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The Symptoms of Lyme Disease

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Introduction:

Since 1990 the Society of Actuaries and the Lyme Disease Foundation have been building a data base of the experiences of individuals who have been diagnosed with lyme disease. The data base is the tabulation of answers to a questionnaire distributed by doctors, support groups, and individuals. Both individuals who believed they had Lyme disease and symptom free individuals were solicited, the later group could be characterized as the controls There are now 1132 entries in the data base including 771 who have been diagnosed with lyme disease. In addition a follow up questionnaire was distributed to those individuals answering the original form. The additional questionnaire focused particularly on the question of the swelling of joints, a factor which would distinguish between lyme disease (which can exhibit such symptoms) and chronic fatigue syndrom or fibromyalgia (which should not). 215 of the original group responded to the follow up questionnaire. Of this number 191 had been diagnosed as having lyme disease. Because of the self selection involved in the filling out of the basic questionnaires, it would be expected that the more serious and intractable cases would be over represented. The results of these studies would then be more applicable to such cases.

Copies of the original and follow up questionnaire are appended to this report. Inspection will reveal that at this point there is a very large amount of information available and either one long report or several shorter reports would be needed to provide an evaluation of all the available material. One preliminary report was presented in "Lyme Disease: The Cost to Society" (Contingencies, Jan.-Feb., 1993, pp. 42-48, Karen Vanderhoof-Forschner and Irwin T. Vanderhoof). Following that pattern the decision was made to continue with shorter papers covering specific phases of the study.

This analysis is the study of the symptoms of the disease. There are two mutually supporting reasons for this choice. The first is the unrecognized seriousness of the disease. Based on anecdotal evidence it would be possible to conclude that infected individuals fall within two general classes. The first respond well to treatment and have little in the way of sequelae. The second group, highly represented in our data base, have very serious personal and medical losses and do not report a high proportion of easy or complete cures. Some of the medical literature have focused only on the first group and has therefore incorrectly understated the overall effects of the disease on society.

The second, and related, reason for the choice of "Symptoms" as the current subject is that the data base clearly indicates that there is a relationship between the promptness of diagnosis and treatment and the possibility of eventual cure. In addition the indication is that these serious cases of our data base had tardy diagnosis and treatment. <u>Physicians who were reluctant or incompetent in making a prompt diagnosis are responsible for much of the misery in the lives of these patients.</u>

This paper will first present a table describing the characteristics of the current study and

then document, from data of that sample, the impact of the serious form of the disease captured in this sample. It will further document the assertions above about the significance of early treatment and the apparent time period between infection and proper diagnosis.

The paper will then present the frequency of the various symptoms of the disease and describe the nature of the Hotelling-T^2 test. Using this statistic we will establish which groups may be considered the same and which might seem to be different. This test will also be used to establish that the characteristics of those answering the follow up questionnaire are the same as those of the original study. This justifies the use of the follow up results to characterize the entire group.

Results will then be presented showing the symptoms of various subgroups of the data base in several different ways. The first will be the average intensity of the various symptoms for the entire group (intensity is defined later in this document). A second display will show the percentage of infected individuals that report a given level of discomfort as measures by the "intensity". The final exhibits will display the extent to which the disease is demonstrably multi-systemic.

<u>Sample Characteristics</u>

The following table presents the general characteristics of the individuals who completed the original questionnaire:

Total	1,032.
Diagnosed	771.
Female	553.
Male	184.
Sex Unknown	34.
SF (Symptom Free)	94.
Reported to State	208.
Report Unk	360.
Not Rep. to State	203.
No. MDs 'til Diag	5.
Months 'til Diag All	21.50
SF, M'ths 'til Diag.	8.60
Wks Diag to Trt all	4.80
SF, Mths Trt to Cure	6.00
Bite	543.
Rash	353.
Pos Test Only	208.
Neg Test Only	104.
Pos & Neg Tests	382.
States	
NJ	236.
NY	109.
CA	73.
PA	50.
MN	40.
CT	38.
WI	30.
TX	20.
MO	18.
MI	17.
OH	18.
IL	15.
28 Others	107.

An additional piece of information is that of the 771 diagnosed with Lyme disease, 505 of the questionnaires were submitted by physicians on behalf of their patients. The remainder would be from miscellaneous sources.

The Importance of Early Diagnosis

Using our data base it is easy to demonstrate the crucial importance of early treatment, and the impact on the patient of physician inability to make the necessary rapid diagnosis. Number of MD's is the number of different physicians required to make the eventual diagnosis. Diag Mnths is the number of months before such a diagnosis was reached. Total Cost is the averag for the category.

Category	No.	No. of MD's	Diag Mnths	Total Costs
Total	771	5	21.5	$67,388.00
Diag Mos				
Diag Mo <7	377	3	2	$33,534.00
6<Diag Mo<13	103	4.4	10	$67,585.00
Diag Mo>12	291	7.7	46.2	$108,360.00
Rash				
Rash	353	5.8	23.3	$63,252.00
Rash & Bite	318	5.9	23.5	$67,553.00
Tests				
Pos only	208	3.4	16.4	$71,883.00
Neg only	104	5.6	21.5	$62,100.00
Pos & Neg	382	6	25.4	$65,395.00
Pos &Rash & Bite	77	3.4	16.1	$48,829.00
No Pos, has Rash	87	5.6	18.7	$78,709.90
Neg No Rash nor Bite	23	3.3	20.8	$37,261.00
Symp Free				
Total	94	2.7	8.6	$16,330.00
Rash	44	2.3	5.6	$17,961.00
No Rash	50	3.1	11.6	$14,750.20
Pos & Rash & Bite	10	1.5	3.2	$11,007.00
NO. of MD's				
1	156	1	8.6	$27,939.60
2	113	2	13.5	$27,747.70
3	115	3	15.9	$131,313.70
4	64	4	21.1	$35,395.40
5	44	5	30.4	$44,396.70
6	44	6	28.3	$67,438.20
7	27	7	28.9	$126,010.20
over 7	126	15	40.1	$96,926.80

This table was constructed from the responses to the questionnaire. For this total group of 771 difficult cases the average cost, including loss of income and treatment was $67,388. If an average cost of an early treatment could be set at $200, these costs for the group would be adequate to pay for treatment of almost 260,000 people. This is on the order of twice the total

number of people ever reported under the CDC criteria. Note that the average number of MD's required to make the diagnosis was 5 and he average number of moths 'til treatment commenced was 21.5. Note further that the group who now consider themselves symptom free were generally diagnosed earlier and have incurred significantly lower expenses. We further note that those patients who report only positive tests, report a tick bite, and report the characteristic rash still required 3.4 MD's to make the diagnosis on average after 16.1 months. Of this group the ones who reported that they were now symptom free only required 1.5 MD's and 3.2 months to get treatment. The total costs of the disease for even this self selected of what might be the more difficult patients were only $11,000. This is markedly less that the average for the whole study and for the larger group with bite, rash, and positive tests. Finally the bottom of the panel shows that the number of months 'til diagnosis increases with the number of physicians needed to make such a diagnosis and the costs also so increase. (The average costs values for 3 and for 7 MD's required were influenced by a small number of very large reports.) The facts seem clear. There is a relationship between early diagnosis and treatment, and the costs of the infection. The evidence of a history of tick bite and a rash has usually been considered definitive evidence of Lyme disease. The table shows that this combination has an average of 5.9 MD's and 23.5 months with an average cost of $67,553. The groups that have only positive tests, only negative tests, or both positive and negative tests, show no significant differences in costs. Other interesting observations may be made by examining this chart. The conclusion must be, however, that a mighty strategy in an attempted reduction in costs of the disease would be earlier treatment and that a lamentable number of physicians seem unable to make any diagnosis early enough to forestall the extreme consequences of costs indicated above.

