# *User Guide*

## What It Is And Does ...

STATworkUP is a medical application for iOS iPhone, iPad and iPod touch and Android phones and tablets. It is designed to support the diagnostic process. Because its use parallels typical methods of clinical investigation, its operation is fairly intuitive for health care providers.

Clinical medicine is an artistic and philosophic discipline combining scientific skill. Adept and competent practice requires years of training and experience plus lots of insightful wisdom. Although STATworkUP is not intended to supplant sound medical judgment, it is a modern tool for rapid decision support, easy to understand, adapt and use. It includes a big knowledge database for multiple specialties that is frequently updated. STATworkUP contains a collection of evidence-based facts and correlations for quick review of many details to guide comprehensive history-taking and physical examination of the patient.

STATworkUP presents the essential criteria to help you determine diagnoses. It also can sharpen skills by shifting focus from the chief complaint to provide a wider spectrum of considerations in valuable and useful ways. By providing quick information, at your fingertips, it helps to save time and gain practice efficiencies. The

app can be helpful for utilization review activities. Ultimately, it may also improve the quality of outcomes and save on the costs of healthcare delivery.

Its features can be used to explore and evaluate conditions for fast problem assessment. Correlation panels, drill-down information views, and a web mode assist in associating symptoms and studies with diagnoses and treatments. As workup proceeds, the program instantly adjusts the differential diagnoses list to fit with selected findings.

Signs and symptoms of many disorders can be similar to those of other conditions. That can make diagnosis challenging. Usually early detection of disease is important to derive the benefits of treatments and prevent complications. Symptoms can wax and wane during the course of an illness. Sometimes they are similar to initial findings that occurred and may represent a recurrence of the condition or a flareup. At other times new signs and symptoms indicate progression or exacerbation of a disease or complications of it or its treatments. STATworkUP quickly reveals the types of complications that can occur during many diseases and treatments. It includes the symptoms and signs they can share in common and shows their possible causes too.

You can use STATworkUP tables to rapidly search for

symptoms or signs. It can be voice-activated. And it recognizes synonyms too. Simply checkmark listed items to designate them as findings or problems. Drill-down to detailed info views where you can tap the correlate button. It instantly presents a panel of additional choices to build lists of contextual events or situations. These can be significant attributes of other possible disorders. The app also produces lists of appropriate diagnostic lab tests to examine, analyze and scrutinize. Those investigations may be pertinent to help validate and corroborate assumptions or clarify impressions. During assessment the combined weights of designated findings justify and produce resulting differential diagnoses for consideration.

This app has the power to generate prioritized or alphabetized tables of conditions for the set of findings that you place on its problems list. And each differential diagnosis table that it calculates can be expanded or constrained to loosen or tighten the fit of the listed diagnoses for the signified findings by simply adjusting a likelihood meter. It is quite easy to use. Additionally, STATworkUP provides swift, concise and relevant info for each of more than 10,000 entities in the database. It can automatically search for links to subject matter expert web-pages, with graphics and videos, to view more in-depth content for study, review, learning and evaluation. Content and app help can also be printed.

Every effort has been taken to conform to standard practices and guidelines in both the medical and computing industries. The authors include physicians, engineers, mathematicians and medical informaticists. We sincerely hope you will enjoy using it.

## What It Does Not Do ...

Although the program calculates a range of diagnostic possibilities for finding selections, it does not interpret symptom complexes, nor perform synthesis of information, based on quality, magnitude or temporal-spatial relationships. Those subtle, albeit important, considerations require the user's keen medical insight. Such special factors and determinations presently transcend this program's scope.

For these reasons STATworkUP is an interactive application requiring discretion and awareness of its limitations. Again, this application is **NOT** intended to supplant expertise when performing medical practice. It is just a quick reference that should be a helpful tool for those who are prepared to provide medical care.

To preserve confidentiality, reports of the workup cannot be produced or printed with this version. The database cannot be modified either. Updates are often available and you will be notified when they are ready for installation.

