ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION
DIVISION OF BIOMEDICAL AND ENVIRONMENTAL RESEARCH

BIOLOGIC CONSIDERATIONS IN ANATOMIC IMAGING WITH RADIONUCLIDES

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FINAL PROGRESS REPORT

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ABSTRACT

An important task relating to anatomic imaging with radio-nuclides is the determination of factors which effect the use of imaging procedures. This is important to reduce radiation exposure in the population, to improve the efficacy of diagnostic imaging procedures and finally to provide a basis for evaluating the potential effects of proposed regulation of use rates. In this report we describe a methodology for obtaining clinical data relating to the use of the brain scan in an inner city teaching hospital. The development of a questionnaire suitable for use in a clinical setting and providing both prospective and retrospective data is presented. The results of the use of the questionnaire at the Johns Hopkins Hospital during a three month period in 1974 are shown and discussed. Some preliminary results from these data are given and a method for further analysis is indicated.

SECTION I: INTRODUCTION

A fundamental consideration in evaluating the biological impact of radionuclide imaging is the exposure of the population to the ionizing radiation associated with this diagnostic technique. Such exposure can be determined and quantified objectively through the simple tabulation of use-rates for a given population. However, such elementary tabulation does not offer any indication as to either the efficacy of the imaging technique or the factors that contribute to its use within the population under study. The efficacy of the diagnostic technique is a very difficult quantity to measure and consequently our efforts under this contract were limited to the acquisition of data relating to determination of the factors which effect the use of an imaging technique within a specific clinical setting.

An understanding of the factors which determine use is important from at least two points of view. The first is to provide better mechanisms for feeding back specific information to a clinical group in order that they might improve their practice of medicine. The second has to do with the ever-present possibility of government regulation of use rates. In this second regard, we feel that it is important that any attempt at regulation be predicated upon a thorough understanding of the factors which affect the use of a procedure, such that the proposed regulation does not detract from the beneficial effects of the regulated procedure.

Our purpose, in this work, was to acquire a set of data relating specifically to the factors which effect the use of the brain scan in a large inner-city teaching institution. The basic problem which

we were attempting to investigate can be outlined as follows. A patient presents to an examining physician a certain set of signs, symptoms, history and results of previous tests. We classify these pieces of objective data along with the results of the doctor's physical examination as a set of patient attributes. Based upon this set of patient attributes, the physician makes a decision to order a specific procedure; in this case, a brain scan. We are specifically concerned with obtaining data which will allow us to better understand which patterns, groups or clusters of attributes have contributed to the physician's decision to order this examination. The second point we are interested in concerns the patterns, groups or clusters of attributes which best correlate with given outcomes of the examination such as abnormal and normal. We were also concerned that the data which we acquire support both Basian and Non-Basian methods of analysis.

With this problem statement and objectives in mind, we set about designing a data acquisition system using the following procedure. The first step was the design and test of an appropriate questionnaire which could be used in the clinical setting represented by Johns Hopkins Hospital. We then performed a pilot test of our draft questionnaire in order to determine the particular problems which we would have both with the questionnaire itself and with its implementation in a clinical setting. Next, we introduced the questionnaire in a full-fledged data gathering program utilizing the services of highly motivated medical students as principal interviewers and data gatherers. Finally, we reduced the completed questionnaires to a form compatible with computer analysis and began the process of data analysis. The results, to date, of the

implementation of the above experimental plan are detailed below.

SECTION II: BRAIN SCAN STUDY, CURRENT STATUS

A. Questionnaire Design

Our first step in designing the questionnaire to be used in our Brain Scan Efficacy Study was to meet with Dr. Guy M. McKhann, Chairman of the Department of Neurology, in order to develop the basic diagnostic attribute list. Following that series of meetings, we met with Dr. Thomas J. Preziosi whose responsibilities included the direction of the house staff training program. Dr. Preziosi and members of the Neurology house staff then reviewed the original draft of the proposed brain scan questionnaire. Their thoughtful and critical review led to a number of changes in both format and content in the questionnaire.

