you missed. Those correct responses you failed to enter are listed with the word "(omitted)" written alongside. Those you entered incorrectly are listed without comment. After viewing the items missed, press any key to return to the "DIAGNOSTIC SUMMARY PAGE".

You may select "END INTERACTION" to exit the program entirely, or you may select "ANOTHER CASE" to return to the "TRAINING OPTIONS" menu, where you may select "EXIT TRAINING MODULE" to return to the "MAIN OPTIONS:" page of the diagnostic program.

5.4 Retrieving Last Real or Last Simulated Case

Select this option from the "MAIN OPTIONS:" page to retrieve the last real or last simulated case entered into the computer. While all real and simulated cases entered into the computer are stored on the disk, only the last ones are available for recall into memory.

Occasionally you will see a patient who presents with such a vague early picture that you must perform several evaluations until you are sure of your diagnosis. If you select the option "LAST REAL CASE"

you can update the time and findings of the exam instead of re-entering all of the information each time you examine the patient.

If you do not make any changes to the recalled case, when you select "MAKE DIAGNOSIS", you will not be asked to enter your diagnosis. Instead, the program will proceed directly to the "DIAGNOSTIC SUMMARY PAGE:". If you make any changes, you will be asked for your diagnosis, and the case will be stored.

5.5 Using the SF-600 Generation Module

This module allows you to print the medical record entry of a real case on the SF-600. To use the module, select "GENERATE SF-600" from the "MAIN OPTIONS:"page. Assuming you have real cases stored, you will be shown a list of all of the real cases by SSN, date, and time. Use the arrow keys to move the cursor to the desired case and press "ENTER". Then you will be asked where the output of the generation module is to go. You can have the output displayed on the screen, printed on the SF-600, or sent to a file where you can make changes to it with a word processor file before printing the SF-600.

After you have made your selection, you will be shown the vital signs and lab values. Since the computer uses a range for each response for the vital signs and lab values, you will be offered a chance to change the response to a single value. If you do not know the single value, then you can press "ENTER" and the range will be printed on the SF-600, or you can type "X" and the item will not be mentioned on the SF-600. After answering all of the questions for the vital signs and lab, you will be asked to confirm that the responses are correct by typing "Y". Next you will be offered a chance to comment on specific items to which you responded positively. For example if the patient has had previous abdominal surgery, you will be asked to describe that surgery. Otherwise, you can enter "X" to omit any reference to the question, or just press "ENTER" to have the SF-600 state that the patient has a history of previous abdominal surgery. This same format is used for all of the other responses that may require comment.

If a rectal exam was performed, you will be asked if the stool was checked for occult blood and, if so, was it positive. This information is entered as "Y" or "N".

After you have replied to all of the specific responses displayed, you will be asked to enter any additional information on the history and then the physical examination that you feel is important.

After completing the history and physical questions, you will be asked if you desire to change the computer's diagnosis. If you do not agree with the diagnosis, type "Y" and you will be asked to enter the diagnosis as it should be printed on the SF-600. If you agree with the diagnosis, type "N".

Finally the treatment plan is entered. You will be asked if you have a plan stored on the disk. If you have a plan stored as a file, then type "Y" and then enter the name of the file. You can make your own routine plans using a text editor program such as EDLIN or your favorite word processor. See the file VIRALGI.PLN for an example. If you do not have a plan stored, type "N". The number 1 will appear on the screen. Now enter the plan on the computer screen as you would prepare it using a typewriter. Each item in the plan is numbered and can be several lines in length. If you need more than one line for the first item, press "ENTER" at the end of each line. This will give you a fresh un-numbered line to continue the item. However, the computer will print everything in the right place on each line of form SF-600. After you have entered all of the information for the first item, and wish to go on to another numbered line, press "ENTER" on a line prior to entering any text. This signifies the end of the first item and now the number 2 will be displayed on a fresh line. Enter the information for the second item and proceed as above. When you have made all entries for the plan, press "ENTER" by itself while on one of the numbered lines with no text. This informs the computer that the plan is completed.

The computer will send the output to the location you specified earlier. If it is sent to the screen, the computer will print the information to the screen one page at a time and you will be asked to press a key to continue to the next screen.

If the output is sent to the printer, you will be asked whether you are starting the printout on the front or the back of the SF-600. You must start at the top of the page on either side, otherwise the computer will not know how many lines it can print on the SF-600. Align the top edge of the SF-600 page (front or back) with the top edge of the printing head. If the medical record entry is sent to the printer, the computer will double-space the document. If the entry is sent to a file or to the screen, the computer will use single-spacing.

Acknowledgments

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APPENDIX A
TREATMENT PROTOCOLS

Acute Appendicitis (APPEND)

1. **TREATMENT PROTOCOL AT A GLANCE** (see detailed discussion of treatment below; this section is for quick reference).

Definitive treatment of acute appendicitis is surgical.

Notify command of need for immediate MEDEVAC.

The treatment goals pending MEDEVAC:

a. bed rest
b. intravenous antibiotics
c. intravenous fluid and electrolyte replacement
d. intestinal rest-NPO
e. abdominal ice packs
f. analgesia

a. Place patient at strict bedrest with head of bed slightly elevated. Monitor vital signs, fluid intake and output, and progress of symptoms and examination.

b. Appropriate antibiotic therapy is crucial:

1) Cefoxitin 2 gm IV every 6 hours; and

Gentamicin 80 mg IV every 8 hours; or

2) For patient's with a history of Penicillin or Cephalosporin allergy only:

Gentamicin 80 mg IV q8h; and

Metronidazole (Flagyl):

Loading dose - 15 mg/kg body weight IV infused over one hour (approximately 1 gm for average sized male); and

Maintenance dose - 7.5 mg/kg IV infused over one hour every 6 hours (approximately 500 mg).

Slow IV infusions are best accomplished by mixing in small bags of IV solution and running "piggy backs."

c. Start IV D5NS or D5LR at 150 ml/hr and adjust rate as needed to maintain adequate hydration. Monitor urine output as an indicator of hydration status.

d. Make patient NPO. Place NG tube to low-intermittent suction.

e. Abdominal ice packs intermittently as tolerated.

f. Analgesics are usually contraindicated since they will mask the symptoms and make it difficult to follow the progress of the illness.

2. DISCUSSION

Acute appendicitis results from a bacterial invasion of the appendix with inflammation. Incidence is highest in adolescents and young adults, peaking between ages 15 and 24. Typically, the pain is initially poorly localized in the periumbilical region. This pain represents irritation of the lumen of the appendix itself. Gradually the pain shifts to the right lower quadrant, becoming constant and discrete as the inflamed appendix begins to irritate the surrounding peritoneum. Anorexia, fever, and diminished bowel sounds are usually noted; nausea, vomiting, and diarrhea are variable. Temperature, pulse, and respiratory rate may be only slightly elevated unless perforation occurs.

A history of right lower quadrant pain and a finding of right lower quadrant tenderness and guarding are the most important indicators in acute appendicitis. Since the appendix may lie dorsally, the rectal examination is also extremely important. The white blood cell count is usually elevated above 10,000 with a preponderance of neutrophils. The urinalysis may also reveal an increase in WBC's. There are no specific laboratory tests.

3. DIFFERENTIAL DIAGNOSIS

Other illnesses that produce findings that may mimic acute appendicitis and which should be considered are:

a. mesenteric adenitis
b. Meckel's diverticulitis
c. diverticulitis
d. regional enteritis
e. inguinal hernia
f. ureteral calculus
g. perforated ulcer
h. acute cholecystitis

a. Mesenteric adenitis can be indistinguishable from acute appendicitis, but the pain may not be as well localized and the white blood cell count may contain an increased fraction of lymphocytes. Initial medical management is the same as for appendicitis.

b. Meckel's diverticulitis may also closely mimic the presentation of acute appendicitis if the diverticulum is in its usual

position in the right lower quadrant. Meckel's diverticulitis may also lead to other intra-abdominal complications including bowel obstruction and G.I. bleeding. The definitive treatment, as with appendicitis, is surgical; initial medical management is the same as outlined below for appendicitis.

c. Diverticulitis confined to the cecum can be hard to distinguish from appendicitis. However, it more commonly involves the descending (left) colon. These symptoms are often intermittent and less severe, but may be acute. This condition has been described figuratively as a "left-sided appendicitis." The presence of diverticular disease does not preclude development of acute appendicitis concomitantly. The initial medical treatment is the same as for appendicitis.

d. Regional enteritis attacks are usually preceded by bouts of crampy abdominal pain and diarrhea. An attack of regional enteritis involving the terminal ileum, located in the right lower quadrant, can be indistinguishable from acute appendicitis. The pre-existence of regional enteritis does not preclude development of acute appendicitis concomitantly. Initial medical management is the same as for appendicitis. Additional treatments include steroids and analgesics, but these should not be used unless the diagnosis is firm and a Medical Officer is consulted.

e. An inguinal hernia can be easily distinguished by its sharp, localized pain which radiates into the testicle and by a palpable lump in the inguinal canal accentuated by valsalva. Treatment is symptomatic pending surgical consultation ashore. Reduction should be attempted. If the hernia is not reducible (i.e. incarcerated), it will be necessary to follow the patient closely. If the hernia becomes strangulated, the patient may present with the symptoms of an acute abdomen. In this latter case use the medical management outlined for appendicitis.

f. Ureteral calculus - see RENAL COLIC

g. Perforated ulcer - see PERFORATED DUODENAL ULCER

h. Acute cholecystitis - see CHOLECYSTITIS

4. TREATMENT OF ACUTE APPENDICITIS

Definitive treatment of acute appendicitis is surgical. Medical management can, however, avert or delay serious morbidity in many cases. Treatment includes bowel rest and aggressive antibiotic therapy. The body's own primary defense consists of omental migration toward the inflamed appendix in an attempt to surround and confine the infectious process.

Arrange immediately to MEDEVAC the patient. The treatments outlined are intended to stabilize the patient while awaiting

evacuation. However, MEDEVAC's are not always immediately available or operationally feasible. Always remain prepared to care for the patient for a prolonged period of time. The treatments as outlined are written for this contingency.

The treatment regimen should consist of the following:

a. bed rest
b. intravenous antibiotics
c. intravenous fluid and electrolyte replacement
d. intestinal rest - NPO
e. abdominal ice packs
f. analgesia

a. Place patient at strict bed rest with head of bed slightly elevated (semi-Fowler's position). Monitor vital signs, fluid intake and output, and progress of symptoms and examination.

b. Appropriate antibiotic therapy is crucial. Bowel flora will be predominantly gram-negative organisms, enterococci (Streptococcus fecaelis), and anaerobes. Specific intravenous antibiotic regimens are as follows:

1) Cefoxitin 2 gm IV every 6 hours; and

Gentamicin 80 mg IV every 8 hours; or

2) For patients with a history of Penicillin or Cephalosporin allergy only:

Gentamicin 80 mg IV q8h; and

Metronidazole (Flagyl):

Loading dose - 15 mg/kg body weight IV infused over one hour (approximately 1 gm for average sized male); and

Maintenance dose - 7.5 mg/kg IV infused over one hour every 6 hours (approximately 500 mg)

Slow IV infusions are best accomplished by mixing in small bags of IV solution and running "piggy backs."

c. Intravenous fluids are utilized to maintain fluid and electrolyte requirements in the face of increased need and decreased intake. Dextrose 5% and Lactated Ringer's solution (D5LR) should be started at 150 ml/hour. Additional fluid replacement will be needed for the additional losses caused by fever, diaphoresis, emesis, diarrhea, and nasogastric suctioning. Fluid and electrolyte replacement must keep pace with losses to prevent dehydration and electrolyte imbalance. Monitor the urine output to maintain at least 1000 ml/day (or 1/2 ml per kg body wt

per hour) and increase fluid intake as needed. Urine specific gravity and hematocrit are also good indicators of the adequacy of hydration.

d. Intestinal rest is accomplished by making patient NPO (nothing by mouth) and by nasogastric suctioning. Low-intermittent suction (1-3 psi) is most effective. Irrigation of the tube with small volumes of saline may be needed periodically to maintain patency.

e. Abdominal ice packs applied to the right lower quadrant may decrease inflammation and offer some psychological benefit to the patient. If used as an adjunct to the above treatment regimen, it should be continued only if subjective relief is obtained. Use intermittently to avoid a reduction in the rate of diffusion of antibiotics to the region.

f. Analgesics are relatively contraindicated since they will mask the symptoms and make it difficult to follow the progress of the illness. However, it may become necessary to offer the patient some pain relief by judicious use of morphine or Demerol.