# How To Use It ...

STATworkUP is a useful mobile medical app that can help guide quick and comprehensive history and physical exam assessments during evaluation of problems encountered in most clinical settings. It includes a large, robust and fully relational multispecialty database that has been carefully crafted by a team of well qualified doctors and computer engineers. The content and design is frequently updated to reflect current best practices, and keep it relevant, fast, and easy to use. It works in either portrait or landscape orientation on the iPhone, iPad or iPod touch and Android phones and tablets . For optimal speed and performance we recommend using the latest operating system on compatible devices. Reading the help document is useful to get the most value from STATworkUP. Yet, many want to jump right in and begin exploring. So, here are a few pointers and tips to help you get started:

This application has four tables that are each packed full of Symptoms (Sx), Studies (Lab), Diagnoses (Dx) or Treatments (Rx). Tab bar buttons, at the bottom of most views, open each corresponding table when selected. Their lists of sub-categorized names are alphabetized. Additionally, each table view has a button shaped like a magnifying glass on the navigation bar. Tap on that button to open or close the search and

scope tools. Use these search functions to quickly locate items on each table. They are quite versatile for retrieving words from the apps core data structure. For instance, open the Diagnosis table view and enter 'Heart' into the table's search field to create a list of cardiac disorders. Or enter the word 'Emergency' to build a list of urgent or life-threatening situations that may require rapid or prompt intervention. Voice-activated search is also possible. And you can also find things by entering just part of a name manually. The scope bar can be used to filter by Title, Subtitle or All. For example, the scope function can be used to find all words that start with the letter 'R' by entering 'R' into the search field while the Scope Title button is selected.

To see detailed INFO views for table items, simply drill-down. The selected item will appear in white on a gradient-tinted name field at the top of the INFO view, just below the navigation bar. These views may include concisely detailed information, like definitions, etiologies, epidemiology, manifestations, onset, prevalence, incidence, occurrence, risk factors, associations, complications and prognoses. And Treatment table item Info views may show generic and proprietary drug names, properties, medication classifications, actions and interactions, indications, contraindications, off-label uses, side-effects, precautions and warnings.

The embedded INFO content is helpful in the Airport Mode, or in situations when you are not within WiFi or network range. Additionally, associated subject matter expert web pages can be accessed when the device is connected to the internet. Just tap the ("Web") button on the navigation bar of any Info view to get a list of related links. When you are done browsing simply tap the "Done" button to return to the view you were at previously.

STATworkUP is designed to correlate each database item. Its cross-referencing capability is quite powerful so please do not overlook this feature while you explore the app. To harness these useful functions drill-down to INFO views by tapping on a table item. Then touch the CORRELATE button which is present on the tool bar, right above the tab bar. When the CORRELATE button is tapped a correlation panel of additional buttons will pop-up. That facilitates choosing various pathways of investigation.

For example, select the Symptoms (Sx) table. If you drill-down to an item's INFO view and touch its CORRELATE button, the correlation panel shows FINDINGS, CONDITIONS, TESTS, and RX SIDE EFFECTS buttons. (Think of FINDINGS or CONDITIONS as similar names for Symptoms or Diagnoses, respectively. And also think of TESTS as the same things as Studies.)

As another example, open the Studies (Lab) table. When you drill down to a listed item's INFO view and tap the CORRELATE button its Correlation Panel has FINDINGS and CONDITIONS buttons.

As yet another example, select the Diagnoses (Dx) table. Drill down on any item to the INFO view. When the CORRELATE button is touched its correlation panel of buttons include CAUSES, COMPLICATIONS, TESTS, REMEDIES, RX RISKS and RX CONTRAINDICATIONS. It also includes Diagnostic FINDINGS. Tapping on that button reveals history and physical signs, or the results of lab studies. These can be checkmarked to designate them as Findings that can lend their diagnostic weight to Diagnoses. Now, Go back to the previous view by tapping the Info button on the Left side of the top Navigation bar.

Last, go to the Treatment (Rx) table and select any item's Info View. Tapping its CORRELATE button will pop-up a Correlation Panel of buttons that include RX INDICATIONS, RX SIDE EFFECTS, RX INTERACTIONS, RX RISKS and RX CONTRAINDICATIONS.