Our objective in working with Drs. McKhann, Preziosi and the Neurological house staff was to obtain an overall questionnaire which would combine completeness in diagnostic attributes with a basic simplicity of format in order to facilitate gathering of the data. Since it was our intention to utilize medical students as the principal data gatherers, we did not have to be as concerned about the layout and styling of the form as we would have to have been if we were to rely upon individual physicians to fill out the form while actually in the process of examining the patient. Our selection of this particular methodology for data acquisition was based upon the recommendations of a number of sources with considerable experience in this field, most notably the staff at the University of Michigan Institute for Social Research. Their findings have consistently demonstrated that the use of well-trained and

conscientious personal interviewers was, without doubt, the most effective and reliable method to obtain data. Thus, once having compiled a suitable attribute list, it was only necessary to refine the format to meet the requirements of the data gatherers.

Following the work with the Neurology faculty and house staff, we then met with the chiefs of service of three of the major departments in the medical school to acquaint them with the proposed study and its objectives. These included the Departments of Medicine, Pediatrics, and Psychiatry. We also included the head of the Division of Neurological Surgery, since his was the surgical division most likely to be concerned with the use of brain scans. Following our meeting with the chiefs of staff, we met with their designated chief residents in order to enlist the support of the respective house staffs in this study. By and large, this proved to be an effective strategy since it gave us the opportunity to explain in some detail the purposes and methodology in our study and thus to elicit their cooperation from the point of view of assisting in a scientific endeavor.

Following these meetings, we initiated a trial run of the questionnaire on the Neurology service. This trial uncovered a number of minor problems and resulted in several incidental improvements in the questionnaire. More importantly, it indicated to us some of the potential problems which we would have when we attempted to obtain these data under operational conditions. A particular problem arose when it became obvious that we needed to establish a mechanism by which an individual physician could be identified by one of our data collecting medical students at the time he actually ordered a brain scan on a particular patient. This became necessary

in order for us to initiate a timely acquisition of the required data. The basic problem was simply that if we could not get to the individual doctor either at the time of, or shortly after making his decision to order a brain scan, the validity of the subjective data would be in question. We had two alternatives in this regard. The first was to restructure the questionnaire such that the individual doctor could complete it at the time he was examining the patient and the second was to initiate a procedure that would allow us to dispatch one of our data gatherers at the time the examination was being made or shortly thereafter. Either way, there was the possibility of data bias since only those doctors interested in participating in the study would bother to fill out a questionnaire while in the process of conducting an examination or to cooperate at a later time with the medical student to complete the questionnaire. Since we had great confidence in our medical student interviewers, and, since we were dependent on physician cooperation at any rate, we decided to follow our original plan and utilize the student interviewer as the primary data acquisition device and to have the interviewer discuss the case with the examining physician in as timely a manner as possible.

Thus, at the end of a period of approximately two months we had succeeded in evolving a questionnaire in which we had some degree of faith and a data acquisition system based on medical student interviewers which we felt would yield consistent and reproducible results. We must acknowledge that since the system was based largely on physicians who were willing to cooperate with us that there may, in fact, exist the possibility for bias by self selection in our particular data sample. However, within these limitations we have high

confidence in the quality of the data subsequently obtained.

B. Implementation

Implementation of the data gathering activity utilizing the questionnaire described above began in June, 1974 and continued through the following August. Although the summertime is not, perhaps, the ideal time to initiate such a study because of vacations and general slowdowns in activity, it nonetheless did have the advantage that our medical student interviewers had their maximum free time available to devote to the study. Moreover, the slowdown in summer activity at the Johns Hopkins Hospital was not significant since the Nuclear Medicine Department could still count on performing from 10 to 20 brain scans per day. Finally, we had no particular reason to suspect a seasonal bias in the incidence of disease that would normally require brain scans and, consequently, we conclude that implementation of the data gathering phase of the study during the summer months should not effect the validity of the data.