There are other costs of this disease in terms of human impact. According to the answers to the questionnaire of the 771 diagnosed cases 553 report mental anguish, 527 report some sort of non-cash loss, 318 report permanent damage, 149 lost a job, 137 lost school time, 19 were divorced, and there were 7 deaths of family members off which 5 were autopsied.

The saddest results of Lyme disease infection were reported in connection with child birth. The survey as described included a few questions in connection with childbirth. 55 live births were Sadly there were 19 miscarriages and 7 neonatal deaths also reported. According to the Statistical Abstracts of the United States in 1992 there were 7.4 fetal deaths and 5.4 neonatal deaths per 1,000 live births. This would correspond to less than 0.5 deaths from either cause, or 1 for the combination of fetal death and neonatal death. There is no significant probability that these results are by chance. According to the separately kept birth register of the Lyme Disease Foundation there were a total of 732 entries. Of these there were 148 reported abnormal births. The listing of the nature of the abnormalities included multiple still births and a wide variety of malformations. It was very troubling to read the list.

While it is not possible to demonstrate that all of the problems of the disease would be eliminated through early diagnosis and treatment, the results of the survey make a strong case that early treatment would be one powerful strategy to reduce the number of diminished lives described above. Since the costs of these cases alone would cover the costs of all CDC reported cases the argument for saving money by deferring treatment seems ill founded.

Quantization of Intensity and the Hotelling T² Statistic

Throughout this paper we will be referring to the 'intensity' of the symptoms. The questionnaire asks the patient to rate frequency and severity from 0 to 4. In proceeding with the calculations we increased each value by 1 so that 0's could be reserved for failures to answer. While severity is not clearly defined, frequency is then defined with 1 representing never, 2 rarely, 3 sometimes, 4 frequently, and 5 constantly. It is reasonable to assume that the rating of severity was done on some similar basis by the patients: 1 would represent nothing, 2 slight, 3 moderate, 4 severe, and 5 excruciating. We than multiplied these values of frequency and severity together to create a value of intensity. A value of intensity over nine would correspond to a symptom that is of more than moderate severity or experienced more frequently than "sometimes". This seems to the writer to be something that would be mentioned to a physician during an examination. A value of over 15 would correspond to a frequent severe symptom or worse. It seems to the writer that most persons would make a special trip to the physician for alleviation of such a condition.

The Hotelling T² statistic is an important factor in this investigation. Since it does not seem to have been extensively used in this type of investigation it deserves some explanation.

Various statistical measures are now commonly used in medical literature. These are generally based on univariate comparisons - the comparison of two different values of a single variable based on two different groups of individuals, treatment modalities etc. Statistical significance at the 5% or 1% level is often used as a demonstration that two samples differ from each other. Calculations of standard deviations, the assumption of normality, or the use of the Student's t statistic are all proper examples of such techniques. Calculation of correlation between such variables is also an example of such technology.

The Hotelling T² is the multidimensional analogue for the Student t statistic in one dimension. However, rather than being a unidimensional test it is a multidimensional test or an example of multivariate analysis. If we attempted to use the common test of correlation and significance between the 55 symptom categories we would be involved in $((55 \times 54)/2) = 1485$ comparisons. While such a volume of calculation is now easily performed, no one suggests that such number of comparisons can be made to make any sense. The T² statistic combines all of the correlations between all of the variates and translates to a value of the more familiar F distribution which provides a single probability that the two samples being considered for all these many different factors are the same or different. We are thus getting a familiar answer in terms of a probability measure of statistical significance, but one which considers a large number of characteristic all at once rather than one at a time.

As was mentioned this statistic is part of the general discipline called "multivariate analysis". The theory for such analysis has been fairly well developed based upon the assumption that all of the variates are distributed according to the "normal" distribution. Univariate analysis has progressed fairly well for distributions other than the "normal". This has not been true for multivariate analysis. Because there are many variables involved the theory

becomes too complex for an easy analysis. Unless the variables follow the "normal" distribution there is a question about the applicability of the theories and calculations. While these is no reason why a theory could not be developed for other distributions, it would require a different theory for each distribution and not yet been well developed. However, the techniques of multivariate analysis and the Hotelling test are generally regarded as robust to violations of the assumptions. In straight forward language, the test is usually pretty good even if the distributions are definitely not normal. Unfortunately, there is no obvious way to tell the extent to which violations in the assumptions have invalidated the test.

Professor Simonoff, of NYU, made the useful suggestion that resolved this problem. He said that if the lack of normality in the data effected the outcome then a change in the scaling of the variable would also change the result. In practice this meant that we could resolve the problem by following the calculational process using the logarithm of the data rather than the data itself. If the actual distribution of the variable mattered, the results of the calculations then would differ between the two variables. If the results were the same then the distribution could not matter and the results would be dependable.

A few examples will make this methodology clear. If we compare the matrix of symptoms for the Diagnosed vs. the not Diagnosed we get an F value of 11.58 with 55 and 976 degrees of freedom. This corresponds to a probability of the two being the same as 0. If we used the symptoms matrices with 1's replacing the 0's (we had left the 0's to represent no answer) we get an F value of 10.11 for a probability of 0. If we use the logs of the last matrix we get an F value of 15.99 for a probability of 0.

A comparison of the matrices for Diagnosed males vs. Diagnosed females with 55 and 681 degrees of freedom gives F values of 1.6737 with probability .2% for the original matrices, 1.6714 for the matrices with 1's replacing 0's for probability of .2%, and 1.9163 with probability of .01% using the logs.

Finally, we performed the same series of tests using the matrices of individuals who responded to the follow up questionnaire and those who did not. While the earlier tests showed that very significant differences would be shown by all version of the data, this would probe the more significant question as to whether or not the pattern of symptoms of those who responded was the same as those who did not. Since there were a total of 55 symptoms compared it would seem almost inconceivable that the two groups could match on all those and yet differ with respect to the follow up questions on swelling of joints. Using the basic matrices produced for the groups of diagnosed individuals who did and did not respond to the follow up we found an F value of 1.052 with 55 and 715 degrees of freedom corresponding to a probability of 38% that the two are the same. Since the normal level for acceptance that the two are different would be a value of 5% or less, we would conclude from this calculation that the two samples are similar enough such that the conclusion drawn about those who respond to the follow up would apply to the entire sample. Further tests were done as above. When all the 0's in the matrices were replaced with 1's the F value was 1.033 with a probability of 41%. When the same analysis was done using the logs of the values of intensity the F value was 1.044 with a probability of 39%.

The additional conclusion can then be reached that the violation of the assumption of normality is of minimal significance in these calculations and that we can rely on the Hotelling T^2 using our original values for intensity to determine if particular groups show the same or different patterns of symptoms. We should further be able to assume that differences in these patterns correspond to some differences in the nature of the disease.

We have used these kinds of criteria to establish for which groups results should be shown separately. As was indicated above, the symptoms were different for those diagnosed and those not diagnosed. Also the symptom complex for males and females significantly differ. In addition we find that those who remember a tick bite, report a rash, and who had positive serology and no negative test when compared with the complementary group of those who were diagnosed but not have the other characteristics shows an F value of 1.66 with 55, and 715 degrees of freedom for a probability of 0.2%. The group with all the indicia might be considered the group most surely being correctly diagnosed.