Next, open the Symptoms (Sx) table up again and drill-down to see an INFO view. Then tap on the CORRELATE button. The "FINDINGS" button, on the pop-up Correlation panel, builds sets of potentially relevant things for further evaluation. The alphabetized

FINDINGS list is displayed below the tinted name bar which is just under the upper black navigation bar on INFO views. Those things can be especially pertinent to focus on during your investigation. FINDINGS can also be correlated for selected Studies (Tests). Each of the listed items can be annotated to designate them as Findings or not. Just touch on the adjacent gray checkmarks to toggle them to green. That is all you need to do to signify that the correlated association is a Finding. When added or removed, each designated Finding instantly conveys its respective proportion of attributable weight to each related diagnosis in the database structure. Touching a green checkmark again will toggle it back to gray. That turns the checkmark off and removes the Finding from calculations of possible diagnoses to which it can portend weight when checkmarked to green as a Finding. In this way the app quickly computes corresponding sets of related disorders or conditions for checkmarked Finding items.

(Read more about how the program does this in the Help section called Calculations.) The program rapidly aggregates collective combinations of Finding weights and simultaneously integrates them to produce Differential Diagnoses for the Findings you select during workup.

To quickly see a view of all the checked Findings simply tap on the PROBLEMS button. It is present on the tool

bar above the lower tab bar. This will reveal the Problems list of Findings. Individual findings can be cleared from the Problems list. Just back-swipe a listed finding and tap on the Delete button that subsequently appears at the right side of the selected Finding's list cell. Additionally, all of the listed findings in the PROBLEMS view can be removed by tapping on the CLEAR button. It is present on the upper navigation bar. However, be aware that doing this returns all of the checked findings to an unchecked state everywhere else in the app. Clearing the Problems table removes the impact of the previously listed Findings as corroborative Diagnostic attributes. Doing so removes the significant contributory Finding weights that are used to calculate and determine the array of differential diagnosis. As a result the diagnostic differential list will be emptied when all of the Findings are cleared.

This application does not currently save the workup when it is cleared. And there is no way to save findings with personally identifiable information in this version. That feature is being considered for future updates. When you quit the application without clearing findings from the problems list, they are saved for the next session. In that situation, upon launch an alert asks whether to continue the prior workup in progress or to delete it. Deleting erases the checked Findings and empties the Problems list.. Continue returns to the workup with the Findings checked as they were when

you last exited the app.

Plausible diagnoses that are associated with the collection of checked findings can be viewed by tapping the DIFFERENTIAL button. It is located above the tab bar on the tool bar. A sliding control meter is present in the Differential view to adjust the fit of diagnoses for all of the selected findings. Moving the slider control setting toward the more likely side of the meter generally constrains the list to show better fit diagnoses. Moving the slider control setting in the other direction, toward the less likely side of the meter, usually expands the list, showing more diagnoses that may not be as likely, based upon the total weighting of all selected findings when compared to that setting.

A PRIORITIZE LIST switch is also present in the Differential view to sort listed Diagnoses. The list is sorted alphabetically when the switch is turned OFF. When the switch is ON, more-probable diagnoses are shown near the top of the list and less-probable ones toward the bottom of the list. Of course, when no findings are checked at all the Differential list of Diagnoses will be empty.

Now, go ahead and try using STATworkUP to assess some problems. There are a lot of ways to correlate the many entities that are contained in its big database. DISORDERS can be listed for any selected Symptoms or

Studies. TESTS, that may be appropriate during the workup of Symptoms or Diagnoses items can also be displayed when those correlation panel buttons are tapped. Remedies can be shown for Diagnoses too. Remember to return to the INFO views to get back to the Correlate button at any time during assisted problem evaluations.

This medical app derives corroborated lists of possible diagnoses for mindful consideration. And it presents a lot of useful correlations that can facilitate utilization review too. But, also keep in mind that STATworkUP is NOT intended to supplant sound medical judgment! Appropriate practices require years of training plus ample experience and insight. The great amount of good information that it contains for quality assurance should not be substituted for the expert advice of licensed physicians or other healthcare providers during clinical decision-making.