5. USUAL COURSE WITH TREATMENT

Response to the therapeutic regimen will be slow initially. The patient's discomfort will resolve over the first 48 hours, temperature and pulse will remain elevated for 48-72 hrs, and the leukocytosis will continue to rise well beyond 72 hours as the inflammatory response peaks and begins to resolve. By 96 hours the patient's symptoms should have abated, and he should be ambulatory. A clear liquid diet should be tolerated when bowel sounds return and the pain resolves. At this point, intravenous fluids can be decreased or discontinued as appropriate. Antibiotics must be continued for at least 10 days.

6. COMPLICATIONS AND THEIR MANAGEMENT

Perforation, diffuse peritonitis and/or abscess formation are the principal complications of concern. The incidence of these complications should be significantly reduced in patients expeditiously treated as outlined above.

a. Perforation and diffuse peritonitis will result in a rapid deterioration of the patient's condition as indicated by:

1) progressive tachycardia, fever, and tachypnea

2) a diffusely distended, tender, silent, rigid abdomen despite nasogastric suction,

3) difficulty maintaining adequate hydration and electrolyte balance despite vigorous fluid replacement.

These signs can develop with frightening rapidity during any stage of management of an acute appendicitis and are further indications for immediate MEDEVAC. Continue fluid and antibiotic therapy while observing for indications of shock. Septic shock is treated with supportive measures in an effort to maintain blood pressure and adequate tissue perfusion. Place the patient in Trendelenburg and use fluid boluses as necessary.

b. A right lower quadrant mass may indicate the formation of an abscess around the inflamed appendix. A mass may develop, however, as the inflamed appendix is walled off by omentum or adjacent viscera, and thereby represent resolution rather than a complication. If the mass is accompanied by improvement, an abscess is less likely. If the fever and abdominal examination fails to improve, an abscess may be forming. Fluids and antibiotics should be continued with close observation for signs of perforation. Abscess formation is not a critical event and can be managed surgically at a later date as long as medical management is continued.

Non-Specific Abdominal Pain (NONSAP)

The category of NONSAP is reserved for causes of abdominal pain which are non-surgical and not life threatening, and are amenable to symptomatic treatment. This category is not meant to cover all maladies not included in the remainder of the program, but, rather, is meant to include those illnesses which are likely to be self-limited and, therefore, not reasons for MEDEVAC. NONSAP includes some specific diagnoses requiring specific treatments. In addition NONSAP is used for those patients whose symptoms are non-specific and resolve spontaneously without a diagnosis being made.

Peptic ulcer disease (PUD) is included in this section. Its diagnosis and treatment are discussed below. One of the complications of PUD, perforated duodenal ulcer, is treated as a separate diagnosis and may be reviewed from the REVIEW TREATMENTS menu.

Peptic Ulcer Disease (PUD)

1. DISCUSSION

PUD will affect 1 person in 10 during his lifetime. The stomach normally secretes a highly corrosive acid to aid in the digestion of food. The stomach also has defenses to protect itself from these secretions. A disruption of this balance between acid secretion and the protective mechanisms can result in damage or destruction of the stomach lining. Emotional stress, cigarette smoking, alcohol abuse, and many drugs have been cited as risk factors for PUD. Some drugs may alter the stomach's protective lining and allow damage to occur. Family history may play a role. Contrary to popular belief a spicy diet plays no role in the development of ulcers. The stomach's normal secretions are far more acidic than any spice or food that the patient could eat. Ulcer disease tends to be chronic with exacerbations and remissions. The duration of symptoms will vary, most cases resolve without complication if properly treated.

The pain of ulcer disease is often described as a steady, gnawing, burning ache in the epigastrium radiating laterally, usually to the right. The pain characteristically occurs 1/2 to 2 1/2 hours after meals and is rapidly relieved by ingestion of food or antacids. The temporal relationship to meals and the history of relief of the pain with food are important diagnostically. Also characteristic is the history of pain in the middle of the night and the absence of pain upon awakening in the morning.

A history of melena or black, tarry stools is indicative of upper gastrointestinal bleeding. Ask the patient specifically about changes in their stool or bowel habits. Patients often fail to volunteer this

history.

The physical examination may be non-specific except for tenderness corresponding to the location of the pain in the epigastrium. Test the stool for occult blood and draw blood for a hematocrit to rule out bleeding.

2. DIFFERENTIAL DIAGNOSIS

The vague initial symptoms of a new ulcer can sometimes cloud the diagnosis. Several other illnesses may produce similar pain in the epigastrium. A partial list of the more common ones follows:

a. gastritis
b. gastroenteritis
c. cholecystitis
d. pancreatitis
e. hepatitis

a. Gastritis is a diffuse more superficial inflammation and degeneration of the gastric mucosa. History will help differentiate it from PUD in that the symptoms are usually aggravated by food rather than relieved. Initial management is the same as for PUD.

b. Gastroenteritis may initially present as a crampy pain in the epigastrium but will quickly involve symptoms of nausea, vomiting, and diarrhea, thereby differentiating it from ulcer disease. Gastroenteritis is usually viral and accompanied by symptoms of fever, myalgias, and malaise. The course is usually self limiting and benign, but bowel rest and dehydration may necessitate IV hydration.

c. Cholecystitis - see CHOLE

d. Pancreatitis is associated with duodenal ulcer, cholecystitis, trauma, and alcoholism and will present as a boring epigastric pain radiating to the back. Signs and symptoms of peritoneal irritation are sometimes present. Antacids will not relieve the pain of pancreatitis. Food and particularly fatty foods will exacerbate the pain. Treatment should include bowel rest, with absolutely no fatty foods or alcohol permitted.

e. Hepatitis may initially present with a dull epigastric or right upper quadrant pain. The patient may complain of mild constitutional, flu-like symptoms or may feel quite well. Low grade fever may be noted. Jaundice may be noted, pay particular attention to the sclerae. "Coca-cola" urine is often the first sign. The liver edge is often apparent and may be tender on gentle palpation. Treat patient with bedrest and symptomatically. Though most causes of hepatitis are not highly infectious, isolation is advisable. Preventing contact with the patient's secretions is adequate. Some patient's may have a fulminant course and some rare cases are fatal. Those cases that require MEDEVAC should be self-evident.

3. TREATMENT OF PEPTIC ULCER DISEASE

The mainstay of ulcer therapy is the reduction of gastric acidity through neutralization and decreased secretion. This is accomplished with a regimen of antacids and a relatively new class of drugs, the H-2 blockers, that inhibit acid production. Food adequately buffers stomach acidity for approximately 90 minutes, after which the stomach is empty and secreting un-neutralized acid. Antacids taken 1 hour after meals will effectively buffer acid for an additional 2 hours.

A liquid antacid (Maalox, Mylanta) and Cimetidine (Tagamet), an H-2 blocker, are used according to the following regimen:

a. ACUTE CASE

Liquid antacid 30 ml at 1 and 3 hours after meals and once before bedtime. This regimen should be continued for 2 months.

Cimetidine (Tagamet) 300 mg PO qid for at least 4-6 weeks.

b. OCCASIONAL PAIN: 15-30 ml of liquid antacid PRN.

c. RECURRENCE: Treat as an acute case.

The diet should be modified to decrease fatty foods, as they stimulate acid secretion. Alcohol, caffeine, and smoking should be limited if not eliminated. Aspirin and other drugs in the non-steroidal anti-inflammatory drug (NSAID) class (Motrin, Tolectin, Indocin, etc.) should not be used except as absolutely necessary.

4. USUAL COURSE WITH TREATMENT

Most patients treated with the above regimen will have at least partial relief of their pain immediately. A gradual diminution of all symptoms within 2 to 4 weeks follows. Recurrences exacerbated by life-style (i.e. diet, alcohol, tobacco) are common and should be treated as acute cases.

5. COMPLICATIONS AND THEIR MANAGEMENT

The most common complications of peptic ulcer disease are intractable pain, hemorrhage, and perforation. These complications develop in 10-20% of symptomatic cases. Interestingly, 20-30% of all hemorrhage and perforation cases occur with no antecedent history of ulcer symptoms. Less often, the complications of obstruction and intractable pain will arise, requiring definitive (surgical) treatment.

Intractable pain may be an indication for surgery. The patient should be transported to a shore based facility when possible.

Hemorrhage will be evident as either vomitus which is colored bright red (hematemesis) if the bleeding is profuse or containing older, partially digested blood having a "coffee grounds" appearance. Black, tarry stool (melena) may occur if the bleeding is slow and subclinical.

Hematemesis is a medical emergency and can result in hypovolemic shock or death. It should be treated with the aim of maintaining the patient's blood pressure and fluid and electrolyte balance while preparing him for MEDEVAC. Start the IV with Normal Saline or Lactated Ringer's at maintenance rate (125-150 ml/hr). Be prepared for massive infusions to counteract the potentially massive blood loss from an ulcer which has eroded an artery within the duodenal wall. Additional fluid replacement should be calculated to compensate for the extra fluid losses from temperature elevation, diaphoresis, emesis, diarrhea, and nasogastric suctioning as well as estimated blood loss. Fluid and electrolyte replacement must keep pace with losses to prevent dehydration and electrolyte imbalance. Serial hematocrits will permit a rough estimate of the magnitude of the bleed. Remember, however, bleeding does not lower the hematocrit until the volume has been replaced either by IV solutions or the body's own fluid reserve. Monitoring of the urine output is a good indicator of the adequacy of hydration. If the bleeding is profuse, an attempt should be made to stop the hemorrhage using iced saline lavage. The patient should be kept NPO and a nasogastric tube placed. Iced saline lavage should be administered via the nasogastric tube until the lavage is clear.

Although melena is a cause for concern and investigation at the earliest convenience, it is not life-threatening and can be treated with the acute case protocol above and followed with serial hematocrits. Melena supports the diagnosis of PUD, but is not diagnostic in and of itself.

Perforation and obstruction should be managed by the protocols for PERFDU and SMBOBS, respectively.

Renal Colic (RCOLIC)

1. TREATMENT PROTOCOL AT A GLANCE (see detailed discussion of treatment below; this section is for quick reference).

Analgesia:

Demerol 50-150 mg IM q 3-4 hours

Hydration:

D5NS at 150-200 ml/hour

2. DISCUSSION

Renal colic is caused by the passage of a calculus or stone, through the renal pelvis or ureter or other cause of acute ureteral obstruction. It presents with the sudden onset of severe, sharp pain in the flank and upper abdomen with radiation to the lower abdomen, scrotum (or labia) or thigh area. The pain is intermittent, but without complete remission between attacks. This is described as wave-like fluctuations in the pain or colic. The pain typically is described as the worst ever experienced by the patient and has been said to be worse than child-birth. A history of milder symptoms or of past stones is often elicited. Nausea and vomiting may occur.

The physical examination reveals costo-phrenic angle and flank tenderness without rebound. Fever and chills as the stone passes are not uncommon. Gross or microscopic hematuria are usually evident. Pyuria or crystalluria may be noted. Some stones will be visible on plain films of the abdomen, others only on IVP.

3. DIFFERENTIAL DIAGNOSIS

Renal calculi are not always associated with classic flank pain or referred pain. Rule out other causes of intra-abdominal pain, especially the potentially surgical cases.