When this most surely diagnosed group was compared with the group reporting a bite and rash but at least one negative and no positive serology we found an F value of 1.011 with 55 and 72 degrees of freedom and a probability of 47.7%. Since the normal criteria for statistical significance would be a value of less than 5% and since we have already demonstrated the appropriateness of our test, we must conclude that there is not a significant difference between the two groups. The blood tests do not measure anything related to the symptoms of the disease.

If we can work on the basis that the bitten, rash, positive and no negative groups is our surest diagnosed group a comparison with other groups is interesting. When we compare this group (referred to as Dbrp_n) to the group diagnosed with rash but no positive test (Dr_p) we find that the F value is .944 with 55 and 108 degrees of freedom with a probability of 58%. Again the serology seems to measure something independent of the symptoms.

However, if we compare the Dbrp_n group with its opposite, the group not reporting a bite or rash and having at least one negative but no positive serology we get an F value of 2.05 with 55 and 44 degrees of freedom for a probability of 0.7%. Since it is far less than the crucial level of 5% we would have to conclude that these are a distinguishable group of individuals. Examination of the actual average intensity levels seem to show that the Dbrp_n group has somewhat higher values for intensity. The other group might therefore be supposed to include some misdiagnosed cases. This observation is somewhat counter intuitive. The writer would expect that the cases without bite, rash or positive tests (and having a negative test) would have required more intense symptoms to support a positive diagnosis.

A comforting calculation compared those questionnaires from MD's offices with those without such sourcing. We found an F value of .933 with 55 and 715 degrees of freedom and a probability of 61%. There was no significant difference in the patterns of symptoms.

Finally, a comparison was made between the questionnaires of those diagnosed from NJ with those from other states. NJ was found to be similar to California, NY, Connecticut, and

the group as a whole. However, the comparison of the combined Mn and WI groups with the complement of all not in this category showed an F value of 1.547 with an F value of 55 and 715 with a probability of 0.8%. The pattern of symptoms seems significantly different.

These comparison were significant in the determination of which sets of data would be reported. Because of the indications that there were significantly different sets of symptoms represented, in detailing their frequency we showed separately : "All Diagnosed", "All not Diagnosed" (the control group), "All Diagnosed Females", "All Diagnosed Males", "All Diagnosed, Bitten, Rash, Positive and no Negative Tests", "All Diagnosed but not bitten, no Rash, Negative but no Positive Tests", and "MN and WI".

Two other points should be made before we complete this section. The first has to do with the distinctions mentioned in the preceding paragraph. A comparison of the figures on the charts detailing symptom intensities did not indicate to the writer that there were such large differences as indicated by the T^2 calculations. A separate test was done to try to establish which particular symptoms accounted for the distinction. This experiment was unsuccessful. It seems as if the T^2 results were a function of all of the differences and the various variance and covariance terms rather than choice of one symptom that was greatly different.

A second question, of some possible interest, is in the correlations between the various symptom intensities. Here an unexpected result was obtained. A calculation of all the correlation coefficients for all Diagnosed was made and an average value of 23% was calculated. The same calculation was performed for all those not Diagnosed (the controls) produced an average value of 42%. The interpretation of this result is that for the control group there is a greater tendency for all symptom intensities to rise or fall together than for the diagnosed group where the specific symptoms of the disease can rise or fall independent of the other factors. In retrospect, this result is not surprising.

The Symptoms of Lyme Disease

As was mentioned earlier, the first step was the calculation of intensities which were defined as the product of the frequency and the severity measures of each symptom. The entire set of 55 symptoms categories was used to establish which groups of patients actually had differing sets of symptoms. These different groups might have differences which would be revealing to the acute physician. Also the differences might be of aid in actual diagnosis when one is dealing with a male vs. female patient etc.

The results are summarized in nine charts. The first shows the average intensity for each of the symptoms for the following groups (number of individuals shown):

1) All individuals Diagnosed with Lyme disease (771).
2) All individuals not diagnosed with Lyme disease- the control group (261).
3) All Diagnosed Females (553).
4) All Diagnosed Males (184).
5) Diagnosed, Bitten, had Rash, Pos tests no Neg. Tests (77).
6) Diagnosed, no Bite, no Rash, Neg. Tests and no Pos tests (51).
7) Diagnosed from MN and WI (70).

Chart 2 is again based upon the same set of categories but instead of showing average intensities this chart is based upon the percentage of the group that has each symptom intensity over 9. This is chosen as the level at which a patient could be expected to mention the problem to the physician. Chart 3 is based on the percentage in each of the groups that register over 15 for each of the symptoms. This would be the level at which a patient would be expected to make a special visit to physician in hopes of alleviation of the condition.

Charts 4 through 9 are intended to demonstrate the often made comment that Lyme disease is multi systemic. A description of the construction of Chart 4 will make this clear. In the questionnaire the various symptoms are divided into 7 systems: General, Heart-Lungs, Muscle-Skeletal, Eye-Ear, Neurological, Gastric- Intestinal, and Skin. If any symptom within a system has an intensity thaat is greater than 9 then the system is assigned this value. We can then calculate what percentage of the total number of individuals have 1, 2 , or more systems registering values which would produce complaints to the physician. Chart 4 is for all diagnosed cases. The upper panel shows the actual number of cases. The middle panel shows the percentage distribution for these cases and the lower panel shows the percentage distribution for those which had at least one system impaired. This later analysis is significant when comparison is made with Chart 5. That Chart shows the same analysis for those cases which were diagnosed, had been bitten, had a rash, and had positive tests but no negative tests. Because of the indicia all supporting the diagnosis a larger number of the cases were diagnosed without the symptoms. A comparison of the two lower panels indicates that the actual cases did not differ that much in terms of the number of systems compromised by the disease. Chart 6 Shows he same analysis for those cases which were diagnosed but were not bitten, had no rash, and had negative tests but no positive test. Charts 7,8, and 9 provide the same analysis for system

involvement at the over 15 level at which we would anticipate special visits to a physicians based on these disabling symptoms.

The discussion of the symptoms can start with the analysis of chart 7. If the physician has the advantage of a recollection by the patient of a bite and a rash is presented the diagnosis would seem to be immediate. The existence of positive tests and no negative test would be helpful, but the discussion of the previous section casts doubt on the additional information provided by blood test information. However, if these indicia are not available then the diagnosis must be made based upon the symptoms. We would expect that the patient would exhibit several systems involved in the disease. While these cases in the present sample are the more intractable ones, we would still expect the same patterns to be exhibited. We would expect at least two and more likely three systems to be involved. We would expect that symptoms from the General class, the Muscle Skeletal class, and the Neurological system to be presented. Additional systems are likely to be involved and 40% of the cases will exhibit symptoms in five or more systems.

While the first three charts are designed to pinpoint the specific symptoms involved Chart 3 can provide enough of a direction as to specifics. In the General system we find profound exhaustion in 62%, but fever and weight changes also cause distress at the over 15 level in 20%. Heart palpitations and chest pains at the over 15 level occur in about 20% of the people.