When new databases are ready to update STATworkUP, alerts will notify users. Have fun with this universal iPhone and iPad app and send us your comments about the things that you would like to see in future versions. Please write a review for us and let your colleagues know about this product too. (You can find links to our web sites in the credits section.)

## Getting Started With It ...

To begin, choose something to evaluate. For instance, tap the tab bar button named Symptoms. A full list of symptoms will appear. Use the search bar to find listed things. The app's search function is very fast and powerful. You can find stuff in many different ways by searching for synonyms, or even for parts of names. You can also enter something like the word "eye" to see all ocular symptoms or search "heart" to get a list of cardiovascular conditions. Additionally, you can search by title, subtitle or both.

You can also quickly see detailed overviews of information for any listed item. Just tap the drill-down control at the right side of the list cell to get to the corresponding Info view. The name of the selected list item will appear in a gray header just below the navigation bar in Info views. Web page links for selected list items can also be browsed by tapping the ("Web") button in Info view navigation bars. When done browsing the Web tap the "Done" button to return to the Info views. Use the navigation bar breadcrumb buttons to get back to previous views.

A CORRELATE button is also present above the tab bar of Info views for further analysis. Tapping the CORRELATE button will pop open a display panel of other buttons to cross-relate things that can be associated with the name on the header bar. These things may be pertinent to focus on during

examination. Try the encompassing design of the Correlation panel to view the many possible relationships. It is rather easy to see how it works. Use this feature to derive fast associations that may help resolve complexities and guide problem assessments and evaluations. You can correlate manifestations, tests, disorders and remedies that might be of interest to review during the encounter. For instance, other conditions that are significant for full investigation can be listed for any selected symptom. Diagnostic considerations and appropriate tests can be shown for each symptom too. Similar functions are available for other entities. Related conditions for each symptom, study, diagnosis, or treatment, will be listed as each correlation panel button is tapped. We encourage you to experiment with the possible options to see what happens.

Any listed condition or symptom can easily be designated as a Finding during the workup. To add a symptom's diagnostic weight, simply toggle its adjacent checkmark to green. Unchecking a finding instantly removes its weight as an attribute of related diagnoses. To view a list of all of the checked findings during the workup simply tap the FINDINGS button. (It is present above the tab bar in almost all of the views.) If you want to set all checked findings to off, just tap on the Clear button in the Findings view navigation bar. But be cautioned, if you do this, the findings are not saved.

Individual findings can be removed from the Findings view by back-swiping a listed item and tapping on the resulting Delete button. The item is unchecked elsewhere and its diagnostic weight is removed as well.

Diagnostic possibilities for combined findings can be displayed during the workup. You can see them by selecting the DIFFERENTIAL button, present above the tab bars and at the bottom of the Findings view. Diagnoses that are corroborated by findings are listed. You can adjust their fit to the selected findings by setting the sliding probability meter to more or less likely. That can be done in the Differential view. The list can also be prioritized and sorted by most-to-least likely diagnosis for the check-marked findings.

(See the Calculations section of Help to get an understanding of how the differential diagnoses are computed for the designated Findings.)

# Problem Workup ...

This application lists many symptoms (history and physical signs), studies and diagnoses for evaluation. Potential disorders for each condition are shown. Also, conditions that might be found for each diagnosis can be displayed, plus relevant tests to workup each situation.

As each symptom, study or diagnosis is selected, related information is shown to widen the perspective. This shifts focus from the chief complaint to other contributory, yet perhaps less obvious, problems for further investigation.

Findings, that may corroborate possible disorders, can be checked during problem assessment. STATworkUP instantly adds each finding's supportive weight as it is selected, to justify pertinent diagnoses placed onto the differential list for consideration. The list can be sorted by most-to-least likely by turning on the prioritize switch. Turn off the prioritize switch to display the listed the diagnoses alphabetically.