The environment in which the data gathering occurred is shown schematically in Figure 1. In this Figure, a patient presents signs, symptoms, history, and the results of previous tests. Ideally, we would have preferred to have our medical interviewer present at the time the referring physician was actually completing his history and physical. For a variety of reasons this ideal situation seldom obtained. In particular, the sheer geographic size of the Johns Hopkins Medical Institution precluded the possibility of having interviewers strategically stationed so as to be able to capitalize on the immediate availability of diagnostic information. However,

we were able to evolve a system which depended upon a twice-daily check of orders received in the Department of Nuclear Medicine for brain scans. Quite often, individual physicians would notify us that they had just completed an examination and had ordered a brain scan. In other cases, we would select brain scans which had been ordered at random from the list of patients maintained by the Department of Nuclear Medicine. In these latter cases, we would contact the individual physician who had ordered the scan in order to obtain his cooperation in filling out a questionnaire.

Our interviewers soon discovered that those portions of the questionnaire regarding the physical and history could be completed without bothering the physician simply by reviewing the notes in the chart. Since these notes presumably represented an accurate description of the physician's observations at the time he made his decision, we felt that they comprised accurate objective data. However, our interviewers did find it necessary to locate the physician to complete Question II-3 relating to whether the decision to order a brain scan was based on previous tests and all of the questions relating to prospective outcomes. Our interviewers noted that, in most cases, it took only an average of three minutes of a physician's time to complete this portion of the data set. However, they also noted that on average it took them well over an hour to locate the individual physician in order to obtain the required three-minute interview. This fact seriously limited the number of questionnaires which we were able to complete.

Once the patient had obtained the brain scan, as shown in Figure 1, the medical students attended the subsequent afternoon film reading session. At the session the individual films were presented

by the Nuclear Medicine residents and were read by both the residents and the staff. This allowed the opportunity for the medical students to obtain at first hand the outcome of the brain scan in the objective terms of normal, abnormal or equivocal. Since we were principally interested in obtaining patterns of attributes in relation to confirmed normals or abnormals, we instructed our student interviewers to set aside any examinations which produced a result of equivocal.

As a final check on the data and to remove any false positives or false negatives from the final data, we initiated a follow-up procedure which relied principally on chart reviews in order to ascertain the pathological outcome of all of those studies listed as abnormal. Likewise, we initiated a six-month follow-up on those cases listed as normal in order to determine that we did not have any short term false negatives in our sample. As it happened, we were not able to identify any false positives and, at least out to the time period of a six-month follow-up, we did not have any false negatives.

C. Results of the Data Acquisition Phase

In gathering these data we utilized two medical students full-time during the months of June, July and August. Because two of those months were not full working months, the medical students were actually able to devote the equivalent of nine man weeks each. It is an interesting measure of the difficulties involved in obtaining this sort of data even under conditions in which the physicians participating in the study were highly cooperative, that the average questionnaire still required slightly in excess of five

man hours in order to complete. During the nine week period in which the medical students concentrated their full time effort on obtaining data, we were able to complete some 161 questionnaires. Twenty-two of these questionnaires had to be removed from the sample data for a variety of reasons. These reasons included such events as last minute cancellations of the scan itself, severe technical difficulties encountered when attempting to perform the scan or, alternatively, various portions of the questionnaire were incomplete due to either incomplete records or non-availability or non-cooperation on the part of the physician. However, 139 of these questionnaires could be considered complete in all regards. This included both the prospective and retrospective portions shown in Appendix I.

Table 1 gives a breakdown of the number of examinations for which we have completed questionnaires by both ordering physician and by outcome. This table indicates that 87 of the 139 brain scan examinations sampled were ordered by house staff and the remaining 52 were ordered by members of the Johns Hopkins medical faculty. Of the 139 brain scans, 127 were determined to be normals and 12 were confirmed abnormal. Since there were approximately 810 brain scans performed at the nuclear medicine facility during that same time span our sample of 139 represents 17% of the total and consequently can be expected to yield results indicative of the population as a whole.