Distress in the Muscle-Skeletal system present in about 50% but we note that TMJ like pain is most common in the group with no bite, no rash, and no positive tests - the group with the weakest diagnosis criteria. This group may include some individuals who have been diagnosed solely based on this system results. The group who answered the follow up questionnaire indicated that about 60% had some swelling problems and 30% had problems at the over 15 level. This is generally consistent with the other complaint frequency for this system. We have already demonstrated that this result can be justified as applying to the entire diagnosed group since there is no bias in the decision to answer the follow up.

The Eye-Ear category's most common symptom is light sensitivity in 31% and ringing in ears in 25%. The values for the total group and the diagnosed, bite, rash, positive group are in good agreement. The no bite, no rash, no positive group has a distinctly lower value.

In the neurological group weakness in extremities seems common at 31%, but over 50% complain of disabling headaches and stiff neck. Bell's palsy is less frequent that expected at 5%. It might be that this symptom leads to more rapid diagnosis. Dizziness and fainting are also exhibited by one quarter of the patients. The most common problems of the neurological system are behavioral changes, cognitive changes and sleep pattern changes occurring in almost half the patients at the disabling over 15 level..

Gastric problems seem to be less common, but still 17% of the patients have disabling problems at the over 15 level. Finally skin problems are fairly common but not usual on a

serious level.

Discussion

Based on the information provided in the survey the serological tests seem of limited usefulness. If a test is positive it provides strong support of the diagnosis. However, if the test is negative it seems to have no correlation with the symptoms. The diagnosis would have to be made based on the symptoms alone. Because of the demonstrated seriousness of the illness in cases where treatment is delayed a diagnosis should be made early based on symptoms if serology is negative. The diagnosis may be based on the number of systems involved and the specific symptoms exhibited by the patient. Light sensitivity and continuing headache are symptoms that may not have received enough recognition in the literature.

Early diagnosis and treatment based on symptoms should lead to reduction in the human suffering described in this data and also a radical reduction in the costs of treatment and other costs to society.

This worksheet is to show the average intensity for each of the symptoms
for several different classes of diagnosed individuals

	All Diagnosed	All not Diagnosed	All Females	All Males	All Bitten Rash Pos no Neg Tests	No Bite No Rash Neg no Pos Tests	Diag. MN & WI
General Symptoms							
Profound Exhaustion	15.77	4.01	16.46	13.47	15.60	13.35	17.71
Recurrent Fever	8.60	2.03	8.97	7.45	8.91	6.70	9.39
Weight Changes	7.40	1.84	7.71	6.01	7.17	5.22	8.74
Heart and Lungs							
Heart Palpitations	8.24	1.90	8.83	6.38	8.64	6.57	10.04
Heart Block/myocarditis	1.98	0.37	1.93	2.00	2.27	1.00	2.06
Heart Attack	1.17	0.40	1.15	1.29	1.03	1.00	1.10
Chest Pains, short breath	8.30	1.61	8.63	6.95	8.66	7.26	10.39
LB pneumonia	1.48	0.54	1.55	1.28	1.58	2.13	2.40
Muscle and Skeletal							
TMJ like pain	6.72	1.64	7.19	5.57	7.35	9.48	8.66
Neck and back pain	14.70	3.72	15.25	12.78	13.44	14.70	14.69
Joint pain-arm and shoulder	11.25	2.66	11.41	10.41	13.01	11.30	11.47
hand and wrist	10.95	2.57	11.51	9.22	10.55	11.26	11.31
hips and knee	13.62	3.15	14.11	11.92	12.99	15.00	13.44
ankles and feet	10.43	2.41	10.75	9.15	10.19	13.87	10.17
Muscle pains and cramps	11.26	2.49	11.39	10.53	10.94	14.17	11.24
Loss of muscle tone	8.77	1.57	9.20	7.73	8.23	11.70	8.77
Eye and Ear							
Vision changes - has glasses	4.37	1.20	4.49	3.70	4.38	3.30	5.17
Vision changes - no glasses	4.33	0.80	4.58	3.32	4.31	4.83	5.03
Reduced vision/ blindness	3.38	0.98	3.31	3.38	3.94	1.87	2.80
Retinal damage/optic atrophy	1.47	0.30	1.57	1.26	1.48	0.87	1.64
Red eye/conjunctivitis	3.51	0.71	3.47	3.29	3.36	3.91	3.30
Spots before eyes	5.78	1.55	6.31	4.43	6.66	5.00	6.54
Uveitis	1.79	0.28	1.96	1.38	2.18	0.87	1.99
Eye pain	5.56	1.03	5.85	4.41	5.66	3.39	6.11
Double vision	4.00	0.98	4.26	3.15	4.94	4.30	4.50
Wandering "lazy" eye	2.18	0.39	2.29	2.01	2.35	0.87	2.20
Drooping eyelid	3.05	0.90	3.18	2.67	3.36	1.96	2.31
Light Sensitivity	9.32	1.93	9.84	7.12	9.25	6.04	10.61

Chart 1

Chart 1

Ringin in ears	7.91	1.93	8.12	7.21	8.42	6.04	9.11
Neurological							
Weaknes/paralysis arms or legs	9.82	2.66	10.36	8.10	9.78	10.52	10.47
Loss of reflexes/arms or legs	4.26	1.26	4.20	4.39	5.77	3.52	6.24
Radiating abnormal sensations/arms or legs	9.57	1.95	10.10	8.21	8.40	9.48	10.44
Meningitis	2.62	0.56	2.63	2.49	2.92	0.96	3.00
Extreme headache/stiff neck	13.88	3.31	14.28	12.16	11.38	13.00	14.93
Changes in sense of smell	3.66	0.79	3.79	3.43	3.35	6.17	4.11
Difficulty in chewing	3.88	0.80	4.04	3.43	4.56	4.78	3.59
Bell's palsy	2.75	0.80	2.76	2.67	3.60	2.78	2.83
Dizziness/fainting	8.62	1.51	9.26	7.14	7.56	8.52	8.99
Changes in sense of taste	3.84	0.89	3.89	3.82	4.25	5.74	4.43
Difficulty swallowing	4.39	0.75	4.52	4.11	4.61	5.00	5.11
Difficulty in speech/hoarseness	5.84	1.16	6.08	5.32	6.38	6.35	6.66
Drooping shoulders/inability to turn head	5.42	1.09	5.67	4.58	5.82	3.39	5.24
Paralysis of tongue/thickness of speech	3.17	0.65	3.24	3.19	3.14	3.87	4.00
Seizures or abnormal EKG/brain waves	2.31	0.43	2.27	2.48	1.66	0.96	2.41
Behavioral changes(depression, changes in person:	11.34	2.97	11.82	9.96	11.04	11.70	13.29
Cognitive changes (difficulty with memory, confusior	12.25	3.28	12.75	10.55	12.08	12.91	13.87
Changes in sleep pattern	12.33	3.28	12.86	10.59	10.78	12.70	11.61
Stroke	1.30	0.35	1.23	1.55	1.69	3.43	1.40
Gastric and Intestinal							
Nausea/vomiting	6.66	1.33	7.20	4.79	5.84	7.61	6.69
Diarrhea	6.34	1.46	6.84	4.63	6.21	8.30	7.13
Skin							
Initial rash, EM	4.20	0.98	4.20	4.28	7.77	1.04	5.77
Initial rash, multiple EM	2.56	0.72	2.76	2.10	5.13	1.00	2.94
Recurrent rashes, EM	3.60	0.94	3.86	2.73	4.70	2.30	4.16
Benign nodules, Lymphocytoma-earlobe,breast, face	2.76	0.87	2.88	2.29	3.38	1.13	4.04
Discoloration/abnormal skin of hands, feet, ankles	2.60	0.45	2.78	2.17	2.58	2.04	2.37
	6.31	1.47	6.57	5.47	6.46	6.13	6.88