4. TREATMENT OF RENAL CALCULI

Treatment of uncomplicated renal colic consists of analgesics and hydration.

a. Large doses of narcotics may be necessary. The usual drug of choice is Demerol in the following dosage:

Meperidine (Demerol) 50-150 mg IM every 3-4 hours as needed.

Doses at the higher end of this range are typically needed. The subcutaneous route may be used, but will be slower acting. Nausea and vomiting are common and may be aggravated by the Demerol. For this

reason Demerol is often given concomitantly with an anti-emetic. Most anti-emetics will potentiate CNS depressants, and will, therefore, necessitate lower doses of narcotics.

> CAUTION : Whenever narcotics are used, the opiate antagonist naloxone (Narcan) should be kept available. If the patient should demonstrate excessive CNS depression, respiratory depression, or hypotension, 1-2 ampules (0.4-0.8 mg) of naloxone should be given IV and the A-B-C's of resuscitation employed as necessary. If the episode is due to narcotic overdose, consciousness will return within a minute or two. The pain will likely return and can be re-treated. The maximum dose of Demerol may then have to be judiciously overstepped. The duration of action of naloxone is less than that of Demerol. Patients treated with naloxone for opiate overdose must be monitored for 3 or more hours.

b. Fluid therapy is instituted to increase urine volume and help the stone pass. D5NS at 150-200 ml/hour is used.

If nausea and vomiting are problematic, the patient should be kept NPO and, if severe enough, may require placement of a nasogastric tube.

Every effort should be made to recover the stone when it's passed. This can be accomplished by having the patient urinate through a strainer or gauze sponges. The stone should be saved for analysis in conjunction with an intravenous pyelogram (IVP) performed ashore. Most cases can be treated adequately underway.

5. USUAL COURSE WITH TREATMENT

The stone will usually pass spontaneously within minutes or hours. This will be marked by the sudden cessation of the pain. Hematuria, dysuria, and a dull ache in the flank may persist for a day or two.

Encouraging the patient to drink a sufficient quantity of liquids to keep his daily urine volume over 2500 ml has been thought to decrease the incidence of stone recurrence. The patient should receive a urology consult to determine factors which might predispose him to form another stone.

Anticipate submarine disqualification if applicable.

6. COMPLICATIONS AND THEIR MANAGEMENT

Renal stones which become impacted and do not pass spontaneously must be removed surgically. Renal colic lasting over 24 hours is unusual and is an indication for MEDEVAC. Pain lasting this long will be very exhausting for the patient.

Patients may develop urinary tract infections as a result of a calculus. This presents as dull residual flank pain, dysuria, and residual hematuria with urinary frequency, hesitancy and fever. Treatment is :

Trimethoprim-Sulfamethoxazole (Bactrim, Septra) two tablets (one if double strength DS preparation) PO twice daily for 7 days.

If Sulfa allergic:

Doxycycline (Vibramycin) 100 mg PO twice daily.

Perforated Duodenal Ulcer (PERFDU)

1. **TREATMENT PROTOCOL AT A GLANCE** (see detailed discussion of treatment below; this section is for quick reference)

Definitive treatment of perforated duodenal ulcer is surgical.

Notify command of need for immediate MEDEVAC.

The treatment goals pending MEDEVAC:

a. bed rest/observation
b. antibiotics
c. intravenous fluid and electrolyte replacement
d. intestinal rest.

a. Place patient at strict bedrest with head of bed slightly elevated. Monitor vital signs, fluid intake and output, and progress of symptoms and examination.

b. Appropriate antibiotic therapy is crucial:

1) Cefoxitin 2 gm IV every 6 hours; and

Gentamicin 80 mg IV every 8 hours; or

2) For patient's with a history of Penicillin or Cephalosporin allergy only:

Gentamicin 80 mg IV q8h; and

Metronidazole (Flagyl):

Loading dose - 15 mg/kg body weight IV infused over one hour (approximately 1 gm for average sized male); and

Maintenance dose - 7.5 mg/kg IV infused over one hour every 6 hours (approximately 500 mg)

Slow IV infusions are best accomplished by mixing in small bags of IV solution and running "piggy backs".

c. Start IV D5NS or D5LR at 150 ml/hr and adjust rate as needed to maintain adequate hydration. Monitor urine output as an indicator of hydration status.

d. Make patient NPO. Place NG tube to low-intermittent suction.

Analgesics are relatively contraindicated since they will mask the symptoms and make it difficult to follow the progress of the illness.

2. DISCUSSION

Duodenal perforation usually presents with a sudden, steady, severe pain in the right upper quadrant or epigastrium. The patient will lie still in bed with his legs flexed since the pain is aggravated by movement or coughing. He may vomit initially although sustained vomiting is not characteristic. The patient will usually relate a past history of ulcer disease or ulcer symptoms.

Examination of the abdomen reveals a rigid, quiet abdomen with marked tenderness and rebound tenderness. The pain may radiate or migrate depending on the location of the gastric contents which have been allowed to spill into the peritoneal cavity. Peritonitis in the right lower quadrant by this mechanism may cloud the diagnosis and suggest appendicitis. Normal dullness to percussion overlying the liver may be lost due to free air overlying the liver in the supine position.

Perforation may occur adjacent to the pancreas or gall bladder, allowing gastric contents to irritate these organs and possibly cause pancreatitis or cholecystitis and their inherent signs and symptoms.

3. DIFFERENTIAL DIAGNOSIS

Other illnesses that produce symptoms mimicking duodenal perforation and which should be considered are:

a. acute pancreatitis
b. acute cholecystitis
c. acute appendicitis
d. diverticulitis.

a. Acute pancreatitis is associated with duodenal ulcer, cholecystitis, trauma, and alcoholism and will present as a boring epigastric pain radiating to the back. Signs and symptoms of peritoneal irritation are sometimes present. Antacids will not relieve the pain of pancreatitis. Food, particularly fatty foods, will exacerbate the pain. Treatment should include bowel rest with absolutely no fatty foods or alcohol permitted.

b. Acute cholecystitis - see CHOLECYSTITIS
c. Acute appendicitis - see APPENDICITIS

d. Diverticulitis may be present anywhere along the course of the colon including both upper quadrants and the epigastrium. It is more common, however to involve the descending (left) colon. These symptoms are often intermittent and less severe, but may be acute. This condition has been described figuratively as a "left-sided appendicitis".

4. TREATMENT OF PERFORATED DUODENAL ULCER

Acute perforation of any abdominal viscus is a catastrophic event requiring immediate stabilization and preparation for MEDEVAC. Broad-spectrum antibiotic coverage and fluid replacement are required without delay. The aim of treatment of duodenal perforation is to prevent shock and to limit bacterial seeding of the peritoneum which may result in abscess formation. Spread of gastric contents into the peritoneum after perforation occurs rapidly.

The treatment regimen should consist of the following:

a. antibiotics
b. intravenous fluid and electrolyte replacement
c. intestinal rest.

a. Appropriate antibiotic therapy is crucial. Bowel flora will be predominantly gram negative organisms, enterococci (Streptococcus fecaelis), and anaerobes. Specific intravenous antibiotic regimens are as follows:

1) Cefoxitin 2 gm IV every 6 hours; and

Gentamicin 80 mg IV every 8 hours; or

2) For patient's with a history of Penicillin or Cephalosporin allergy only:

Gentamicin 80 mg IV q8h; and

Metronidazole (Flagyl):

Loading dose - 15 mg/kg body weight IV infused over one hour (approximately 1 gm for average sized male); and

Maintenance dose - 7.5 mg/kg IV infused over one hour every 6 hours (approximately 500 mg)

Slow IV infusions are best accomplished by mixing in small bags of IV solution and running "piggy backs".

b. Intravenous fluids are utilized to maintain fluid and electrolyte requirements in the face of increased need and decreased intake. Dextrose 5% and Lactated Ringer's solution (D5LR) should be started at 150 ml/hour. Additional fluid replacement will be needed for the additional losses caused by fever, diaphoresis, emesis, diarrhea, and nasogastric suctioning. Fluid and electrolyte replacement must keep pace with losses to prevent dehydration and electrolyte imbalance. Monitor the urine output to maintain at least 1000 ml/day (or 1/2 ml per kg body wt per hour) and increase fluid intake as needed. Urine specific gravity and hematocrit are also good

indicators of the adequacy of hydration.

c. Intestinal rest is accomplished by making patient NPO (nothing by mouth) and by nasogastric suctioning. Low-intermittent suction (1-3 psi) is most effective. Irrigation of the tube with small volumes of saline may be needed periodically to maintain patency. Remember anything by mouth may be released into the peritoneal cavity by way of the perforation.

NOTE: PAIN MEDICATIONS ARE CONTRAINDICATED since they will mask the symptoms thereby masking possible deterioration in the patient's condition difficult to detect. The head of the bed should be kept in bed in a slightly elevated (semi-Fowler's) position to prevent subdiaphragmatic involvement.

5. USUAL COURSE WITH TREATMENT

Improvement should follow sealing of the perforation and gradual resolution of the chemical peritonitis caused by the gastric contents. Antibiotic therapy and IV fluids may buy the necessary time to allow this to occur. Shock associated with intestinal perforation is, however, usually not well controlled and cases of perforation should be MEDEVAC'ed as soon as possible for surgical treatment.

6. COMPLICATIONS AND THEIR MANAGEMENT

The greatest dangers of duodenal perforation are shock and abscess formation. Spillage of gastric contents into the peritoneal cavity results in a chemical 'burn' leading to extravasation of large amounts of fluids into the peritoneal space. This may be followed by hypovolemic shock. The shock produced by the peritoneal irritation and fluid loss can be profound and occur with great rapidity. Worsening of the hypovolemic shock is a grave sign and requires an all out effort at fluid and electrolyte replacement and maintenance of blood pressure.

Dramatic symptomatic relief is often seen 6-10 hours after perforation as adhesions form and halt the flow of gastric contents into the peritoneum. This event will reduce the possibility of shock, but will not affect abscess formation since bacterial seeding occurs early. Abscesses can form in any area of the peritoneal space. Initial resolution followed by development of fever, tachycardia, and a general deterioration in the status of hydration and electrolyte balance despite vigorous fluid replacement indicates abscess formation and sepsis.

Small Bowel Obstruction (SMBOBS)

1. **TREATMENT PROTOCOL AT A GLANCE** (see detailed discussion of treatment below; this section is for quick reference)

Notify command of need for immediate MEDEVAC

Goals of treatment pending MEDEVAC:

a. prevent dehydration
b. treat for shock
c. decompress the distension
d. antibiotics

a. Start IV D5NS or D5LR at 150 ml/hr, adjust rate as needed to maintain adequate hydration. Monitor urine output as indicator of hydration status.

b. Bolus therapy may be required to maintain blood pressure if patient goes into shock. Monitor vital signs carefully.

c. Keep patient NPO. Place NG tube to low-intermittent suction.

d. Appropriate antibiotic therapy is crucial:

1) Cefoxitin 2 gm IV every 6 hours; and

Gentamicin 80 mg IV every 8 hours; or

2) For patient's with a history of Penicillin or Cephalosporin allergy only:

Gentamicin 80 mg IV q8h; and

Metronidazole (Flagyl):

Loading dose - 15 mg/kg body weight IV infused over one hour (approximately 1 gm for average sized male); and

Maintenance dose - 7.5 mg/kg IV infused over one hour every 6 hours (approximately 500 mg)

Slow IV infusions are best accomplished by mixing in small bags of IV solution and running "piggy backs".

Note: Analgesics are relatively contraindicated since they will mask the symptoms and make it difficult to follow the progress of the illness.

2. DISCUSSION

Intestinal obstruction represents the prevention of passage of intestinal contents by mechanical blockage or failure of bowel motility. The causes include scarring or adhesions from previous surgery or peritonitis, entrapment of a section of bowel in a hernia, fecal impaction, intestinal parasites, carcinoma, twisting, or intussusception of the bowel, inflammatory disease of the bowel and paralytic ileus.