Table 2 illustrates a breakdown of the relative frequency with which various members of the house staff and faculty ordered brain scan examinations. From this table, we note that, for our particular sample, one member of the house staff and one member of the faculty

each ordered nine brain scans during the study period. The frequency then drops off very rapidly and we find that the house staff seemed to be prone to use the brain scan examination more often than the faculty. The numbers involved here have not been tested for statistical significance and therefore can be interpreted as indicating trends only. We note that the number of house staff ordering exams was 39 as compared to 33 faculty ordering exams. On the other hand, the house staff accounted for some 66% of all examinations ordered while the faculty accounted for only 34%. Thus, it would probably be reasonable to conclude that the house staff do indeed account for the majority of the examinations ordered. However, this may not represent a difference in actual clinical practice between house staff and faculty since it is possible that the prevalence of cases in which the brain scan is indicated is statistically greater in the population seen by the house staff. The one statement that can be made concerning these results is that they probably reflect accurately the true nature of the usage of brain scans in the clinical setting represented by Johns Hopkins Hospital.

The present status of the data analysis on the 139 questionnaires is as follows. These questionnaires have been tabulated according to the coding scheme shown in Appendix II. Each questionnaire has been both coded and key punched onto cards and a small computer program has been written which allows us to select specific groups of attributes from a tape master file and subject these attributes to analysis by means of a pattern discovery program. At present our best estimate is that the attributes and outcomes shown in Table 3 will yield the greatest amount of statistically valid information regarding this particular data sample. The computer

program which selects these attributes and orders them for processing by the pattern detection program has been completed and its operation checked. The next step in the analysis will be the entry of these data into the pattern detection program and the detailed analysis of the resulting patterns. We anticipate that this work will be conducted as part of a subsequent contract.

III. Financial Statement

The attached financial statement represents the status of contract E(11-1)-2427 as of July 31, 1975.

Financial Statement for Contract Period July 1, 1974 - June 30, 1975

ERDA Contract Number E(11-1)-2427

Item	Budget	Expended	Balance
Personnel	21,200.00	22,534.26	(1,334.26) ¹
Fringe Benefits	3,180.00	3,380.12	(200.12)
Supplied	2,120.00	2,888.52	(768.52)
Domestic Travel	500.00	417.65	82.35
Equipment	.00	320.00	(320.00)
Computer	1,800.00	1,047.93	752.07
Total Direct Costs	28,800.00	30,588.48	(1,788.48)
Indirect Costs	10,944.00	11,424.98	(679.62)
Grand Totals	39,744.00	42,212.10	(2,468.10)

Notes:

1. () indicates a negative balance

FIGURE 1 FLOW DIAGRAM INDICATING THE EVENTS INVOLVED IN COMPLETING A SINGLE BRAIN SCAN QUESTIONNAIRE

TABLE I

BREAKDOWN OF THE NUMBER OF EXAMINATIONS
BY ORDERING PHYSICIAN AND BY OUTCOME

Brain Scans Ordered By Housestaff	87
Brain Scans Ordered By Faculty	<u>52</u>
Total Brain Scans	139

Normal Brain Scans	127
Confirmed Abnormal Brain Scans	<u>12</u>
Total Brain Scans	139

TABLE II

NUMBER OF PHYSICIANS ORDERING A GIVEN NUMBER
OF BRAIN SCAN EXAMINATIONS DURING THE SAMPLE PERIOD

A Number of Brain Scans Ordered by an Individual Physician During the Study Period	Number of Housestaff Ordering the Number of Exams Indicated in Column A	Number of Faculty Ordering the Number of Exams Indicated in Column A
9	1	1
8		
7		
6	1	
5	3	
4	3	1
3	3	1
2	8	6
1	20	24
Total Number of Housestaff Ordering Exams = 39		Total Number of Faculty Ordering Exams= 33