This worksheet shows the percentage of individuals who experience symptom intensity over 9

	All Diagnose	All Diagnose Females	All not Diagnose Males	All Diagn Pos no N Tests	All Diagn Neg no Pos Tests	All Bitten No Bite Rash no Rash	All Diag. MN & WI Pos
General Symptoms							
Profound Exhaustion	72.76%	19.16%	75.77%	63.04%	68.83%	60.87%	81.43%
Recurrent Fever	34.89%	6.51%	35.80%	30.98%	36.36%	26.09%	32.86%
Weight Changes	26.20%	5.75%	27.85%	19.57%	24.68%	17.39%	31.43%
Heart and Lungs							
Heart Palpitations	34.76%	6.51%	37.43%	25.54%	40.26%	30.43%	48.57%
Heart Block/myocarditis	4.80%	0.38%	4.52%	4.89%	5.19%	0.00%	5.71%
Heart Attack	0.65%	0.38%	0.54%	1.09%	0.00%	0.00%	0.00%
Chest Pains, short breath	34.11%	4.98%	35.80%	26.63%	36.36%	26.09%	48.57%
LB pneumonia	1.95%	1.15%	2.35%	1.09%	1.30%	4.35%	7.14%
Muscle and Skeletal							
TMJ like pain	26.59%	5.75%	28.57%	22.28%	31.17%	43.48%	34.29%
Neck and back pain	67.32%	16.09%	69.26%	59.24%	57.14%	69.57%	72.86%
Joint pain-arm and shoulder	49.42%	11.49%	50.09%	45.11%	53.25%	52.17%	48.57%
hand and wrist	45.91%	9.58%	49.19%	35.33%	42.86%	47.83%	45.71%
hips and knee	59.79%	12.26%	62.39%	51.63%	51.95%	69.57%	61.43%
ankles and feet	43.84%	9.20%	45.75%	37.50%	38.96%	60.87%	44.29%
Muscle pains and cramps	48.64%	8.43%	49.55%	43.48%	40.26%	69.57%	47.14%
Loss of muscle tone	35.54%	6.13%	38.70%	27.72%	31.17%	43.48%	30.00%
Eye and Ear							
Vision changes - has glasses	13.49%	3.83%	13.92%	9.78%	12.99%	8.70%	18.57%
Vision changes - no glasses	16.60%	2.68%	18.08%	10.87%	18.18%	13.04%	20.00%
Reduced vision/ blindness	11.54%	2.68%	11.57%	11.41%	15.58%	4.35%	10.00%
Retinal damage/optic atrophy	2.72%	0.00%	3.25%	1.63%	2.60%	0.00%	4.29%
Red eye/conjunctivitis	10.51%	1.92%	10.13%	11.41%	9.09%	13.04%	10.00%
Spots before eyes	20.10%	4.60%	22.60%	14.13%	22.08%	21.74%	24.29%
Uveitis	3.50%	0.00%	4.34%	1.63%	5.19%	0.00%	2.86%
Eye pain	19.97%	3.45%	22.06%	12.50%	22.08%	8.70%	21.43%
Double vision	12.06%	2.30%	13.74%	7.61%	16.88%	13.04%	15.71%
Wandering "lazy" eye	5.58%	0.77%	6.33%	4.35%	5.19%	0.00%	4.29%
Drooping eyelid	8.95%	2.68%	9.58%	7.61%	10.39%	8.70%	2.86%
Light Sensitivity	39.04%	7.28%	41.59%	29.35%	38.96%	17.39%	41.43%

Chart 2

Chart 2

Ringin in ears	31.78%	6.13%	32.73%	29.89%	32.47%	17.39%	45.71%
Neurological							
Weaknes/paralysis arms or legs	43.32%	11.88%	45.57%	35.33%	44.16%	43.48%	45.71%
Loss of reflexes/arms or legs	13.23%	4.60%	13.02%	14.13%	19.48%	8.70%	21.43%
Radiating abnormal sensations/arms or legs	41.25%	6.90%	43.94%	33.70%	32.47%	39.13%	44.29%
Meningitis	7.78%	1.15%	7.78%	7.61%	9.09%	0.00%	8.57%
Extreme headache/stiff neck	62.65%	14.94%	65.10%	51.63%	48.05%	56.52%	65.71%
Changes in sense of smell	10.51%	1.92%	10.67%	10.87%	7.79%	26.09%	12.86%
Difficulty in chewing	9.86%	1.92%	11.21%	6.52%	12.99%	8.70%	7.14%
Bell's palsy	7.52%	2.68%	7.23%	7.61%	10.39%	4.35%	8.57%
Dizziness/fainting	33.72%	5.36%	36.35%	28.26%	27.27%	34.78%	34.29%
Changes in sense of taste	10.89%	1.92%	11.21%	10.87%	12.99%	17.39%	12.86%
Difficulty swallowing	12.58%	1.53%	13.56%	10.33%	11.69%	26.09%	17.14%
Difficulty in speech/hoarseness	21.14%	3.45%	22.24%	18.48%	27.27%	17.39%	25.71%
Dropping shoulders/inability to turn head	18.94%	3.07%	20.43%	13.04%	20.78%	4.35%	18.57%
Paralysis of tongue/thickness of speech	8.17%	0.77%	8.68%	7.79%	7.79%	13.04%	11.43%
Seizures or abnormal EKG/brain waves	6.49%	1.15%	6.15%	7.61%	3.90%	0.00%	8.57%
Behavioral changes(depression, changes in persona	49.29%	12.26%	50.45%	45.11%	44.16%	52.17%	61.43%
Cognitive changes (difficulty with memory, confusior	52.66%	14.56%	54.79%	45.11%	46.75%	52.17%	58.57%
Changes in sleep pattern	52.27%	14.56%	54.61%	45.65%	44.16%	52.17%	51.43%
Stroke	1.56%	0.38%	1.27%	2.72%	2.60%	13.04%	1.43%
Gastric and Intestinal							
Nausea/vomiting	26.07%	3.45%	28.75%	15.76%	20.78%	30.43%	27.14%
Diarrhea	23.35%	5.75%	26.04%	15.22%	22.08%	34.78%	27.14%
Skin							
Initial rash, EM	13.49%	2.30%	13.56%	14.67%	29.87%	0.00%	21.43%
Initial rash, multiple EM	7.00%	1.53%	8.14%	4.35%	16.88%	0.00%	8.57%
Recurrent rashes, EM	11.93%	2.68%	13.20%	8.15%	14.29%	8.70%	14.29%
Benign nodules,Lymphocytoma-earlobe,breast, face	7.91%	2.68%	8.14%	6.52%	10.39%	0.00%	15.71%
Discoloration/abnormal skin of hands, feet, ankles	7.13%	0.77%	8.14%	5.43%	7.79%	4.35%	7.14%