Patients with intestinal obstruction will typically present with abdominal pain, constipation, vomiting, abdominal distension, and failure to pass flatus. The abdominal pain is described as crampy and intermittent, occurring at 3-5 minute intervals. If the obstruction is proximal (close to the stomach), the vomiting may be profuse and the distention not as pronounced. Distal obstruction (closer to the colon or involving the colon itself) will present with less vomiting, but vomitus may contain fecal material. More distal obstruction will be associated with greater distension as intestinal gas and liquid contents accumulate behind the obstruction. Diarrhea may be evident early, followed by failure to pass either flatus or feces.

Examination will reveal abdominal distension, and hyperactive, high-pitched bowel sounds, often described as tinkling or rushes. Increased peristaltic activity may be visible proximal to the obstruction. Dehydration will be of variable severity, dependent on the duration of the complaint and the extent of the vomiting. Rectal examination should be performed to rule out fecal impaction which could be manually removed, detect lesions and test for occult blood (which might indicate the presence of a carcinoma). The white blood cell count will reveal an increased number of neutrophils.

3. DIFFERENTIAL DIAGNOSIS

The diagnosis of intestinal obstruction is usually easily made on the basis of physical examination. Early cases or partial obstructions or other conditions resulting in peritonitis, decreased bowel motility and distention may present diagnostic challenges. Other conditions to consider include:

a. acute appendicitis
b. acute cholecystitis
c. perforated duodenal ulcer
d. pancreatitis

a. Acute appendicitis - see APPEND
b. Acute cholecystitis - see CHOLE
c. Perforated duodenal ulcer - see PERFDU

d. Pancreatitis is associated with duodenal ulcer, cholecystitis, trauma, and alcoholism and will present as a boring epigastric pain radiating to the back. Signs and symptoms of

peritoneal irritation are sometimes present. Antacids will not relieve the pain of pancreatitis. Food, particularly fatty foods, will exacerbate the pain. Treatment should include bowel rest, with absolutely no fatty foods or alcohol permitted.

4. TREATMENT OF BOWEL OBSTRUCTION

The aims of treatment of intestinal obstruction are to prevent dehydration and shock and to attempt to decompress the distension in preparation for MEDEVAC.

a. Intravenous fluids are utilized to maintain fluid and electrolyte requirements in the face of increased need and decreased intake. There is also a potentially massive fluid shift into the lumen of the obstructed bowel. D5NS or D5LR should be started at 150 ml/hour. Additional fluid replacement will be needed for the additional losses caused by fever, diaphoresis, emesis, diarrhea, and nasogastric suctioning. Fluid and electrolyte replacement must keep pace with losses to prevent dehydration and electrolyte imbalance. Monitor the urine output to maintain at least 1000 ml/day (or 1/2 ml per kg body wt per hour) and increase fluid intake as needed. Urine specific gravity and hematocrit are also good indicators of the adequacy of hydration.

b. Decompression of the stomach and relief of distension can be accomplished by placement of a nasogastric tube and keeping the patient NPO. Low-intermittent suction (1-3 psi) is most effective. Irrigation of the tube with small volumes of saline may be needed periodically to maintain patency.

c. Appropriate antibiotic therapy is crucial. Bowel flora will be predominantly gram negative organisms, enterococci (Streptococcus fecaelis), and anaerobes. Specific intravenous antibiotic regimens are as follows:

1) Cefoxitin 2 gm IV every 6 hours; and

   Gentamicin 80 mg IV every 8 hours; or

2) For patient's with a history of Penicillin or Cephalosporin allergy only:

   Gentamicin 80 mg IV q8h; and

   Metronidazole (Flagyl):

   Loading dose 15 mg/kg body weight IV infused over one hour (approximately 1 gm for average sized male); and

   Maintenance dose 7.5 mg/kg IV infused over one hour every 6 hours (approximately 500 mg)

Slow IV infusions are best accomplished by mixing in small bags of IV solution and running "piggy backs".

d. Analgesics are relatively contraindicated since they will mask the symptoms and make it difficult to follow the progress of the illness. However, it may become necessary to offer the patient some pain relief by judicious use of morphine or Demerol.

5. USUAL COURSE WITH TREATMENT

Intestinal obstruction is an indication for immediate MEDEVAC since there is no reliable way to determine if necrosis of the involved bowel has occurred due to strangulation of the blood supply. The mortality is greatly increased by a delay in definitive care. Obstruction ordinarily does not resolve spontaneously.

6. COMPLICATIONS AND THEIR MANAGEMENT

Strangulation with or without perforation and peritonitis is heralded by a change in the character of the pain which will be continuous and severe. Abdominal sounds will be diminished, and tachycardia, fever, tachypnea and a deterioration of the hydration status despite rigorous efforts will be evident. Morbidity is high in this scenario. Continue supportive care pending MEDEVAC.

Pelvic Inflammatory Disease (PID)

1. DISCUSSION

Pelvic inflammatory disease (PID) is a clinical syndrome characterized by the spread of micro-organisms from the vagina and cervix to the endometrium, fallopian tubes and related pelvic structures. Etiology may be bacterial or nonbacterial. Gonococcus and Chlamydia are the most common offending agents. Polymicrobial infections are common. Predisposing factors include: multiple sexual partners, IUD, and introduction of foreign bodies into the vagina.

History and examination reveal lower quadrant abdominal pain and tenderness, which may be bilateral or unilateral, though infection is usually present bilaterally. On pelvic exam, cervical motion tenderness, purulent cervical discharge, adnexal tenderness, plus one or more of the following is diagnostic:

a. positive gram stain for gonococcus.
b. temperature greater than 38°C (100.4°F).
c. WBC > 10,000/cu mm.
d. pelvic abscess on examination.

Other findings on physical examination may include liver tenderness, abdominal rigidity and/or guarding, abdominal distension, decreased bowel sounds, adnexal mass, vaginal bleeding, vaginal discharge, dysuria, and/or low back pain.

As a general rule, PID associated with gonococcal infections presents with more severe symptoms than those associated with nongonococcal infections. Many cases are asymptomatic.

2. DIFFERENTIAL DIAGNOSIS:

a. incomplete abortion and Septic abortion
b. pyelonephritis
c. appendicitis
d. diverticulitis
e. ruptured ovarian cyst
f. cholecystitis
g. pelvic thrombophlebitis
h. ectopic pregnancy
i. intestinal obstruction
j. endometriosis

a. Incomplete and septic abortion - see INCOMPLETE ABORTION

b. Pyelonephritis - see URINARY TRACT INFECTION

c. Appendicitis - see APPENDICITIS

d. Diverticulitis usually occurs in older individuals. It may occur on the right side, but most commonly is on the left. See APPENDICITIS.

e. Ruptured ovarian cyst - see OVARIAN CYST

f. Cholecystitis - see CHOLECYSTITIS

g. Pelvic thrombophlebitis typically presents with abdominal pain and recurrent spiking fever developing 2-21 days post-partum, or following abortion or pelvic surgery. The pain may be minimal and poorly localized. Tachycardia and tachypnea may be associated findings. The white count will range from normal to as high as 25,000/cu mm.

h. Ectopic pregnancy - see ECTOPIC PREGNANCY

i. Intestinal obstruction - see SMALL BOWEL OBSTRUCTION

j. Endometriosis has a nonspecific presentation including progressive dysmenorrhea, pelvic pain, and infertility. Premenstrual spotting, meno-metrorrhagia, rectal bleeding, and hematuria are common. On pelvic examination tender nodularities may be present. Definitive diagnosis is made with direct visualization by laparotomy or laparoscopy.

3. TREATMENT OF PELVIC INFLAMMATORY DISEASE

Treatment of PID requires broad spectrum antibiotic coverage, as well as supportive therapy.

a. Antibiotics: In the absence of peritoneal signs (stage I PID), therapy may be initiated with oral antibiotics. Suggested regimens are outlined below:

1) Ceftriaxone (Rocephin) 250 mg IM single dose; and Doxycycline (Vibramycin) 100 mg PO bid for 14 days.

2) Spectinomycin (Trobicin) 2 gm IM may be substituted for ceftriaxone if the patient is penicillin allergic.

The patient must be followed closely. If there is no improvement in 48 hours, or the initial evaluation reveals evidence of peritonitis (stage II PID), more aggressive therapy is required:

3) Ceftriaxone 500 mg IM or IV q 6 hours; and Doxycycline 100 mg IV q 12 hours (if available, not currently on AMAL) or 100 mg PO bid.

(Cefoxitin 2 gm IV q 6 hours may be substituted for ceftriaxone.)

4) Metronidazole (Flagyl) 1 gm IV q 12 hours may be substituted for ceftriaxone if the patient is penicillin allergic.

Continue IV antibiotics for a minimum of 2 days after improvement is noted, but for at least 4 days. Switch to the appropriate PO regimen and continue the doxycycline for a total of 14 days.

b. Supportive therapy:

1) Bed rest with elevation of the head.

2) Abstinence from sexual intercourse throughout the course of the treatment.

3) Encourage po fluid intake.

4) Analgesics acetaminophen and codeine (Tylenol 3) 1-2 tablets PO q4 hours PRN.

MEDEVAC and inpatient therapy must be sought if any of the following conditions exist in conjunction with PID:

a. nulliparity
b. presence of tubo-ovarian mass or abscess
c. pregnancy
d. uncertain diagnosis
e. gastrointestinal symptoms
f. peritonitis in upper quadrants
g. presence of an intrauterine device (IUD)
h. recent history of abdominal or pelvic surgery
i. inadequate response to outpatient therapy.

4. USUAL COURSE WITH TREATMENT:

Recovery can be anticipated in the vast majority of patients given appropriate treatment. There is a high degree of recurrence of this disease with future sexually transmitted infections. Scarring of the fallopian tubes secondary to the infection increases the risk of infertility and ectopic pregnancy. Twenty percent may develop chronic pelvic pain without evidence of infection.

5. COMPLICATIONS AND THEIR MANAGEMENT:

a. Tubo-ovarian abscess formation (stage III PID) and intra-abdominal rupture (stage IV PID) are the most serious complications of PID. The mortality of a ruptured abscess ranges from 10-50%. The diagnosis must be suspected if the patient presents with signs of generalized peritonitis or septic shock, especially if accompanied by a high, spiking fever, chills, tachycardia, and hypotension. This condition is a medical emergency requiring immediate MEDEVAC. Prompt intervention with fluid resuscitation to restore blood pressure may be

required.

Therapy will include IV antibiotics as outlined above.

Add: Gentamicin 2 mg/kg body weight IV followed by 1.5 mg/kg IV q 8 hours.

b. Fitz-Hugh-Curtis Syndrome is a perihepatitis resulting from the spread of infection into the peritoneal cavity and to the liver capsule. The patient will present with sudden onset of severe sharp pain in the right upper quadrant and liver edge tenderness. The pain may be aggravated by deep breathing, coughing, or movement, and may be referred to the shoulder. Fever, chills, sweats, nausea and headache are common. Presentation may mimic cholecystitis. This condition is a medical emergency which requires immediate MEDEVAC.

c. Infertility occurs in approximately 20% of patients with PID secondary to tubal occlusion. The extent of tubal occlusion increases with repeated bouts of PID and the severity of the infections. Counsel all female STD patients on these risks.

d. Ectopic pregnancy may result from damage to the fallopian tubes. PID is the most common cause of ectopic pregnancy. A patient recovering from PID should be referred for counseling and follow-up with OB-GYN. See ECTOPIC PREGNANCY.

Urinary Tract Infection (UTI)

1. DISCUSSION

Urinary tract infections are divided into lower tract infections involving the bladder (cystitis) and more serious upper tract infections involving the kidneys (pyelonephritis). The offending organism is most commonly E. coli from the patient's own natural flora, though many others are seen. Ninety-five percent of the cases arise as bacteria ascends the urethra, while 5% arise via other routes including hematogenous spread and secondary to bladder catheterization. UTI's are more common in the female due to the shorter, wider urethra. Predisposing factors include decreased resistance to infection, urinary stasis from obstruction or abnormal bladder function, pregnancy, kidney stones, neurogenic bladder, and diabetes.