ATTRIBUTES CODED FOR USE IN

PATTERN ANALYSIS

Binary Variable Name

Sex, $\emptyset$ = Female; 1 = Male

Decision Based on Another Procedure
 $\emptyset$ = No; 1 = Yes

Headache, $\emptyset$ = No; 1 = Yes

Seizure, $\emptyset$ = No; 1 = Yes

No Known Neoplasm, $\emptyset$ = No; 1 = Yes

History of Trauma, $\emptyset$ = No; 1 = Yes

Cortical Deficit, $\emptyset$ = No; 1 = Yes

Motor Deficit, $\emptyset$ = No; 1 = Yes

Sensory Abnormality, $\emptyset$ = No; 1 = Yes

Visual Field Defect, $\emptyset$ = No; 1 = Yes

Alteration of Brain Stem Function
 $\emptyset$ = No; 1 = Yes

Will Normal Result Change Patient Management
 $\emptyset$ = No; 1 = Yes

Will Abnormal Result Change Patient Management
 $\emptyset$ = No; 1 = Yes

Outcome of Scan $\emptyset$ = Normal; 1 = Abnormal; 2 = Not recorded

Scaler Variables

Age

Apriori Probability of a Normal Brain Scan

Outcome Variables

1. Will a Normal Result Change Patient Management?

No
 Yes
 No Answer

2. Will an Abnormal Result Change Patient Management?

No
 Yes
 No Answer

3. Apriori Odds in Favor of a Normal Scan

Remote 1:10
Even 50:50
Likely 10:1

4. Primary Motivation For Ordering a Scan

Efficacy
Defense
Innovation
Other

5. Results of the Brain Scan

Normal
Abnormal
Not Recorded

6. Did Results of Brain Scan Contribute to Patient Management

No
Yes
No Answer

7. Current Therapy

Chemotherapy
Radiation
Pharmacotherapy
Surgery
Other

APPENDIX I

Prospective and Retrospective

Brain Scan Questionnaire

No:

Date:

BRAIN SCAN EVALUATION STUDY QUESTIONNAIRE

I. Patient Identification

JHH History Number _____

Patient Name _____

Sex: - - - - - ☐ Male
☐ Female

Age: _____

☐ Outpatient
☐ Inpatient

Fill in or use JHH Patient Identification Card.

II. General Information

1. Physician Filling Out Form _____

2. Date _____

3. Is the decision to do a brain scan based (in part) on the results of another diagnostic procedure? ☐ yes
☐ no

If yes, what was it? _____

4. Has the patient had a:	yes	no	normal	abnormal
Lumbar Puncture - - - - -	☐	☐	☐	☐
EEG - - - - -	☐	☐	☐	☐
Skull X-ray - - - - -	☐	☐	☐	☐
Arteriogram - - - - -	☐	☐	☐	☐
Echo - - - - -	☐	☐	☐	☐

III. Definitions of Motivational Factors

1. Efficacy:

The use of a diagnostic procedure is motivated by efficacy if the outcome of the procedure could contribute to-or effect-a change in the course of the patient's disease.

2. Defense:

A procedure is being used defensively if its use is motivated by either potential peer incrimination or legal responsibility.

3. Innovation-Curiosity

Innovation-Curiosity is the principal motivating force if the objective in ordering a procedure is simply to find out what the result will be for this particular case. It may even help the patient.