# Cross-Referencing ...

Robust functions correlate conditions, tests or disorders for many problems. Just choose a tab item to build a full list of Symptoms, Studies, Diagnoses or Treatments. Then select something to evaluate from the list. Upon drill-down, fast information for the selection is presented in the Info view. The name of the item appears just below the Navigation Bar and right above its information. Next, tap on the CORRELATE button that appears above the info view tab bar. That will reveal a panel of additional buttons for building relationships for the selected item. Many combinations are possible for focused assessment and further review. Try it out.

STATworkUP can help to explore Conditions or Tests that may be relevant or pertinent to the workup of Symptoms and their possible Diagnoses. It can also show Disorders associated with Symptoms, Studies or Treatments and the converse for Diagnoses. Remedies for Diagnoses can be displayed. It can show Conditions related to Studies too. Those are the diagnostically related Symptoms for pertinent Studies.

The program dynamically integrates many viewpoints for rapid problem analysis. It also keeps track of findings designated by check marks. The list of those appear by tapping on the Findings button just above the tab bar in list views. All of these things can be correlated for a quick yet comprehensive evaluation. At any point during the workup tap the DIFFERENTIAL button to view the Diagnostic possibilities for the noted findings. That button is present above the tab bar in most views.

In addition to the above functions, there is also a "Web" button on the navigation bar of info windows. Tapping on that button transitions to a browser view of web-links for the selected item to get even more details. Links to other sites are provided for information only. They do not constitute endorsements of those other sites.

## Selecting Findings ...

A checkmark appears adjacent to each listed symptom. These can be toggled on (green) or off (gray). The on state indicates that the symptom is present, or noted, during the workup. Selected findings contribute some portion of weight to associated diagnoses (disorders). The amount of weight that is conveyed to each related diagnosis depends on how many diagnoses have the finding as a potential attribute. If all findings (symptoms) for a diagnosis were selected then that would constitute the aggregate best weight for that diagnosis. However, that is unusual. Most of the time only part of the diagnosis best weight is present because only some of the total possible symptoms or conditions for any given diagnosis are found. The sum of finding weights for a diagnosis is called the actual weight of the findings for each related diagnosis. Some diagnoses share findings and some do not.

STATworkUP instantly compares the actual finding weights selected to the best weight for each diagnosis and builds a list of diagnoses for consideration. These are shown whenever the Differential button is selected. As more findings are selected the differential diagnoses list grows and it shrinks when less findings are noted. The resulting differential diagnoses list can be sorted with priority. Read more about how all this works in the help sections named Deriving Diagnoses and Calculations.

A Findings button is present above the tab bar in list views. Tapping that button shows a view of all the selected findings. Individual Findings can be removed in that view, and unchecked elsewhere. Just back-swipe a listed finding and tap the Delete button that subsequently appears to the right. All Findings can also be removed by tapping the navigation bar Clear button. Be aware that doing so also clears the diagnostic differential list and all of the checked findings elsewhere.

The application does not save the workup when it is cleared. There is no way to save findings with personally identifiable information in this version. That feature is being considered for future updates. When you quit the application without clearing findings, they are saved for the next session. Upon startup an alert asks whether to continue the prior workup in progress or to delete it.

## Deriving Diagnoses ...

STATworkUP is intended to facilitate, not replace the traditional diagnostic process.

As any clinician knows, making a correct diagnosis is as much an art as a science. Most problems encountered in the real world are not "textbook cases" with only one diagnosis present and all its characteristic findings.

Early in the course of an illness, only a few suggestive findings may be present and laboratory studies can be negative or equivocal. "Red herrings" are often present (findings that exist, but due to another unrelated disorder).

Although much effort has been spent by many programmers to come up with a "computerized diagnostician", only limited progress has been made. While computers are far faster and more accurate than people at numeric computation and searching of lengthy databases, people remain better at generalizing and inferring. No program yet written is capable of human insight and intuition. No practical method has been developed to categorize the myriad variations of symptoms - the smell of a septic wound, the briskness of an ankle jerk reflex, the pain that "started here and moved there and is somewhere between dull, aching, and throbbing."