Signs and symptoms of cystitis include suprapubic abdominal pain, dysuria, and urinary frequency. Fever, nausea, and vomiting are inconstant findings. On microscopic examination the urine will exhibit >8 white blood cells (WBC)/high power field (hpf) and one bacteria per oil emersion field (equivalent to 100,000 bacteria/ml). Routine urinalysis may show an increase in pH, positive leukocytes, and positive nitrite (if organism is urea splitting).

Pyelonephritis may result from the reflux of urine up the ureters. Fever (>101^{o}F), rigors, nausea, vomiting, flank pain, and tenderness are indicative of kidney involvement. Patients with pyelonephritis, if not adequately treated, may become septic. Labs may demonstrate an increased WBC count on CBC, hematuria, proteinuria, ketonuria, and white blood cell casts on microscopic urine examination.

2. DIFFERENTIAL DIAGNOSIS

The differential diagnosis of cystitis includes:

a. urethritis
b. vaginitis
c. genital herpes

a. Urethritis is more common in males and presents with similar symptoms and lab findings. Five to eight WBC/hpf on microscopic urine examination is sufficient for diagnosis. Treatment is the same as for cystitis.

b. Vaginitis may have a similar presentation with a complaint of dysuria, additionally the patient may have evidence of vaginal discharge and vaginal itching.

c. Genital herpes presents with characteristic lesions in most primary cases. However, recurrent episodes may present with symptoms

similar to cystitis. Occasionally, dysuria may precede the appearance of the lesions in both primary and recurrent cases making diagnosis difficult.

The differential diagnosis of pyelonephritis includes:

a. renal contusion
b. perinephric abscess
c. glomerulonephritis
d. cholecystitis
e. appendicitis
f. kidney stones
g. renal neoplasm

a. Renal contusion secondary to trauma may produce flank pain and hematuria. A history of trauma makes the diagnosis clear.

b. Perinephric abscess see Complications of UTI (below)

c. Glomerulonephritis is inflammation and damage to the microscopic structure of the kidney. There are a number of different causes and manifestations. WBC's, RBC's and red and white cell casts may be seen. The urine is usually sterile. Proteinuria may be pronounced.

d. Cholecystitis see CHOLECYSTITIS

e. Appendicitis see APPENDICITIS

f. Kidney stones see RENAL COLIC

g. Renal neoplasms (tumor) may present with hematuria, flank pain, and fever. White cells and bacteria will not be seen in the urine ordinarily. A neoplasm may cause urinary stasis, producing an infection, however.

3. TREATMENT OF URINARY TRACT INFECTION

a. The treatment of cystitis involves the administration of fluids and antibiotics.

1) Fluids: The patient should be advised to drink several (8-10) glasses of water per day to help flush out the urinary tract as well as to prevent dehydration.

2) Antibiotics: Single dose regimens for uncomplicated cystitis include:

a) Amoxicillin 3 grams PO, or

b) Trimethoprim-Sulfamethoxazole (Bactrim,Septra) one double strength (DS) tablet PO

3) Ten day regimens should be employed if the patient:

is pregnant.
is unresponsive to initial single dose therapy.
has evidence of upper urinary tract infection.
has evidence of urologic abnormalities.
is a child.
is male.
is unreliable or non-compliant.
is greater than six days past the onset of symptoms.

Ten day antibiotic regimens include:

a) Trimethoprim/Sulfamethoxazole (Septra, Bactrim) one DS tablet PO BID (not for use during pregnancy or while breast feeding).

b) Ampicillin 250 mg PO QID (use this drug in pregnant and breast feeding women).

c) Sulfisoxazole (Gantrisin) 1.5 gm PO QID (not for use during pregnancy or while breast feeding).

d) Nitrofurantoin (Furdantin, Macrodantin) 100 mg PO QID x 10 days (not for use during pregnancy or while breast feeding).

4) Pyridium is a drug that is excreted in the urine and acts as a topical anesthetic on the bladder and urethral mucosa.

Phenazopyridine (Pyridium) 200 mg PO TID x 2-3 days. Do not use for more than three days. Longer courses may mask the symptoms of continued infection.

Warn the patient that this drug may cause their urine to be red or orange.

b. The treatment of pyelonephritis involves antibiotics and fluid administration. Patients with mild illness who are not toxic (septic) and able to maintain hydration orally can be managed locally with close follow-up. Patients who are toxic or who cannot maintain good hydration with oral fluids or who fail to improve should be evacuated for inpatient IV hydration, and antibiotics. If the patient is pregnant they should be MEDEVAC'ed for inpatient care.

The treatment for uncomplicated pyelonephritis is:

1) Fluids: The patient should be instructed to drink 3-4 L of water or other clear fluids per day to increase urine output and maintain hydration.

2) Antibiotics

a) Ampicillin 1 gm PO QID x 10 days. (use in pregnant and breast feeding women).

b) Trimethoprim/Sulfamethoxazole (Bactrim, Septra) one DS tablet PO BID x 10 days. (Not for use during pregnancy or while breast feeding).

c) Sulfisoxazole (Gantrisin) 1 gram PO QID x 10 days. (Not for use during pregnancy or while breast feeding).

3) Pyridium may be used as outlined above.

4. USUAL COURSE WITH TREATMENT:

Patients with uncomplicated cystitis usually begin to feel relief within 48 hours, sooner if Pyridium is used. The patient must be instructed to return if the symptoms continue. The importance of drinking large amounts of fluids cannot be over stressed. The patient must be instructed to complete the course of antibiotics and continue the medications even after the symptoms improve. A follow-up urinalysis should be done after completion of the antibiotic course.

Patients with pyelonephritis may notice relief of their urinary symptoms (dysuria, frequency etc.) before their constitutional symptoms and flank pain. Improvement should be noted within 48 hours. Worsening symptoms should be treated aggressively. Permanent kidney damage can result.

5. COMPLICATIONS AND THEIR MANAGEMENT:

a. Complications of cystitis include:

1) Pyelonephritis see PYELONEPHRITIS above.

2) Septic shock - see BACTEREMIA under complications of pyelonephritis.

3) Kidney stones see RENAL COLIC

b. Complications of pyelonephritis include:

1) Bacteremia is the spread of bacteria into the blood stream. This may be asymptomatic, or the patient may demonstrate signs of septicemia with high, spiking fevers, shaking chills (rigors), nausea, vomiting and prostration. Some cases may progress to septic shock, with tachycardia, tachypnea, and hypotension. These patients are gravely ill and require aggressive care pending MEDEVAC.

Treatment for bacteremia/septicemia:

a) notify command of the need for MEDEVAC

b) start IV D5NS or D5LR

c) Ampicillin 1 gram IV q 4 hours; and Gentamicin 80 mg IV q 8 hours

d) Remain prepared for large volume fluid resuscitation should patient's blood pressure begin to fall.

2) Perinephric abscess primarily occurs in association with recurrent infections, immunocompromise, diabetes, or urinary tract obstruction. The patient may present up to 2-3 weeks following an episode of pyelonephritis with persistent fever, vague constitutional symptoms, and flank or chest pain. Such abscesses require MEDEVAC and inpatient treatment and may require surgical drainage. Treat with the above IV antibiotic regimen pending MEDEVAC.

3) Acute renal failure (ARF) is a rare complication of pyelonephritis most often seen in severely dehydrated patients. It may be transient or permanent. It may present as a marked decrease in urine output despite evidence of adequate hydration. It requires immediate MEDEVAC for intervention. Use of IV fluids in the interim must be closely monitored. It is possible to fluid overload the patient and produce respiratory compromise.

Ovarian Cyst

1. DISCUSSION

Benign ovarian cysts are fluid filled masses located on the ovary. They are most common in women in the child-bearing years and are under hormonal influence. They may be filled with clear fluid or blood, vary greatly in size, and may be unilateral or bilateral. There are different types of ovarian cysts with differing potentials for later malignancy. They are usually asymptomatic unless torsion (twisting) or rupture occurs. Large cysts may cause aching pelvic pain, dyspareunia, and, occasionally, abnormal uterine bleeding. On pelvic exam, the ovary may be slightly enlarged and tender to palpation.

Some cysts have thin walls and are prone to rupture during the pelvic examination. This rupture occasionally causes transient pain and very rarely significant bleeding. Other types of cysts are less prone to rupture, but may cause significant bleeding if they do. The rupture of a cyst can cause peritoneal irritation from fluid or blood. The pain associated with this irritation tends to be constant and exacerbated by motion.

With torsion of a cyst, the pain may be mild and intermittent if the torsion is incomplete, or severe and constant if infarction occurs. An infarcted, gangrenous cyst may cause peritonitis.

There are a number of malignancies that are cystic. All patients suspected of having ovarian cysts should, therefore, be referred to a Gynecologist at the earliest opportunity.

2. DIFFERENTIAL DIAGNOSIS

a. ectopic pregnancy
b. acute appendicitis
c. pelvic inflammatory disease
d. diverticulitis

a. Ectopic Pregnancy see ECTOPIC PREGNANCY. If an adnexal mass is palpated and there is a possibility that the patient is pregnant (eg: history of unprotected intercourse) MEDEVAC. Err on the side of over-diagnosing ectopic pregnancy. Failure to do so could be catastrophic.

b. Acute appendicitis see APPENDICITIS.

c. Pelvic inflammatory disease see PID.

d. Diverticulitis most commonly involves the descending (left) colon. Symptoms are often intermittent and moderate, but may be acute. This condition has been described figuratively as a "left-sided

appendicitis", but may present with a pelvic or lower abdominal mass and peritoneal signs, thus mimicking a gynecological problem.

3. TREATMENT OF OVARIAN CYST

Treatment of ovarian cysts is symptomatic and supportive. For intermittent pain due to torsion, Motrin 400 mg PO qid should provide relief. The pain associated with the majority of ruptured cysts will resolve spontaneously in several hours. If the pain does not subside, consider one of the complications of ovarian cyst and carefully monitor the patient accordingly.

4. USUAL COURSE WITH TREATMENT

The symptoms of ovarian cysts will usually resolve spontaneously, but it may take up to 8 weeks, as the cyst reabsorbs. If the cyst ruptures, symptoms should resolve in a matter of hours if the bleeding is not severe.

5. COMPLICATIONS AND THEIR MANAGEMENT

a. Rupture may result in significant hemorrhage in rare cases. These cases will become obvious as symptoms persist and become more severe. Immediate MEDEVAC is required. Two IV lines (18g or larger) should be placed with NS or LR at KVO. The patient should be closely monitored for signs of shock (tachycardia, tachypnea, hypotension, etc.) and volume resuscitation implemented accordingly. If pain is severe, narcotic analgesics may be used judiciously, but care should be taken to avoid hypotension.

b. Malignancy must be ruled out. Refer all cases to a Gynecologist as soon as possible.

c. Pregnancy: Presence of any of the symptoms of an ovarian cyst in conjunction with pregnancy requires immediate MEDEVAC to rule out ectopic pregnancy.

Ectopic Pregnancy

1. DISCUSSION

Ectopic pregnancy is the implantation of a fertilized ovum outside the fundus of the uterus. It is a medical emergency which requires immediate MEDEVAC and surgical intervention. It is the leading cause of maternal death in the first trimester of pregnancy, with delay in diagnosis contributing to the majority of these deaths. The fertilized ovum may implant in the fallopian tube, ovary, abdominal viscera, or the cervix. Regardless of the site of implantation, the fetus grows until it ruptures the supporting structure. This rupture results in massive bleeding which may ultimately exsanguinate the patient. Signs and symptoms may occur prior to or following the rupture. There is often a history of PID or other gynecologic infections.

Typically, menses are 1 to 2 weeks late, with spotting and intermittent cramping pelvic pain. Rupture may be preceded by increased vaginal bleeding. Abdominal pain will increase and may initially present as pressure in the pelvis; it is variable in character and intensity. Hemorrhage may be gradual or catastrophic, resulting in rapid onset of shock.