IV. Historical Data

1. Headache - - - - - ☐ yes ☐ no
- a) Duration - - - - - ☐ <1 Week
☐ 1 Week to 1 Mo.
☐ 1 Mo. to 3 Mo.
☐ >3 Mo.
- b) Continuity - - - - - ☐ Continuous
☐ Intermittent
- c) Severity - - - - - ☐ Mild
☐ Moderate
☐ Severe
- d) Location if diffuse - - - - ☐ Bilateral
☐ Unilateral
- e) Location if focal - - - - - ☐ Retroorbital
☐ Frontal
☐ Temporal
☐ Parietal
☐ Occipital
2. Seizure - - - - - ☐ yes ☐ no
- a) Number of Episodes - - - - ☐ Single (First)
☐ Multiple >10
☐ Multiple <10 (Longstanding)
- b) Location - - - - - ☐ Generalized
☐ Focal
- c) Type - - - - - ☐ Major Motor
☐ Minor Motor
☐ Temporal Lobe
☐ Other
- d) Is Seizure Pattern - - - - ☐ yes
Changing? ☐ no
- e) Pertinent Family History ☐ yes
of Seizures ☐ no
☐ unknown
3. Neoplasm - - - - - ☐ yes ☐ no ☐ suspect
- a) Location - - - - - ☐ Brain
☐ Lung
☐ Breast
☐ Other
- b) Pertinent Family History ☐ yes
of Neoplasm ☐ no
☐ unknown
4. History of Trauma - - - - - ☐ yes ☐ no

V. Physical Examination

1. Cortical Deficit - - - - - ☐ yes
☐ no
 - a) State of Consciousness 1 ☐ Normal
 (Indicate by an X anywhere 2 ☐
 on the scale) 3 ☐
 4 ☐
 5 ☐ Abnormal
 - b) Generalized Deficit - - - ☐ Dementia
☐ Other Abnormality
 If "Other" what is it? _____
 - c) Focal Deficit - - - - - ☐ yes
☐ no
 If yes, what is it? _____
2. Motor Deficit - - - - - ☐ yes
☐ no
 - a) If yes: Location _____
 Lateralization _____
 Severity _____
 1 ☐ Mild
 2 ☐
 3 ☐
 4 ☐
 5 ☐ Severe
 - b) Ataxia - - - - - ☐ yes
☐ no
 Type? _____
 - c) Involuntary Movement - - - ☐ yes
☐ no
 Type? _____
 - d) Reflex Abnormality - - - - ☐ yes
☐ no
 Type? _____
 - e) Abnormal Gait - - - - - ☐ yes
☐ no
3. Sensory Abnormality - - - - - ☐ yes
☐ no
 If yes, what is it? _____
4. Visual Field Defect - - - - - ☐ yes
☐ no
 If yes, what is it? _____
5. Alteration of Brain Stem - - - ☐ yes
 Function Including Eye ☐ no
 Movements
 If yes, what is it? _____

VI. Prospective Outcomes

1. Subjective Probabilities (Mark anywhere on the scale, probabilities need not total 100%)

a) In your opinion what is the probability that this brain scan will be normal

0% 20% 40% 60% 80% 100%

b) With what probability do you suspect each of the following diagnosis?

Note: Probabilities need not total 100%

0% 20% 40% 60% 80% 100%

Subdural Hematoma

Vascular Malformation

Stroke (e.g., TIA, Hemorrhage or Infarction)

Cerebral Infection

Cerebral Tumor (Primary)

Cerebral Tumor (Metastasis)

Other Pathology

c) What is your Presumptive Diagnosis?

Certain Even Remote

10:1 1:1 1:10

e) Will you alter your management of this patient if the result of this brain scan is:

(i) Normal ☐ yes ☐ no

(ii) Abnormal ☐ yes ☐ no

Taking total motivation to request brain scan as 100 - How do you distribute your subjective motivation over the following reasons (as defined above) for requesting this examination?

Efficacy _____ %

Defense _____ %

Innovation-Curiosity _____ %

Other _____ %

Total 100

FOLLOW-UP QUESTIONNAIRE

To be completed after receipt of
THE NUCLEAR MEDICINE DIAGNOSTIC REPORT

Type of Scan: Brain

VII. RETROSPECTIVE

Patient:

I. With what probability do you suspect each of the following diagnosis?

Note: Probabilities need not total 100%

	0%	20%	40%	60%	80%	100%
Subdural Hematoma						
Vascular Malformation						
Stroke (e.g., TIA, Hemorrhage or Infarction)						
Cerebral Infection						
Cerebral Tumor (Primary)						
Cerebral Tumor (Metastasis)						
Other Pathology						

What is your Presumptive Diagnosis?