No matter how accurate computer diagnostic programs become, we feel people will always be necessary to ask certain questions in just the right way, to examine the patient, and use clinical judgment to interpret the findings for a particular patient then recommend a treatment plan. People have limitations though. Organic memory can be less reliable than a hard disk, unfamiliar presentations of diseases can be overlooked, common diagnoses are unconsciously favored for

uncommon ones and red herrings.

We have not attempted to have STATworkUP determine THE definitive diagnosis. In fact, this version does not even have all possible diagnoses defined, just a group of about 4,000 relatively common or important ones. The current version of STATworkUP does not take into account the intensity or temporal variations in symptoms, significant negative findings, or pathognomonic symptom groups. In fact, STATworkUP uses a relatively simple, but very thorough method to evaluate each of its known diagnoses.

Technically speaking, STATworkUP is heuristic in nature and incorporates Bayesian logic in its approach to determining diagnostic probability. A heuristic method is particularly useful to rapidly come to a solution that is hoped to be close to the best possible answer, or 'optimal solution'. Heuristics are "rules of thumb", educated guesses, intuitive judgments or simply common sense. A heuristic is a general way of solving a problem. The Bayesian interpretation of probability can be seen as an extension of logic that enables reasoning with uncertain statements. To evaluate the probability of a hypothesis, Bayesian logic specifies some prior probability, which is then updated in the light of new relevant data. The Bayesian interpretation provides a standard set of procedures and formula to perform this calculation. Bayesian probability interprets the concept

of probability as "a measure of a state of knowledge", in contrast to interpreting it as a frequency or a physical property of a system.

STATworkUP provides groups of conditions that may be appropriate for further consideration when evaluating various possible diagnoses. It does not overlook the obvious diagnosis, doesn't forget to check unusual diagnoses, is not fooled by atypical presentations, and can even be helpful when more than one diagnosis coexists.

Considering the limitations mentioned above, inherent in computerized diagnosis, and in view of the main purpose of STATworkUP, we tried a number of possible approaches for generating a differential diagnosis list. The method we are currently using has met our needs quite well, and has the advantage of being relatively straight-forward to implement (although not quite so easy to describe.)

In addition to the practical fact that it does generate reasonable differential diagnostic lists for selected findings, we feel that the method "makes sense" when compared with the way a human diagnostician arrives at a differential diagnosis list. Briefly, we first select a list of possible diagnoses based on how well the selected findings fit each diagnosis, then we also sort that list based upon how well each diagnosis accounts

for some, or all, of its selected findings.

STATworkUP instantly compares the checked finding weights to the best weight for each diagnosis. Then it calculates a list of diagnoses for consideration. At a given likelihood meter setting the number of listed diagnoses often expands as additional findings are selected. The list is constrained when less findings are noted or when a group of checked findings are more specific for some diagnoses than others in the database. Additionally, the resulting differential diagnoses list can be prioritized.

When the prioritize switch is toggled ON the differential list is sorted by best fit. The resulting list is based upon the cumulative weights of all check marked findings in that case. It is also computed based upon the total number of selected findings that are associated attributes of each listed diagnosis. The differential diagnosis list is sorted by weighted match in the Prioritize mode. That is the product of weighted specificity times the finding inclusivity for each listed diagnosis at any given likelihood setting.

The differential diagnosis list can be viewed anytime during the workup by simply tapping on the DIFFERENTIAL button. Use the sliding likelihood control meter in that view to show less likely, but possible diagnoses, based on findings. Raise the meter to more

likely to reveal diagnoses that are more plausible based upon the checked finding selections. As that is done the list often becomes shorter, showing more likely diagnoses for consideration. Turning the prioritize switch OFF displays the differential diagnoses list alphabetically.

The method of diagnoses computation is described in more detail in the Help section titled Calculations.

# Calculations ...

Whenever a finding is checked in STATworkUP, all diagnoses are reevaluated for possible inclusion in the differential list. If all diagnoses had the same number of findings, and if each finding had equal weighting, then we could just sort the diagnoses by counting the numbers of selected findings contained in the definition for each diagnosis. But, in the real world, some findings are more diagnostically significant than others (e.g., hemoptysis vs cough) and most diagnoses are defined by different numbers of findings.