	All Diagnose	All not Diagnose	All Diagnose Females	All Diagn Males	All Diagn Pos Tests	All Diagn Rash no N, Neg no Pos Tests	All Bitten No Rash Pos no N, Neg no Pos Tests	No Bite No Rash MN & WI	All Diag. MN & WI Pos
General Symptoms									
Profound Exhaustion	62.39%	15.71%	66.18%	49.46%	55.84%	52.17%	61.34%		
Recurrent Fever	21.40%	3.45%	22.78%	17.93%	25.97%	8.70%	21.26%		
Weight Changes	20.62%	4.21%	22.24%	14.67%	19.48%	13.04%	20.26%		
Heart and Lungs									
Heart Palpitations	22.57%	4.98%	24.59%	15.22%	25.97%	13.04%	22.11%		
Heart Block/myocarditis	2.59%	0.38%	2.35%	2.72%	3.90%	0.00%	2.71%		
Heart Attack	0.39%	0.38%	0.36%	0.54%	0.00%	0.00%	0.43%		
Chest Pains, short breath	24.38%	3.07%	26.58%	16.30%	28.57%	17.39%	22.97%		
LB pneumonia	0.91%	0.77%	1.27%	0.00%	1.30%	4.35%	0.57%		
Muscle and Skeletal									
TMJ like pain	18.29%	3.07%	20.43%	13.59%	23.38%	34.78%	17.55%		
Neck and back pain	56.81%	14.56%	58.77%	48.37%	54.55%	65.22%	56.49%		
Joint pain-arm and shoulder	41.12%	8.43%	41.59%	38.04%	49.35%	43.48%	40.80%		
hand and wrist	38.78%	7.66%	41.59%	29.89%	40.26%	47.83%	38.52%		
hips and knee	52.14%	9.96%	54.97%	42.39%	46.75%	65.22%	51.64%		
ankles and feet	36.32%	7.66%	38.52%	28.80%	38.96%	60.87%	36.52%		
Muscle pains and cramps	37.61%	6.51%	38.34%	33.15%	33.77%	47.83%	37.95%		
Loss of muscle tone	29.83%	4.98%	31.65%	25.54%	29.87%	34.78%	30.24%		
Eye and Ear									
Vision changes - has glasses	11.02%	2.30%	11.93%	7.61%	11.69%	8.70%	10.98%		
Vision changes - no glasses	12.06%	1.15%	12.84%	8.15%	14.29%	13.04%	11.98%		
Reduced vision/ blindness	7.52%	1.92%	8.14%	5.43%	10.39%	4.35%	7.70%		
Retinal damage/optic atrophy	2.20%	0.00%	2.53%	1.63%	1.30%	0.00%	2.14%		
Red eye/conjunctivitis	7.39%	1.15%	7.78%	5.43%	9.09%	13.04%	7.42%		
Spots before eyes	13.49%	4.60%	15.01%	9.78%	15.58%	17.39%	13.27%		
Uveitis	2.98%	0.00%	3.80%	1.09%	5.19%	0.00%	3.00%		
Eye pain	14.27%	1.15%	16.09%	8.15%	15.58%	4.35%	14.27%		
Double vision	9.21%	1.53%	11.03%	11.03%	14.29%	13.04%	9.27%		
Wandering "lazy" eye	4.54%	0.38%	5.24%	4.89%	5.19%	0.00%	4.71%		
Drooping eyelid	6.74%	2.68%	7.59%	4.89%	9.09%	0.00%	7.28%		
Light Sensitivity	30.74%	5.75%	34.18%	17.93%	31.17%	17.39%	30.67%		

Chart 3

Chart 3

Ringin in ears	24.64%	5.36%	25.86%	21.20%	27.27%	13.04%	24.25%
Neurological							
Weaknes/paralysis arms or legs	31.13%	9.96%	33.45%	23.91%	28.57%	43.48%	31.10%
Loss of reflexes/arms or legs	10.25%	2.68%	10.31%	10.33%	16.88%	8.70%	9.42%
Radiating abnormal sensations/arms or legs	32.81%	5.36%	34.72%	27.17%	28.57%	30.43%	32.38%
Meningitis	5.84%	0.77%	6.15%	4.89%	6.49%	0.00%	5.85%
Extreme headache/stiff neck	52.01%	11.49%	54.43%	41.85%	42.86%	52.17%	51.78%
Changes in sense of smell	8.04%	1.53%	8.50%	7.07%	7.79%	26.09%	7.70%
Difficulty in chewing	7.78%	1.53%	8.86%	4.89%	10.39%	8.70%	7.99%
Bell's palsy	4.54%	0.77%	4.70%	3.80%	9.09%	4.35%	4.56%
Dizziness/fainting	24.77%	3.45%	28.03%	17.39%	18.18%	21.74%	24.39%
Changes in sense of taste	9.08%	1.15%	9.22%	9.24%	11.69%	17.39%	8.99%
Difficulty swallowing	8.95%	0.00%	9.76%	7.61%	10.39%	8.70%	8.70%
Difficulty in speech/hoarseness	15.30%	2.68%	15.73%	14.67%	19.48%	17.39%	15.26%
Drooping shoulders/inability to turn head	15.69%	2.68%	16.64%	11.41%	16.88%	4.35%	15.83%
Paralysis of tongue/thickness of speech	6.23%	0.77%	6.69%	5.98%	6.49%	8.70%	5.99%
Seizures or abnormal EKG/brain waves	4.54%	0.00%	4.34%	5.43%	1.30%	0.00%	4.56%
Behavioral changes(depression, changes in persona	40.08%	10.73%	42.50%	33.15%	36.36%	52.17%	38.80%
Cognitive changes (difficulty with memory, confusior	44.62%	11.11%	46.47%	38.04%	42.86%	47.83%	43.79%
Changes in sleep pattern	46.43%	12.26%	49.01%	38.59%	37.66%	52.17%	46.36%
Stroke	1.30%	0.38%	0.90%	2.72%	2.60%	13.04%	1.28%
Gastric and Intestinal							
Nausea/vomiting	17.51%	2.68%	19.35%	11.41%	15.58%	21.74%	17.40%
Diarrhea	17.51%	3.45%	19.53%	11.41%	16.88%	26.09%	17.12%
Skin							
Initial rash, EM	9.08%	2.30%	9.40%	8.70%	22.08%	0.00%	8.42%
Initial rash, multiple EM	5.97%	1.53%	6.69%	4.35%	16.88%	0.00%	5.71%
Recurrent rashes, EM	8.43%	2.30%	9.04%	5.98%	12.99%	0.00%	7.99%
Benign nodules,Lymphocytoma-earlobe,breast,face	5.06%	1.92%	5.42%	3.26%	7.79%	0.00%	4.85%
Discoloration/abnormal skin of hands, feet, ankles	5.84%	0.77%	6.87%	3.80%	7.79%	4.35%	5.99%

Distribution of Systems Registering over 9
for all Diagnosed

Number of Systems	Number of Cases at Sys Level	Cases at or over Sys Level	General Symptoms	Heart Lungs	Muscle Skeletal	Eye Ear	Neuro-logical	Gastric Intestinal	Skin
0	54	771							
1	44	717	8	4	14	3	8		7
2	50	673	24	5	30	6	25	5	5
3	88	623	62	6	77	23	76	8	12
4	120	535	95	29	114	78	116	28	20
5	184	415	177	114	182	156	184	55	52
6	150	231	149	132	150	145	150	97	77
7	81	81	81	81	81	81	81	81	81
Totals	771		596	371	648	492	640	274	254