On examination, the uterus is enlarged, but smaller than anticipated for dates. There will be cervical motion tenderness and an adnexal mass may be present. Absence of the latter does not rule out the diagnosis. Intraperitoneal bleeding may produce generalized abdominal pain and tenderness, rebound, and other signs of peritonitis. The peritonitis may, however, be lateralized to the side of the rupture. Vital sign derangement will reflect the degree of hemorrhage.

2. DIFFERENTIAL DIAGNOSIS

Other illnesses and conditions which may produce symptoms mimicking ectopic pregnancy are listed below.

Err on the side of over-diagnosing ectopic pregnancy. Failure to do so could be catastrophic.

a. pelvic inflammatory disease
b. acute appendicitis
c. ovarian cyst
d. threatened/incomplete abortion
e. endometriosis
f. diverticulitis

a. Pelvic inflammatory disease see PID

b. Acute appendicitis see APPENDICITIS

c. Ovarian cyst see OVARIAN CYST

d. Threatened/Incomplete abortion see INCOMPLETE ABORTION

e. Endometriosis has a nonspecific presentation, including progressive dysmenorrhea, pelvic pain, and infertility. Premenstrual spotting, meno-metrorrhagia, rectal bleeding, and hematuria are common. On pelvic examination tender nodularities may be present. Definitive diagnosis is made with direct visualization by laparotomy or laparoscopy.

f. Diverticulitis most commonly involves the descending (left) colon. Symptoms are often intermittent and moderate, but may be acute. This condition has been described figuratively as a "left-sided appendicitis", but may present with a pelvic or lower abdominal mass and peritoneal signs, thus mimicking a gynecological problem.

3. TREATMENT OF ECTOPIC PREGNANCY

Regardless of whether the diagnosis of ectopic pregnancy is made before or after rupture, arrange for immediate MEDEVAC.

Definitive, life-saving care is surgical.

Treatment pending MEDEVAC is supportive and adjusted according to the severity of the hemorrhage.

The treatment regimen for the patient with no signs or symptoms of rupture or shock include:

a. Establish intravenous access with two large-bore (18 ga or larger) catheter with NS or LR at 100-125 ml/hour.

b. Carefully monitor for signs of rupture and/or shock.

c. Avoid the use of analgesics. Masking symptoms of a ruptured ectopic pregnancy could be catastrophic.

The treatment regimen for the patient with any sign of rupture and/or shock include:

a. Immediate placement of two large-bore (18 ga or larger) catheters and fluid administration (NS or LR) to maintain blood pressure. Rapid infusion of several liters may be necessary. If facilities for transfusion are available, consider transfusing whole blood as needed.

b. Oxygen 2 liters/minute via nasal canula.

c. Avoid the use of analgesics as they may exacerbate hypotension.

d. Use of MAST suit to assist in the treatment of profound shock may be indicated.

4. USUAL COURSE WITH TREATMENT

The overall mortality rate of ectopic pregnancy is less than 1% when definitive, surgical treatment is available. Delay in obtaining treatment, either due to misdiagnosis or to delay in the patient's seeking care, contributes significantly to the morbidity.

Failure to maintain adequate volume infusion and to support the patient's blood pressure may result in death.

5. COMPLICATIONS AND THEIR MANAGEMENT

The most serious complication of an ectopic pregnancy is hemorrhaging and shock secondary to rupture. Once the diagnosis of ectopic pregnancy is made, or even in the case where it cannot be ruled out, MEDEVAC must be arranged at once. Should rupture occur without immediate access to surgical care, the prognosis is poor.

Spontaneous Abortion

1. DISCUSSION

Abortion is defined as the delivery of the products of conception (POC) prior to the twentieth week of gestation. In spontaneous abortion this occurs without outside inducement or influence. Spontaneous abortion may be classified as threatened, inevitable, incomplete, or complete.

Threatened abortion: any bleeding or cramping during first 20 weeks of gestation. Cervix is closed. No passage of POC.

Inevitable abortion: intolerable pain, or bleeding that threatens maternal well-being. Cervix may be partially open. No passage of POC.

Incomplete abortion: same as inevitable abortion except cervix will be partially open and there is some passage of POC. Retained POC may be visible in cervical os on speculum exam.

Complete abortion: history of pain and bleeding. All POC are passed. Cervix is closed. Uterus has shrunk back down to its normal size. A loss of the subjective signs of pregnancy may be reported. Bleeding at time of presentation may be limited to spotting.

Threatened abortion occurs in approximately 20 to 30% of pregnancies. Ten to fifteen percent of pregnancies actually end in spontaneous abortion. Most of these occur between the 8th and 14th weeks of pregnancy.

Frequently, the pregnancy has not been diagnosed prior to presentation with spontaneous abortion. Therefore, a discussion of the presentation must include the signs and symptoms of pregnancy. These include a history of unprotected intercourse or inadequate contraception, delay of menses greater than one week in an ordinarily regular cycle, breast engorgement or tenderness, nausea and vomiting, fatigue, abdominal enlargement and uterine enlargement on pelvic exam. Signs and symptoms will change with increasing gestational age. Several other signs may be noted by the experienced examiner on pelvic exam. A urine HCG, if available, is highly supportive of the diagnosis of pregnancy, but may be negative with spontaneous abortion.

Missed abortion is a related complication of early pregnancy. This is defined as a pregnancy which has been retained for 2 months or more following the death of the fetus. It occurs more commonly later in the first trimester or early second trimester. Missed abortion is manifested by the loss of subjective signs of pregnancy and a decrease in uterine size. The cervical os will be closed with no evidence of fresh bleeding. A brown discharge may be present. There is an absence

of pain or tenderness. The pregnancy test will be negative.

2. DIFFERENTIAL DIAGNOSIS

The differential diagnosis of a spontaneous abortion includes:

a. ectopic pregnancy
b. ovarian cyst

a. Ectopic pregnancy see ECTOPIC PREGNANCY. If an adnexal mass is palpated and there is a possibility that the patient is pregnant (eg: history of unprotected intercourse) MEDEVAC. Err on the side of over-diagnosing ectopic pregnancy. Failure to do so could be catastrophic.

b. Ovarian cyst see OVARIAN CYST

3. TREATMENT OF SPONTANEOUS ABORTION

a. Threatened Abortion:

1) Place the patient at strict bed rest.

2) Notify command of need for MEDEVAC.

3) No intercourse, tampons, or other foreign objects in vagina.

4) Observe and quantify bleeding in units of 'pads soaked per hour', record in note.

5) Start a large bore IV (18g or larger) with NS or LR at KVO.

6) Monitor vital signs carefully to insure hemodynamic stability.

7) Avoid use of sedatives and analgesics, if possible, until viability of fetus is determined; however, diazepam (Valium) 2.5 mg IM q 3-4 hours for sedation or meperidine (Demerol) 50-75 mg IM q 3-4 hours for pain may be used if absolutely necessary.

b. Inevitable and Incomplete Abortion:

1) Institute treatment plan for threatened abortion including plans for MEDEVAC.

2) Start second large bore IV (18g or larger). Monitor vital signs for signs of hemodynamic compromise and infuse fluids as needed.

3) To control bleeding, if greater than 1-2 pads soaked per hour, use:

Oxytocin 10 units (1 ml) in 500 ml of D5NS to run at 10-40 drops per minute.

4) Preserve all passed products of conception and transport with patient for later examination. (Use formalin if available; if not a 50% solution of ethanol or isopropyl alcohol in saline may be used).

5) Diazepam (Valium) 2.5 mg IM q 3-4 hours PRN and meperidine (Demerol) 50-75 mg IM q 3-4 hours PRN may be used for sedation and analgesia respectively.

c. Complete abortion: As it is difficult to determine whether the abortion is complete without a gynecological examination, the protocol for inevitable or incomplete abortion should be followed.

4. USUAL COURSE WITH TREATMENT

With prompt medical treatment the prognosis for maternal survival is excellent. The patient may experience intermittent bleeding and cramping during the following week.

With the above measures approximately 50% of threatened abortions will be carried to term. In the majority of spontaneous abortions the fetus is either absent or has abnormalities incompatible with life. A single spontaneous abortion is usually ascribed to chance. You must use careful judgment, but some patients may find these facts reassuring. Since all of these patients must ultimately be referred for gynecological care, a discussion of further work-up is unnecessary here.

5. COMPLICATIONS AND THEIR MANAGEMENT

a. Septic abortion develops when the contents of the uterus become infected before, during, or after abortion. Prior to legalized abortion, this was most often associated with induced abortions by untrained persons.

In addition to the signs and symptoms of spontaneous abortion, the patient will present with fever (> 102°F), weakness, purulent, foul-smelling vaginal discharge, and cervical pain on pelvic exam. The patient may also be tachycardic and hypotensive due to the infection or blood loss. On CBC, the white count will be elevated. This is a life-threatening situation which require immediate MEDEVAC.

Add the following antibiotics to the inevitable/incomplete abortion regimen for the first 24 hours:

Penicillin 3 million u IV q 4 hours and

Gentamicin 1.5 mg/kg IV q 8 hours

b. Coagulation disorders including disseminated intravascular coagulopathy (DIC) may rarely develop, particularly with missed abortion. The patient may develop massive bleeding due to a consumption of their own clotting factors. This disorder requires very complex management including transfusions of fresh frozen plasma and platelets. Immediate MEDEVAC is warranted.

APPENDIX B

DATA SHEET DEFINITIONS

The definitions listed below are intended for use in the context of the program. In some cases they may differ from the traditional usage or your training. Additionally some terms may seem to be included in an inappropriate category. This is due to the nature of the statistical analysis performed by the program and the way it weighs different findings in relation to one another. Do not use this section in place of a medical dictionary or a physical examination text. HOWEVER, it is important that you and the computer are "speaking the same language", so familiarize yourself with this section.

HISTORY PAGES

PAGE ONE

SITE OF PAIN at ONSET definition:

Mark the response in the left column which represents the site at the time the pain started. The corresponding area of the diagram will then be highlighted. Occasionally, pain isn't the first symptom of an illness which later involves abdominal pain. This would require an entry of NO PAIN.

SITE OF PAIN at PRESENT definition:

Mark the response in the right column which represents the site of pain at the time of examination. The corresponding area of the diagram will then be highlighted.

PAGE TWO

TYPE OF PAIN definition:

INTERMITTENT
STEADY
COLICKY

It's especially important to distinguish between the types of pain. If the pain is constant and present the whole time, mark STEADY on your data sheet. If the pain is present the whole time but varies rhythmically in intensity, mark COLICKY. If your patient has times when he's free of pain, mark INTERMITTENT.

SEVERITY OF PAIN definition:

MODERATE
SEVERE

Do not ask the patient directly and do not expect to rely on the answer if you do. If the pain is obviously intense and is causing obvious distress such as sweating or shivering, then it is SEVERE, otherwise it is MODERATE. The difficulty in distinguishing between mild and moderate pain is so great that we prefer to call all pain moderate or severe. Be especially wary of relying on the patient's description since the threshold for pain varies greatly between people. A patient with mild or moderate pain may make a great deal of fuss about it. The patient who is quiet may be in severe pain. Use your own judgment.

AGGRAVATING FACTORS definition:

MOVEMENT
COUGH
BREATHING
FOOD
OTHER
NONE

These are factors which make the pain worse. The patient should be asked about each item specifically. The patient should be asked to actually perform some MOVEMENT, deep BREATHING, and COUGH to see if his pain is aggravated.

PROGRESS OF PAIN definition:

BETTER
SAME
WORSE

Pain which has subjectively remained unchanged is termed SAME. The categories of BETTER and WORSE refer to subjective changes in pain prior to seeing the practitioner. It is often difficult to evaluate this category since abdominal pain can vary so much. In this instance, don't mark any of the choices. Instead, write 'VARIABLE' on the data sheet and skip this entry when performing data input.