STATworkUP computes a "Weighted Specificity" based on how well the selected findings can account for each diagnosis (described in more detail below.) Diagnoses whose "Weighted Specificity" meets or exceeds the current setting of the Differential View LIKELIHOOD METER are included on the differential diagnosis list.

The list is sorted based on the "Weighted Match" of each diagnosis. This number is computed for each diagnosis from the product of its "Weighted Specificity" and "Finding Inclusivity" (also defined in detail below). A sorted list of most to least likely Diagnoses is shown in the Differential view when the PRIORITIZE switch is turned ON. Otherwise the list is shown alphabetically.

FINDING WEIGHTS:

STATworkUP describes each diagnosis or disorder in its database with useful sets of associated symptoms or conditions. It also includes reference information in drill-down texts or at attached web links. And the application correlates treatments or remedies, and useful studies or tests for each diagnosis.

When attempting to determine a diagnosis from a given group of findings, some findings are more useful than others:

A finding such as "FATIGUE" helps very little in weighting any specific diagnosis because fatigue occurs as a symptom for many of the diagnoses. A finding such as "HEMOPTYSIS" is more helpful, since it occurs with a lesser number of disorders, thus narrowing the diagnostic possibilities when it is present during workup (checked). A finding such as "BONE PROTRUSION THROUGH SKIN" is both necessary and sufficient to

make the diagnosis of COMPOUND FRACTURE. The presence of other symptoms do not alter the certainty of that diagnosis, but might suggest other diagnoses that could also be present.

Findings, that may corroborate possible disorders, can be checked during problem assessment. STATworkUP instantly adds each finding's supportive weight as it is selected, to justify pertinent diagnoses placed on the differential list for consideration. The list can be sorted by most-to-least likely by turning on the prioritize switch.

The relative importance of a finding for any particular diagnosis depends, in large part, on the number of different diagnoses where it can occur. Uncommon findings usually have greater diagnostic specificity than do common ones. STATworkUP assigns a weight to each finding by simply determining the inverse of the number of diagnostic inclusions of that finding. In order to speed the numeric calculations an integer is applied rather than fractional numbers (this value is multiplied by a large constant).

WEIGHTED SPECIFICITY:

Whenever the selected findings are changed (checking a symptom or condition on or off) STATworkUP recomputes the Weighted Specificity for each diagnosis

in its data base. The Weighted Specificity is a number that indicates how well a given diagnosis can be "explained" by the selected findings. Irrelevant findings have no effect on this number.

STATworkUP first adds up the weights of all the POSSIBLE finding weights for each diagnosis to determine the "BEST FIT VALUE "for each diagnosis. Then it adds up the weights of all the checked conditions belonging to the finding set of each diagnosis to compute the "ACTUAL VALUE" for each diagnosis. Of course, if all the findings for a diagnosis are selected then the ACTUAL VALUE = BEST FIT VALUE.

By computing the ratio of ACTUAL FIT to BEST FIT for each diagnosis, STATworkUP generates a "Weighted Specificity" value for each diagnosis. If all the findings for a given diagnosis are present, then the weighted specificity for that diagnosis is 100%.

All diagnoses whose Weighted Specificity exceeds the sliding likelihood meter setting in the Differential view are listed and can be prioritized.

While Weighted Specificity is useful in building a list of likely diagnoses, it is sorted better by factoring in the influence of Finding Inclusivity as well as Weighted Specificity. STATworkUP also does this.

FINDING INCLUSIVITY:

Combining Finding Inclusivity with Weighted Specificity creates quite reasonable likelihoods for resulting differential diagnoses lists.
The Finding Inclusivity for a diagnosis is a measure of how well the diagnosis accounts for the list of its selected findings. This is determined for each diagnosis by simply counting the number of selected conditions that are in the list of findings that describe the diagnosis. A Weighted Match for each listed diagnosis is computed by multiplying its Weighted Specificity by its Finding Inclusivity.

This STATworkUP sorting methodology nicely arranges the Differential of possible Diagnoses for selected findings.