What do you feel the odds are that your diagnosis is correct?

Certain	Even	Remote
10:1	1:1	1:10

II. Therapy currently being undertaken for patient's primary problem (Specify type, dosage, etc.)

- ☐ Chemotherapy
- ☐ Radiation Therapy
- ☐ Pharmacotherapy
- ☐ Anticipated Surgery
- ☐ Other

III. In your opinion, did the results of the scan contribute significantly to your management of the patient?

- ☐ yes
- ☐ no

IV. Results of scan:

- ☐ normal
- ☐ abnormal

APPENDIX II

Binary and Scaler Variable

Coding Sheets

CODE SHEETBRAIN SCAN BINARY SHEET

Sex 1 In-Outpatient 2 Decision 3 XX
4

Previous Lumbar 5 6 EEG 7 8 XX Skull X-Ray 10 11
9

Arteriogram 12 13 XX Echo 15 16 XX
14 17

Headache 18 Continuity 19 Diffuse 20 XX
21

Focal 22 23 24 25 26 XX Seizure 28 XX
27 29

#Episodes 30 31 32 XX Location 34 XX
33 35

Type 36 37 38 39 XX Changing 41 History 42
40

Neoplasm 43 XX Location 45 46 47 48 XX
44 49

History 50 Trauma 51 Cortical 52 XX
53

Deficit 54 55 56 XX Ataxia etc. 58 59 60 61 XX
57 62

Sensory Abnormality etc. 63 64 65 XX Management 67 68
66

XX Therapy 70 71 72 73 74 XX Results 76 77
69 75

CODE SHEET

BRAIN SCAN SCALAR SHEET

History #	<u>1</u>	<u>2</u>	<u>3</u>	<u>--</u> <u>4</u>	<u>5</u>	<u>6</u>	<u>--</u> <u>7</u>	<u>8</u>	<u>9</u>	<u>XX</u> <u>10</u>	<u>XX</u> <u>11</u>	<u>XX</u> <u>12</u>
Age	<u>13</u>	<u>14</u>	<u>15</u>	<u>16</u>	<u>XX</u> <u>17</u>	Duration			<u>18</u>	<u>19</u>	<u>20</u>	<u>XX</u> <u>21</u>
Severity	<u>22</u>	<u>23</u>	<u>24</u>	<u>XX</u> <u>25</u>	#Episodes			<u>26</u>	<u>27</u>	<u>28</u>	<u>XX</u> <u>29</u>	
Consciousness	<u>30</u>	<u>31</u>	<u>32</u>	<u>XX</u> <u>33</u>	Severity			<u>34</u>	<u>35</u>	<u>36</u>		
<u>XX</u> <u>37</u> Chances Normal	<u>38</u>	<u>39</u>	<u>40</u>	<u>XX</u> <u>41</u> Hematoma	<u>42</u>	<u>43</u>	<u>44</u>					
<u>XX</u> <u>45</u> Vascular	<u>46</u>	<u>47</u>	<u>48</u>	<u>XX</u> <u>49</u> Stroke	<u>50</u>	<u>51</u>	<u>52</u>					
<u>XX</u> <u>53</u> Infection	<u>54</u>	<u>55</u>	<u>56</u>	<u>XX</u> <u>57</u> Tumor	<u>58</u>	<u>59</u>	<u>60</u>					
<u>XX</u> <u>61</u> Tumor (Metastasis)	<u>62</u>	<u>63</u>	<u>64</u>	<u>XX</u> <u>65</u> Other	<u>66</u>	<u>67</u>	<u>68</u>					
<u>XX</u> <u>69</u> Odds Correct	<u>70</u>	<u>71</u>	<u>72</u>	<u>XX</u> <u>73</u>	<u>XX</u> <u>74</u>	<u>XX</u> <u>75</u>	<u>XX</u> <u>76</u>					

- . 9 = Don't Care

- . 1 = Missing Data