Number of Systems	at Level	at or over Level	Percent of Total Number						
0	7.00%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1	5.71%	93.00%	1.04%	0.52%	1.82%	0.39%	1.04%	0.00%	0.91%
2	6.49%	87.29%	3.11%	0.65%	3.89%	0.78%	3.24%	0.65%	0.65%
3	11.41%	80.80%	8.04%	0.78%	9.99%	2.98%	9.86%	1.04%	1.56%
4	15.56%	69.39%	12.32%	3.76%	14.79%	10.12%	15.05%	3.63%	2.59%
5	23.87%	53.83%	22.96%	14.79%	23.61%	20.23%	23.87%	7.13%	6.74%
6	19.46%	29.96%	19.33%	17.12%	19.46%	18.81%	19.46%	12.58%	9.99%
7	10.51%	10.51%	10.51%	10.51%	10.51%	10.51%	10.51%	10.51%	10.51%
Totals	100.00%		77.30%	48.12%	84.05%	63.81%	83.01%	35.54%	32.94%

The following exclude cases with no symptoms over 9

Number of Systems	at Level	at or over Level	General Symptoms	Heart Lungs	Muscle Skeletal	Eye Ear	Neuro-logical	Gastric Intestinal	Skin
1	6.14%	100.00%	1.12%	0.56%	1.95%	0.42%	1.12%	0.00%	0.98%
2	6.97%	93.86%	3.35%	0.70%	4.18%	0.84%	3.49%	0.70%	0.70%
3	12.27%	86.89%	8.65%	0.84%	10.74%	3.21%	10.60%	1.12%	1.67%
4	16.74%	74.62%	13.25%	4.04%	15.90%	10.88%	16.18%	3.91%	2.79%
5	25.66%	57.88%	24.69%	15.90%	25.38%	21.76%	25.66%	7.67%	7.25%
6	20.92%	32.22%	20.78%	18.41%	20.92%	20.22%	20.92%	13.53%	10.74%
7	11.30%	11.30%	11.30%	11.30%	11.30%	11.30%	11.30%	11.30%	11.30%
	100.00%		83.12%	51.74%	90.38%	68.62%	89.26%	38.21%	35.43%

Chart 4

Distribution of Systems Registering over 9
for Diagnosed, Bitten, with Rash and Positive but no Negative Tests

Number of Systems	Number of Cases at Sys Level	Cases at or over Sys Level	General Symptoms	Heart Lungs	Muscle Skeletal	Eye Ear	Neuro-logical	Gastric Intest.	Skin
0	14	77							
1	3	63	1	1		1			
2	2	60	2		1				1
3	5	58	3	1	3	2	4		2
4	11	53	9	2	11	8	11	1	2
5	12	42	11	9	12	8	12	2	6
6	19	30	19	16	19	18	19	9	14
7	11	11	11	11	11	11	11	11	11
Totals	77		56	40	57	48	57	23	36

Number of Systems	at Level	at or over Level	Percent of Total Number						
0	18.18%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1	3.90%	81.82%	1.30%	1.30%	0.00%	1.30%	0.00%	0.00%	0.00%
2	2.60%	77.92%	2.60%	0.00%	1.30%	0.00%	0.00%	0.00%	1.30%
3	6.49%	75.32%	3.90%	1.30%	3.90%	2.60%	5.19%	0.00%	2.60%
4	14.29%	68.83%	11.69%	2.60%	14.29%	10.39%	14.29%	1.30%	2.60%
5	15.58%	54.55%	14.29%	11.69%	15.58%	10.39%	15.58%	2.60%	7.79%
6	24.68%	38.96%	24.68%	20.78%	24.68%	23.38%	24.68%	11.69%	18.18%
7	14.29%	14.29%	14.29%	14.29%	14.29%	14.29%	14.29%	14.29%	14.29%
Totals	100.00%		72.73%	51.95%	74.03%	62.34%	74.03%	29.87%	46.75%

The following exclude cases with no symptoms over 9

1	4.76%	100.00%	1.59%	1.59%	0.00%	1.59%	0.00%	0.00%	0.00%
2	3.17%	95.24%	3.17%	0.00%	1.59%	0.00%	0.00%	0.00%	1.59%
3	7.94%	92.06%	4.76%	1.59%	4.76%	3.17%	6.35%	0.00%	3.17%
4	17.46%	84.13%	14.29%	3.17%	17.46%	12.70%	17.46%	1.59%	3.17%
5	19.05%	66.67%	17.46%	14.29%	19.05%	12.70%	19.05%	3.17%	9.52%
6	30.16%	47.62%	30.16%	25.40%	30.16%	28.57%	30.16%	14.29%	22.22%
7	17.46%	17.46%	17.46%	17.46%	17.46%	17.46%	17.46%	17.46%	17.46%
Totals	100.00%		88.89%	63.49%	90.48%	76.19%	90.48%	36.51%	57.14%

Chart 5

Systems

Distribution of Symptoms Registering over 9
for Diagnosed, no Bite, no Rash, Negative but no Positive tests

No.of Systems	Number of Cases at Sys Level	Cases at or over Sys Level	General Symptoms	Heart Lungs	Muscle Skeletal	Eye Ear	Neuro-logical	Gastric Intestinall	Skin
0	1								
1	2	22			2				
2	1	20			1		1		
3	2	19	1		1	1	1	1	1
4	7	17	5	3	7	4	7	2	
5	8	10	7	6	8	5	8	4	2
6	2	2	2	2	2	2	2	2	
Totals	23		15	11	21	12	19	9	3

Number of Symptoms	at Level	at or over Level	Percent of Total Number						
0	4.35%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1	8.70%	95.65%	0.00%	0.00%	8.70%	0.00%	0.00%	0.00%	0.00%
2	4.35%	86.96%	0.00%	0.00%	4.35%	0.00%	4.35%	0.00%	0.00%
3	8.70%	82.61%	4.35%	0.00%	4.35%	4.35%	4.35%	4.35%	4.35%
4	30.43%	73.91%	21.74%	13.04%	30.43%	17.39%	30.43%	8.70%	0.00%
5	34.78%	43.48%	30.43%	26.09%	34.78%	21.74%	34.78%	17.39%	8.70%
6	8.70%	8.70%	8.70%	8.70%	8.70%	8.70%	8.70%	8.70%	0.00%
Totals	100.00%		65.22%	47.83%	91.30%	52.17%	82.61%	39.13%	13.04%

The following exclude cases with no symptoms over 9

	at Level	at or over Level							
1	9.09%	100.00%	0.00%	0.00%	9.09%	0.00%	0.00%	0.00%	0.00%
2	4.55%	90.91%	0.00%	0.00%	4.55%	0.00%	4.55%	0.00%	0.00%
3	9.09%	86.36%	4.55%	0.00%	4.55%	4.55%	4.55%	4.55%	4.55%
4	31.82%	77.27%	22.73%	13.64%	31.82%	18.18%	31.82%	9.09%	0.00%
5	36.36%	45.45%	31.82%	27.27%	36.36%	22.73%	36.36%	18.18%	9.09%
6	9.09%	9.09%	9.09%	9.09%	9.09%	9.09%	9.09%	9.09%	0.00%
Totals	100.00%		68.18%	50.00%	95.45%	54.55%	86.36%	40.91%	13.64%

Chart 6

Distribution of Systems Registering over 15
for all Doagnosed

Number of Systems	Number of Cases at Sys Level	Cases at or over Sys Level	General Symptoms	Heart Lungs	Muscle Skeletal	Eye Ear	Neuro-logical	Gastric Intestinal	Skin
0	77	771							
1	58	694	14	3	17	3	13		8
2	70	636	24	4	47	11	46	3	5
3	122	566	77	13	109	33	112	10	12
4	161	444	137	39	153	96	154	38	27
5	148	283	140	93	145	129	147	48	38
6	99	135	97	80	99	97	99	68	54
7	36	36	36	36	36	36	36	36	36
Totals	771		525	268	606	405	607	203	180