DURATION OF PAIN definition:

12h or less
12-24h
24-48h
48+h

Acute abdominal pain is classically defined as pain beginning less than 48 hours prior to presentation. The term DURATION refers to the length of time which the patient has had the pain during this current episode. Similar pain in the past (i.e. at some time greater than 48 hours ago), should be entered under the category of PREVIOUS SIMILAR PAIN.

RELIEVING FACTORS definition:

LYING STILL
VOMITING
ANTACIDS
FOOD
OTHER
NONE

These are factors that make the pain subside. The patient should be asked about each item specifically.

PAGE THREE

NAUSEA definition:

PRESENT
ABSENT

NAUSEA refers to the feeling of being "sick to one's stomach". It is possible to have nausea without vomiting and occasionally, vomiting without nausea. This category refers to the entire present episode, not just at the time he is seen by the practitioner.

VOMITING definition:

PRESENT
ABSENT

Ask if the patient has vomited at any time during this present episode of pain.

BOWELS definition:

NORMAL
CONSTIPATED
DIARRHEA
BLOOD IN STOOL
MUCUS IN STOOL

Identify any recent change in the patient's bowel habits. Remember that 'normal' bowel habits vary widely from one patient to another. BLOOD IN STOOL refers to either bright red blood (hematochezia) or black, tarry stool (melena). If the duration of the present illness is too short to be certain of a choice from this category, leave the entry blank on the data sheet and skip this category when entering data.

APPETITE definition:

DECREASED
NORMAL

This category is intended to reflect any recent change in the patient's appetite. If the patient typically has a poor appetite with no significant change during this current illness, then his appetite is NORMAL.

JAUNDICE definition:

PRESENT
ABSENT

The term JAUNDICE in this portion refers to an appearance of yellow color to the patient's skin or sclera. Mark PRESENT if you note it now or it has been noticed recently by the patient.

URINATION definition:

NORMAL
FREQUENCY
PAINFUL
DARK URINE
BLOOD IN URINE

Note any recent change in urinary habits. Mark FREQUENCY if the patient relates that he has been urinating more often than usual. DARK URINE may be due to gall bladder illness but occasionally indicates dehydration.

BLOOD IN URINE (either grossly or by Labstix) often indicates a

stone in the urinary tract, especially when accompanied by flank pain.

PAGE FOUR

PREVIOUS INDIGESTION definition

YES
NO

PREVIOUS INDIGESTION refers to gastrointestinal upset prior to or as a prodrome to the present episode.

PREVIOUS SIMILAR PAIN definition:

YES
NO

Mark YES if your patient has had a bout of similar abdominal pain prior to the present episode.

PREVIOUS SURGERY definition:

YES
NO

Mark YES if the patient has had abdominal surgery. Only those operations where the peritoneum was entered should be counted. When in doubt, check for operative reports in the patient's health record.

Prior history of inguinal herniorrhaphy may be very important to the diagnosis, especially if there was incarceration of bowel involved. Note this history carefully, but do not enter it as a YES in the program.

PREVIOUS ILLNESS definition:

YES
NO

This requires judgment on the part of the practitioner. Answer YES if there are items in the history (including hospitalizations) which are thought to be pertinent to the present illness. If YES, add details to the back of the data sheet.

TAKING MEDICATIONS definition:

YES
NO

Mark YES if your patient is taking medication to relieve symptoms associated with this episode only. Any medication may be of importance. For example, if the patient is taking a non-steroidal anti-inflammatory drug, such as Motrin, this is important to know, because this may contribute to ulcer disease. Record all medications carefully, but do not enter YES unless it is associated with the present illness as described above.

PAGE FIVE

PERIODS definition:

NOT STARTED
CEASED
REGULAR
IRREGULAR

Categorize the typical pattern of the patient's menstrual cycle. NOT STARTED is reserved for patients who have never had a period and CEASED indicates that the patient is post-menopausal. REGULAR does not necessarily mean every 28 days, some women have slightly longer or shorter cycles. Additionally, women who are ordinarily regular, who have missed their last period may still be marked REGULAR. IRREGULAR indicates a long standing variable interval between periods or bleeding between periods.

LAST PERIOD definition:

NORMAL
LATE/OVERDUE

Ask the patient for the date of the last period and the one prior to that. If the last period was more than one week past its anticipated date, mark LATE/OVERDUE. There may be some variation from cycle to cycle, but a week is used here as the cut-off point.

Also mark LATE/OVERDUE if the date of the last period indicates that the patient is currently overdue for her period.

VAGINAL DISCHARGE definition:

Does the patient have a discharge, not to include vaginal bleeding, that is abnormal for her.

A scanty clear discharge of variable magnitude may be normal for some women.

Note a report of increased flow or frequency of discharge, or change in consistency, color or odor.

PREGNANCY definition:

IMPOSSIBLE
POSSIBLE
CONFIRMED

IMPOSSIBLE - The patient has not had intercourse recently. It is important to make the patient understand that any intercourse however brief, particularly if the 'withdrawal' technique of contraception is practiced, may result in a pregnancy. Although no form of birth control is 100% effective, mark this response if you are confident that the patient is practicing adequate contraception.

POSSIBLE - The patient is sexually active without adequate contraception, or if you suspect improperly used or careless contraceptive technique. Strongly supported by late menses.

CONFIRMED - Strong suspicion that the patient is pregnant by history and examination, ideally confirmed by positive laboratory tests.

FAINT/DIZZY definition:

These terms may mean different things to different people. In the context of this program DIZZY refers to light-headedness rather than the sensation of abnormal motion as is seen in vertigo.

Record both history of actual fainting spells or complaints of feelings of light-headedness or dizziness as part of the current illness. This may indicate hypovolemia from blood loss or dehydration or may be secondary to pregnancy.

PREVIOUS GYN HISTORY definition:

Though a thorough gynecological history should be taken and recorded, only enter YES for a history of prior sexually transmitted disease, salpingitis, pelvic inflammatory disease, ectopic pregnancy, or gynecological surgery.

PHYSICAL PAGES

PAGE ONE

TEMPERATURE definition:

Mark the appropriate range for temperature in degrees Fahrenheit.

PULSE definition:

Mark the appropriate range of values in beats per minute.

BLOOD PRESSURE (Systolic) definition:

Mark the appropriate range of values in mmHg.

BLOOD PRESSURE (Diastolic) definition:

Mark the appropriate range of values in mmHg.

PAGE TWO

MOOD definition:

NORMAL
DISTRESSED
ANXIOUS

Although interpretation of MOOD is very subjective, it allows insight into the patient's psychological status. There is a subtle difference between DISTRESSED and ANXIOUS. A patient who is experiencing significant physical symptoms (such as pain, nausea, vomiting) may be DISTRESSED, but the patient who is primarily worried about his illness would be ANXIOUS.

COLOR definition:

NORMAL
PALE
FLUSHED
JAUNDICED
CYANOTIC

FLUSHED, is an important finding but is meaningful only if the patient's environment is not uncomfortably warm, which might cause flushing normally. A patient with JAUNDICE will have yellowish skin and/or sclerae (whites of the eyes). Patients who are CYANOTIC will

present with a blue tint, especially around the lips and nail beds.

In some patients (especially blacks and orientals) these findings are difficult to appreciate; sometimes examination of the sclera and palm creases is helpful. If doubt exists, skip this category on the data sheet and when entering data into the computer.

WHITE BLOOD CELL COUNT definition:

Mark the appropriate range of values.

PAGE THREE

INSPECTION definition:

NORMAL
VISIBLE PERISTALSIS
DECREASED ABDOMINAL MOVEMENT

Look at the abdomen closely without touching it. VISIBLE PERISTALSIS will appear as wave-like movement occasionally accompanied by audible rushes.

To observe for DECREASED ABDOMINAL MOVEMENT, the patient should lie on his back with knees flexed while the practitioner holds his hand approximately 1 to 2 inches above the patient's umbilicus. The patient is then asked to raise his belly to touch the practitioner's hand. If the patient has difficulty doing this, mark DECREASED ABDOMINAL MOVEMENT.

SCARS definition:

PRESENT
ABSENT

Mark PRESENT if the patient has either surgical scars or scars indicating penetrating trauma to the abdomen.

GUARDING definition:

PRESENT
ABSENT

In the context of this program, guarding is present when there is voluntary tightening of the abdominal wall muscles when the practitioner attempts to palpate.

This can often be overcome by the gentle persuasion of the

examiner. Guarding must be distinguished from involuntary tightening of the abdominal muscles and cannot be overcome by gentle persuasion and reassurance. The latter is entered as RIGIDITY.

RIGIDITY definition:

PRESENT
ABSENT

Rigidity is the involuntary tightening of the abdominal wall muscles which cannot be overcome by the examiner's reassurance. It is an important finding since it often indicates peritonitis. Rigidity must be distinguished from voluntary tightening of the abdominal muscles which can be overcome gentle persuasion, which is entered as GUARDING.

BOWEL SOUNDS definition:

NORMAL
ABSENT
HYPERACTIVE

This category requires judgment since the difference between normal and abnormal bowel sounds may be difficult to appreciate. Use this rule: unless bowel sounds are markedly increased or decreased, mark NORMAL.

Constant gurglings with periods of rushing, high-pitch squeaks, or tinkling are HYPERACTIVE. Constant gurglings alone are probably NORMAL. To mark absent you must listen for five minutes hearing no, or only one or two gurglings, mark ABSENT.

One gurgling sound per minute, is probably normal.

DISTENTION definition:

PRESENT
ABSENT

Distention is a generalized swelling or bloating of the abdomen and should be distinguished from a mass or localized swelling.

MASSES definition:

PRESENT
ABSENT

A mass is a localized or discrete swelling, visible or palpable on

examination. Generalized swelling of the abdomen is entered as DISTENTION.

PAGE FOUR

TENDERNESS definition:

Enter the appropriate response for the location of most significant tenderness. The corresponding area of the diagram will be highlighted.

PAGE FIVE

MURPHY'S SIGN definition:

PRESENT
ABSENT

MURPHY'S SIGN may be elicited as the practitioner hooks his fingers under the patient's right costal margin at the midclavicular line and asks the patient to inspire deeply. This is best done with the patient lying on his back with his knees flexed. If the patient exhibits reflex inhibition of inspiration, sometimes described as a catch, a positive Murphy's sign is PRESENT.

REBOUND TENDERNESS definition:

PRESENT
ABSENT

There are three steps to eliciting rebound tenderness:

1. Slowly depress the tender area.
2. Hold until the pain lessens and the patient relaxes.
3. Quickly withdraw to skin level only.

If the patient grimaces or demonstrates other obvious signs of pain upon withdrawal, rebound is present. The practitioner should not have to ask the patient.

This maneuver should be saved for late in the exam, since it may be difficult to get the patient to relax afterward.

RECTAL EXAMINATION definition:

NORMAL
MASS FELT
LEFT TENDER
RIGHT TENDER

GENERAL TENDERNESS

The rectal exam is often neglected. No abdominal exam is complete without the rectal examination.

Some degree of discomfort is normal during the rectal exam. The patient should be verbally prepared for the examination and the examiner should be as gentle as possible. The patient should be asked if he feels pain as the practitioner moves his finger right, left and centrally. If there is tenderness on both sides, mark GENERAL TENDERNESS even though one side might be more tender than another. (NOTE: directions are in reference to the patient's right and left.)

If the guaiac test for occult blood in the stool is positive, the patient should be examined for obvious sources such as hemorrhoids or a fissure.

VAGINAL EXAMINATION definition:

NORMAL
RIGHT TENDERNESS
LEFT TENDERNESS
CERVICAL TENDERNESS
GENERAL TENDERNESS
MASS
BLOOD (CLOTS)

Vaginal examination should be performed if there is any suspicion of gynecological disease. This involves inspection, bimanual internal examination, and speculum examination.

Unilateral tenderness may be indicative of ovarian or tubal involvement. Cervical tenderness, particularly with cervical motion, may indicate ectopic pregnancy or PID. Palpation with one hand on the lower abdomen above the pubis and two fingers of the other hand internally should help identify any masses. Microscopic examination of any vaginal discharge may be useful, but does not effect this program's diagnosis.