# Adjusting Possibilities ...

This application lets you vary finding selections to list possible diagnoses. Then you can review other associated conditions, tests, or remedies for them. The Differential view contains a sliding control meter that lets you adjust how well the check marked findings fit to listed diagnoses. You can set the amount of likelihood that you desire by using the sliding control meter that is present in that view. At less likely settings the differential diagnosis list is expanded, but then the

listed diagnoses only loosely fit the check marked finding selections. At more likely settings the differential list is constrained but then the fit of listed diagnoses compared to finding selections is better. Various settings can be useful during workup.

Each condition, when selected as a finding, has a factored weight for each diagnosis that it defines in the database. The aggregated sum of all finding weights for each diagnosis establishes the 'BEST FIT VALUE' for that particular diagnosis. If all of the findings for a diagnosis are selected then that constitutes its best weighting. So it is quite likely to show up on the differential diagnoses list in that case. The combined weights of all selected findings determines the 'ACTUAL VALUE' for each diagnosis in the database. When only some of the diagnostic findings are check marked, the ratio of ACTUAL VALUE to BEST VALUE is called the Weighted Specificity for each diagnosis included in STATworkUP.

When starting a new assessment the default setting for the sliding likelihood control meter is 25%. At that setting each diagnosis that is displayed on the Differential list is supported by at least 25% of its total selected Findings' weight. In addition, the number of noted Findings selected for each diagnosis are factored when computing the sort order of the listed Diagnoses in the Differential view. Diagnoses are listed from the

top (most likely) to the bottom of the list (least likely) in the Prioritize mode.

Finding inclusiveness is used to determine the order in which diagnoses are displayed when the Prioritize switch in set ON in the Differential view. That is, the count of findings selected for each diagnosis, chosen from the array of its potential findings, is factored into the calculation that arranges how the diagnoses are listed in the Differential view. The product of the Weighted Specificity times the Finding Inclusivity is called the Weighted Match of each listed diagnosis. The weighted match value determines the sort order of the listed diagnoses.

## Prioritizing Differential ...

To see the list of Diagnoses that may be justified by the selected findings, tap on the DIFFERENTIAL button. It builds a list of potential diagnoses for selected findings during the problem workup. The DIFFERENTIAL button appears next to the FINDINGS button. Both are present above the tab bar. The Differential button is also present at the bottom of the Findings view. The listed differential items are compiled from the diagnoses in the database that fit with selected findings at the likelihood control meter setting.

The sliding control meter in the Differential view can be

adjusted to vary how likely the listed diagnoses may be compared to the selected findings. More likely settings better correlate diagnoses to a finding or the group of findings that are check marked during workup.

Simply by adjusting the sliding likelihood meter to lower or higher settings, the differential diagnosis list can be expanded or constrained for any set of selected findings. Less likely diagnoses are shown at lower settings. They don't have much of their total best weight selected. At higher likelihood settings, a shorter list of diagnoses is built. Those have more of their combined findings' weight chosen, compared to the total Findings weight for other diagnosis in the database. To be listed in the Differential view a Diagnosis' weighted specificity must meet of exceed the likelihood meter setting. Weighted specificity is the cumulative weight of check marked findings for each diagnosis in the database compared to the best weight of all possible findings for each diagnosis.

The Differential list can be prioritized or it can be shown alphabetically. If the Prioritize switch is set to ON, Diagnoses are sorted by their weighted-match likelihood instead of alphabetically. The OFF setting shows the list alphabetically. The weighted match is the product of weighted specificity and the number of check marked findings selected from the array of findings that describe each diagnosis on the differential

list. (See the Help section called Calculations that describes this in more detail.)

All of the selected findings can be viewed by tapping on the Findings button, adjacent to the Differential button, above the tab bar. (In the findings view all of the findings can be removed by tapping on the navigation bar Clear button.) Findings can also be removed individually by deleting them one-by-one from the Findings view or unchecking them in other views where green check marks are present. When all of the findings are cleared the Differential list is also empty. No differential of diagnoses are generated when no findings have been selected.