Number of Systems	at Level	at or over Level	Percent of Total Number						
0	9.99%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1	7.52%	90.01%	1.82%	0.39%	2.20%	0.39%	1.69%	0.00%	1.04%
2	9.08%	82.49%	3.11%	0.52%	6.10%	1.43%	5.97%	0.39%	0.65%
3	15.82%	73.41%	9.99%	1.69%	14.14%	4.28%	14.53%	1.30%	1.56%
4	20.88%	57.59%	17.77%	5.06%	19.84%	12.45%	19.97%	4.93%	3.50%
5	19.20%	36.71%	18.16%	12.06%	18.81%	16.73%	19.07%	6.23%	4.93%
6	12.84%	17.51%	12.58%	10.38%	12.84%	12.58%	12.84%	8.82%	7.00%
7	4.67%	4.67%	4.67%	4.67%	4.67%	4.67%	4.67%	4.67%	4.67%
Totals	100.00%		68.09%	34.76%	78.60%	52.53%	78.73%	26.33%	23.35%

The following exclude cases with no symptoms over 15

Number of Systems	at Level	at or over Level							
1	8.36%	100.00%	2.02%	0.43%	2.45%	0.43%	1.87%	0.00%	1.15%
2	10.09%	91.64%	3.46%	0.58%	6.77%	1.59%	6.63%	0.43%	0.72%
3	17.58%	81.56%	11.10%	1.87%	15.71%	4.76%	16.14%	1.44%	1.73%
4	23.20%	63.98%	19.74%	5.62%	22.05%	13.83%	22.19%	5.48%	3.89%
5	21.33%	40.78%	20.17%	13.40%	20.89%	18.59%	21.18%	6.92%	5.48%
6	14.27%	19.45%	13.98%	11.53%	14.27%	13.98%	14.27%	9.80%	7.78%
7	5.19%	5.19%	5.19%	5.19%	5.19%	5.19%	5.19%	5.19%	5.19%
Totals	100.00%		75.65%	38.62%	87.32%	58.36%	87.46%	29.25%	25.94%

Chart 7

Distribution of Symptoms Registering over 15
for Diagnosed, Bitten, Rash, Positive and no Negative Tests

Number of Systems	Number of Cases at Sys Level	Cases at or over Sys Level	General Symptoms	Heart Lungs	Muscle Skeletal	Eye Ear	Neuro-logical	Gastric Intestinal	Skin
0	14	77							
1	3	63	1	1		1			
2	2	60	1		1				1
3	5	58	2		3	1	4		1
4	11	53	8	2	11	6	11	1	2
5	12	42	10	5	11	8	11	2	5
6	19	30	16	15	18	16	18	7	12
7	11	11	10	8	11	11	11	8	9
Totals	77		48	31	55	43	55	18	30

Number of Systems	at Level	at or over Level	Percentage of total number						
0	18.18%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1	3.90%	81.82%	1.30%	1.30%	0.00%	1.30%	0.00%	0.00%	0.00%
2	2.60%	77.92%	1.30%	0.00%	1.30%	0.00%	0.00%	0.00%	1.30%
3	6.49%	75.32%	2.60%	0.00%	3.90%	1.30%	5.19%	0.00%	1.30%
4	14.29%	68.83%	10.39%	2.60%	14.29%	7.79%	14.29%	1.30%	2.60%
5	15.58%	54.55%	12.99%	6.49%	14.29%	10.39%	14.29%	2.60%	6.49%
6	24.68%	38.96%	20.78%	19.48%	23.38%	20.78%	23.38%	9.09%	15.58%
7	14.29%	14.29%	12.99%	10.39%	14.29%	14.29%	14.29%	10.39%	11.69%
Totals	100.00%		62.34%	40.26%	71.43%	55.84%	71.43%	23.38%	38.96%

The following exclude cases with no symptoms over 15

1	4.76%	100.00%	1.59%	1.59%	0.00%	1.59%	0.00%	0.00%	0.00%
2	3.17%	95.24%	1.59%	0.00%	1.59%	0.00%	0.00%	0.00%	1.59%
3	7.94%	92.06%	3.17%	0.00%	4.76%	1.59%	6.35%	0.00%	1.59%
4	17.46%	84.13%	12.70%	3.17%	17.46%	9.52%	17.46%	1.59%	3.17%
5	19.05%	66.67%	15.87%	7.94%	17.46%	12.70%	17.46%	3.17%	7.94%
6	30.16%	47.62%	25.40%	23.81%	28.57%	25.40%	28.57%	11.11%	19.05%
7	17.46%	17.46%	15.87%	12.70%	17.46%	17.46%	17.46%	12.70%	14.29%
Totals	100.00%		76.19%	49.21%	87.30%	68.25%	87.30%	28.57%	47.62%

Chart 8

Distribution of Systems Registering over 15
for Diagnosed, no Bite, no Rash, Negative but no Positive Tests

No.of Systems	Number of Cases at Sys Level	Cases at or over Sys Level	General Symptom	Heart Lungs	Muscle Skeletal	Eye Ear	Neuro-logical	Gastric Intest.	Skin
0	1	23							
1	2	22			2				
2	2	20			1	1	1		1
3	4	18	4		4		4		
4	8	14	5	4	8	4	8	3	
5	5	6	5	2	5	4	5	4	
6	1	1	1	1	1	1	1	1	
Totals	23		15	7	21	10	19	8	1

Number of Symptoms	at Level	at or over Level	Percent of Total Number						
0	4.35%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1	8.70%	95.65%	0.00%	0.00%	8.70%	0.00%	0.00%	0.00%	0.00%
2	8.70%	86.96%	0.00%	0.00%	4.35%	4.35%	4.35%	0.00%	4.35%
3	17.39%	78.26%	17.39%	0.00%	17.39%	0.00%	17.39%	0.00%	0.00%
4	34.78%	60.87%	21.74%	17.39%	34.78%	17.39%	34.78%	13.04%	0.00%
5	21.74%	26.09%	21.74%	8.70%	21.74%	17.39%	21.74%	17.39%	0.00%
6	4.35%	4.35%	4.35%	4.35%	4.35%	4.35%	4.35%	4.35%	0.00%
Totals	100.00%		65.22%	30.43%	91.30%	43.48%	82.61%	34.78%	4.35%

the following exclude cases with no symptoms over 15

	at Level	at or over Level							
1	9.09%	100.00%	0.00%	0.00%	9.09%	0.00%	0.00%	0.00%	0.00%
2	9.09%	90.91%	0.00%	0.00%	4.55%	4.55%	4.55%	0.00%	4.55%
3	18.18%	81.82%	18.18%	0.00%	18.18%	0.00%	18.18%	0.00%	0.00%
4	36.36%	63.64%	22.73%	18.18%	36.36%	18.18%	36.36%	13.64%	0.00%
5	22.73%	27.27%	22.73%	9.09%	22.73%	18.18%	22.73%	18.18%	0.00%
6	4.55%	4.55%	4.55%	4.55%	4.55%	4.55%	4.55%	4.55%	0.00%
Totals	100.00%		68.18%	31.82%	95.45%	45.45%	86.36%	36.36%	4.55%

Chart 9