APPENDIX C

ABDOMINAL PAIN DATA SHEET

PATIENT NAME:

ABDOMINAL PAIN DATA SHEET

DATE/TIME:

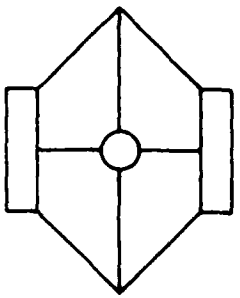
SSN:

HISTORY

AGE: SEX:

PAIN

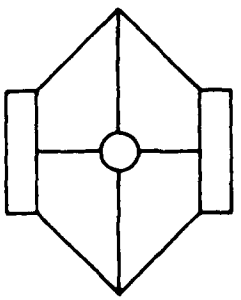
AT ONSET



RUQ
LUQ
RLQ
LLQ
UPPER HALF
LOWER HALF
RIGHT HALF
LEFT HALF
CENTRAL
GENERAL
RIGHT FLANK
LEFT FLANK
NO PAIN

PAIN

AT PRESENT



RUQ
LUQ
RLQ
LLQ
UPPER HALF
LOWER HALF
RIGHT HALF
LEFT HALF
CENTRAL
GENERAL
RIGHT FLANK
LEFT FLANK
NO PAIN

OTHER SYMPTOMS:

NAUSEA:
- PRESENT
- ABSENT

VOMITING:
- PRESENT
- ABSENT

BOWELS:
(RECENT CHANGE)
- NORMAL
- CONSTIPATED
- DIARRHEA
- BLOOD IN STOOL
- MUCUS IN STOOL

APPETITE:
(RECENT CHANGE)
- DECREASED
- NORMAL

JAUNDICE:
(HISTORY OF YELLOW COLOR TO SKIN OR SCLERA)
- PRESENT
- ABSENT

URINATION:
- NORMAL
- FREQUENCY
- PAINFUL
- DARK URINE
- BLOOD IN URINE

TYPE OF PAIN:
(AT TIMES FREE OF PAIN = *INTERMITTENT*; CONSTANT = STEADY; CONSTANT AND VARYING IN INTENSITY = COLICKY)
- INTERMITTENT
- STEADY
- COLICKY

SEVERITY OF PAIN:
(DO NOT ASK; OBVIOUS DISTRESS = SEVERE; EVERYTHING ELSE = MODERATE)
- MODERATE
- SEVERE

AGGRAVATING FACTORS:
(HAVE THE PATIENT MOVE AND COUGH)
- MOVEMENT
- COUGH
- BREATHING
- FOOD
- OTHER
- NONE

PROGRESS OF PAIN:
(AT TIME OF EXAMINATION)
- BETTER
- SAME
- WORSE

DURATION OF PAIN:
- 12H OR LESS
- 12-24H
- 24-48H
- 48+H

RELIEVING FACTORS
- LYING STILL
- VOMITING
- *ANTACIDS*
- *FOOD*
- OTHER
- NONE

PAST HISTORY

PREVIOUS INDIGESTION:
- YES
- NO

PREVIOUS SIMILAR PAIN:
- YES
- NO

PREVIOUS SURGERY:
(ABDOMINAL SURGERY OR TRAUMA - MUST BE INTRAPERITONEAL)
- YES
- NO

PREVIOUS ILLNESS:
(ANY PERTINENT ILLNESS, NOT JUST *ABDOMINAL*; I.E. *REQUIRING* HOSPITALIZATION)
- YES
- NO

TAKING MEDICATIONS:
(*MEDICATION FOR THIS PAIN ONLY*)
- YES
- NO

OB/GYN HISTORY

PERIODS:
- NOT STARTED
- CEASED
- REGULAR
- IRREGULAR

LAST PERIOD:
- NORMAL
- LATE/OVERDUE

VAGINAL DISCHARGE:
- YES
- NO

PREGNANCY:
- IMPOSSIBLE
- POSSIBLE
- IMPOSSIBLE

FAINT/DIZZY:
- YES
- NO

PREV GYN HISTORY:
- YES
- NO

PLEASE TURN OVER FOR PHYSICAL EXAM PORTION.

PHYSICAL EXAM

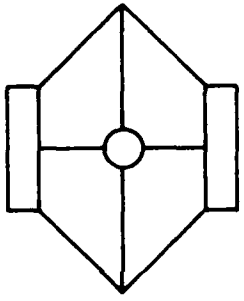
VITAL SIGNS

TEMPERATURE:
- < 98.6
- 98.6 - 100.2
- 100.3 - 102
- > 102

BLOOD PRESSURE (SYSTOLIC):
- < 90
- 90 - 129
- > 129

PULSE RATE:
- < 80
- 80 - 99
- > 99

BLOOD PRESSURE (DIASTOLIC):
- < 70
- 70 - 89
- > 89



TENDERNESS:
(AREA OF MOST SIGNIFICANT PAIN; PALPATE MOST PAINFUL AREA LAST)
- RUQ
- LUQ
- RLQ
- LLQ
- UPPER HALF
- LOWER HALF
- RIGHT HALF
- LEFT HALF
- CENTRAL
- GENERAL
- RIGHT FLANK
- LEFT FLANK
- NO PAIN

GENERAL/LAB

MOOD:
(DON'T ASK; OBVIOUS DISTRESS OR PHYSICAL SYMPTOMS = DISTRESSED; JUST WORRIED ABOUT ILLNESS = ANXIOUS)
- NORMAL
- DISTRESSED
- ANXIOUS

COLOR:
(CONSIDER ENVIRONMENTAL TEMP; CHECK CONJUNCTIVE & PALMS ON BLACK & ORIENTAL)
- NORMAL
- PALE
- FLUSHED
- JAUNDICED
- CYANOTIC

WBC COUNT:
- < 8,000
- 8,000 - 10,000
- 10,100 - 12,000
- 12,100 - 15,000
- > 15,000

ABDOMINAL EXAM

INSPECTION:
(WAVELIKE MOVEMENT = VISIBLE PERSISTALSIS; PT UNABLE TO TOUCH HAND WITH OPPOSITE BUTTON = DECREASED/ABSENT)
- NORMAL
- VISIBLE PERSISTALSIS
- DECREASED ABD. MOVEMENT

SCARS:
- PRESENT
- ABSENT

GUARDING:
(VOLUNTARY TIGHTENING OF ABDOMINAL MUSCLES; CAN RELAX WITH GENTLE PERSUASION)
- PRESENT
- ABSENT

RIGIDITY:
(INVOLUNTARY TIGHTENING OF ABDOMINAL MUSCLES; CANNOT RELAX WITH GENTLE PERSUASION)
- PRESENT
- ABSENT

BOWEL SOUNDS:
(NORMAL UNLESS MARKEDLY HYPERACTIVE OR ABSENT)
- NORMAL
- ABSENT
- HYPERACTIVE

DISTENTION:
(GENERALIZED SWELLING OR BLOATING OF ENTIRE ABDOMEN)
- PRESENT
- ABSENT

MASSES:
(LOCALIZED SWELLING)
- PRESENT
- ABSENT

MURPHY'S SIGN:
(PT ON BACK WITH KNEES BENT; HOOK FINGERS UNDER PT'S RIGHT COSTAL MARGIN AT MID-CLAVICULAR LINE; SEVERE PAIN ON INSPIRATION AND REFLEX INHIBITION OF INSPIRATION = MURPHY'S SIGN PRESENT)
- PRESENT
- ABSENT

REBOUND TENDERNESS:
(DO LATE IN EXAM; SLOWLY DEPRESS TENDER AREA, HOLD UNTIL PT RELAXES THEN QUICKLY WITHDRAW HAND TO SKIN LEVEL; PT GRIMACE = YES REBOUND)
- PRESENT
- ABSENT

RECTAL EXAM:
(DISTINGUISH BETWEEN PAIN AND DISCOMFORT)
- NORMAL
- MASS FELT
- LEFT TENDER
- RIGHT TENDER
- GENERAL TENDERNESS

VAGINAL EXAMINATION:
- NORMAL
- RIGHT TENDERNESS
- LEFT TENDERNESS
- CERVICAL TENDERNESS
- GENERAL TENDERNESS
- MASS
- BLOOD (CLOTS)

CORPSMAN'S EVALUATION

MARK YOUR DIAGNOSIS:

- ( ) APPENDICITIS
- ( ) NONSPECIFIC, NONSURGICAL ABDOMINAL PAIN
- ( ) RENAL COLIC
- ( ) PERFORATED DUODENAL ULCER
- ( ) CHOLECYSTITIS
- ( ) SMALL BOWEL OBSTRUCTION
- ( ) OTHER (SPECIFY)
- ( ) PELVIC INFLAMMATORY DISEASE
- ( ) URINARY TRACT INFECTION
- ( ) OVARIAN CYST
- ( ) ECTOPIC PREGNANCY
- ( ) INCOMPLETE ABORTION

MARK YOUR RECOMMENDATION:
- ( ) EVACUATION
- ( ) NO EVACUATION

YOUR TREATMENT:
- ( ) OBSERVE ONLY
- ( ) MEDICATE
- ( ) PROCEDURE

RECOMMENDATION OF MEDICAL OFFICER:
- ( ) EVACUATION
- ( ) ABD PAIN TX
- ( ) TX FOR OTHER
- ( ) RETURN TO DUTY
- ( ) NOT CONSULTED

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(U) MEDIC - ABDOMINAL PAIN - A Decision Support Program for the Management of Acute Abdominal Pain - USER'S MANUAL

12 PERSONAL AUTHOR(S) LT Barclay G. CARAS, MC, USNR, LCDR David C. SOUTHERLAND, MC, USN, and Karen D. FISHERKELLER

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18 SUBJECT TERMS (Continue on reverse if necessary and identify by block number)
Computer assisted; Appendicitis; Small bowel obstruction; Renal colic; Perforated duodenal ulcer; Cholecystitis; Non-specific abdominal pain; Pelvic inflammatory disease;

19 ABSTRACT (Continue on reverse if necessary and identify by block number)

At sea, the Independent Duty Corpsmen (8402) is responsible for the diagnosis and management of illnesses which arise. He must decide whether to treat the patient on-board the ship, or, if necessary, make recommendations regarding the evacuation of the patient. The corpsman's laboratory facilities are limited and, often, he is unable to communicate with shore-based facilities.

A computer based medical support system has been developed at the Naval Submarine Medical Research Laboratory (NSMRL), Groton, CT, to assist the corpsman in the diagnosis, triage, and management of patients who present with acute illnesses at sea. When complete, the system will consist of programs for acute abdominal pain, acute chest pain, dental complaints, psychiatric disorders, and trauma. The computer programs are designed for use on an IBM PC or an IBM PC compatible computer.

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18 Cont'd. Urinary tract infection; Ovarian cyst; Ectopic pregnancy; Incomplete abortion.

19 Cont'd.

The computer based abdominal pain program is intended for use between the ages of 17 and 70, and provides medical support for five serious causes of abdominal pain in males and five additional categories for female patients. They are: Acute Appendicitis; Renal Colic; Cholecystitis; Perforated Duodenal Ulcer; Small Bowel Obstruction; Pelvic Inflammatory Disease; Urinary Tract Infection; Ovarian Cyst; Ectopic Pregnancy; Incomplete Abortion; and Non-specific Abdominal Pain. The program consists of a diagnostic module, which provides diagnostic and treatment suggestions for each of the abdominal pain diseases, a training module, which tests the corpsman's accuracy in abstracting data from patient narratives, and a SF-600 generation module, which prints medical record entries based on patient data entered into the program.

This report is a manual designed to train the Independent Duty Corpsman in the use of the abdominal pain decision support program. It is written for the person with little or no prior experience with computers. The manual describes the hardware and software needed to run the computer program and discusses in detail each of the program modules, definition of terms, and treatment protocols. After reading the manual, the user should be skilled in the use of the program without the need for supplementary training.