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A SYMPTOM-SCORING TECHNIQUE FOR

SCHEDULING PATIENTS IN A GROUP PRACTICE

by

John F. Rockart, Ph.D., Philip I. Hershberg, M. D.,
Jerome Grossman, M.D., Richard Harrison, MBA.

May 1969   385-69

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ABSTRACT

Specialization of physicians in recent years, coupled with the rapidly growing cost of each specialist's time, has made scheduling an increasingly important problem for group practices and other centralized cooperating groups of physicians. Inefficient or improper scheduling leads to the waste of clinic resources or increased costs to the patient. Current group practice and clinic scheduling systems are noted. A computer-processed, symptom-scoring technique for selecting specialties to which a patient should be scheduled is then discussed. The symptoms are provided by the patient by means of a 200-question automated medical history questionnaire which is filled out before the patient arrives at the clinic. A print-out of symptoms reported by the patient is made available to attending physicians. In addition, points are assigned to each symptom for each specialty. Total point scores for each specialty determine which appointments are selected for the patient. The system outperforms current scheduling techniques in initial tests.

During the past two decades there has been a steadily growing trend for physicians both to specialize and to combine their specialized talents in group practices. These events, coupled with the increasing costs of medical care, have necessitated the development of techniques to utilize most efficiently the physician-time resources available in multiple-doctor practices. One method of better allocating physician time, a symptom-scoring procedure for preselecting those specialists to whom a patient should be scheduled, is presented here.

The Need

The recent trend toward specialization in medicine has been openly acknowledged and extensively documented (1, 2). On the positive side, specialization has increased the ability of physicians to evaluate and treat specific problems. But specialization has also created its own set of difficulties.

Among the problems which specialization has presented has been the need to coordinate specialists so that the "whole patient" is treated (3).[1]

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1. Other notable problems caused by specialization are the increasing disappearance of the general practitioner in the United States (5), and a lengthening period of medical education for the average physician (6).

On one level, the increasing requirement for specialists to be able to work with each other in treating a patient has been partially solved by the growing trend for specialists to join group practices or similar organizational forms. The growth of such groups in recent years has far outstripped the growth of the physician population (4).

From the patient's viewpoint, the group practice is highly advantageous. In addition to benefitting from specialized care, the patient receives many advantages with regard to the logistics of obtaining this care. Appointments are all coordinated and in one physical location, while the information gathered by each physician and the results of diagnostic studies are made easily available to all specialists thus avoiding needless duplication. The outpatient department in most major hospitals is a similar solution to the problem of concentrating the resources of many specialists in one location.

The very process of the grouping of specialized physicians under one

roof has, however, led to a lower-order problem. This is the need to de-
termine which of the available specialists a patient should see when he
presents himself to the clinic.

Where groups of physicians are assembled in one organization, the
process of selecting the necessary specialists is far from simple. Even the
"generalists" in internal medicine are usually subspecialized into cardi-
ologists, nephrologists, etc. Arriving in this environment, the patient
has the right to expect that not only will his problems be diagnosed, but
that the diagnosis will be performed expeditiously and at the lowest
possible cost. With considerable waiting time for each appointment and
the high cost of each physician appointment, this means that the patient
cannot, or should not, be exposed to more physicians than necessary. In
other words, he should theoretically be scheduled to see only those doctors
most conversant with his particular problems.

Methods of selecting those specialists whom a patient will see vary
among medical groups, although they do have a common root. As background,
we shall first look at the traditional "general practitioner" method of
specialist selection; then at this traditional system as it has been
currently continued in many group practices; and finally at a different
system which has been used at the Lahey Clinic in Boston. A method which
has been developed to improve the scheduling process at the Lahey Clinic
will then be presented.

Traditional Patient "Scheduling"

Until relatively recently, the problem of scheduling to the correct
physician was almost non-existant. Physicians were non-differentiated
general practitioners. A patient had his own family physician who administered

to all ills. As medical knowledge expanded, however, specialists came into existance. If a general practitioner, after his initial evaluation and treatment, wished a patient to see a specialist, he personally made the arrangements and "scheduled" the further appointments. In this manner, the patient's "initial appointment" has always been with a generalist. In turn the general practitioner, in recent time, has been the scheduler for all appointments after the first (which we will refer to hereafter as "secondary" appointments or "additional consultations").

The Traditional Method of Scheduling as Applied by Group Practices

Initial Appointment Scheduling

Most specialist groups, whether private group practices or hospital out-patient staff, currently follow the methodology handed down from the general practitioner. The patient, no matter what his symptoms, is first directed to any available internist for his initial appointment. The scheduling of secondary appointments then takes place immediately after the initial physician has seen the patient, taken a history, and performed a physicial examination. At this point, with the evidence from both the history and physical before him, the doctor, acting as scheduler, directs the patient to those specialists whom he feels are indicated.

A study of the scheduling methods of four major group practices (7) found this "initial-physician-as-scheduler" device to be predominant among group practice scheduling systems. A more recent survey of the methods utilized by other group practices and hospital out-patient departments has shown this traditionally-derived approach to be almost ubiquitous.

Organizations which require the patient to see an initial doctor before being fully scheduled operate with one major explicit or implicit

assumption. This assumption is that, no matter how well a patient may
present his symptoms to scheduling personnel, an efficient selection of
specialists cannot be made before the patient enters the clinic. It is
felt that sufficient information cannot be elicited from the patient, as
he applies for appointments over the telephone or by mail, to allow
intelligent scheduling to be performed. In some institutions, it is felt that
not even the first specialist can be meaningfully selected. Thus, for his
initial appointment in the clinic, the patient is often scheduled to see
any physician, usually the first available, in the general fields of
internal medicine. Some organizations relax this disbelief in the value
of the patient's stated symptomology to allow the secretary taking the
appointment request to attempt to schedule the patient's initial visit
with the physician believed to be the most pertinent.

The lack of faith demonstrated by this prevalent system in the ability
of lay scheduling personnel to gather the requisite information and to select
the correct specialists before the initial doctor visit is motivated by
several factors. First, the appointment secretaries who process patients'
initial requests for appointments are almost universally lacking in any
formal medical training. Their ability to understand and interpret symptoms
as stated by the patient is doubted. Equally importantly, the ability or
desire of the patient to transmit accurate or meaningful data is questioned.
Many patients, even when carefully guided by physicians are far from
adequate historians. Further, even the most intelligent patient is expected
to have some difficulty in accurately stating his symptoms, especially if
worried or frightened. Finally, many patient intentionally will not
provide correct information to appointment secretaries, most notably in
the case of sex-related problems. In summary, it is considered that the

intersection of a dubious data-collecting and processing agent with a

questionable information transmitting source greatly minimizes the value

of the data received. The first appointment therefore is made in reality

with a "generalist" - who incidentally happens to be a specialist.

Scheduling of Consultations

It is, of course, recognized that, with this system, time must be

allocated for patients to see additional specialists after their initial

workups. Two approaches are taken to this need for secondary appointments.

First, some institutions, merely schedule the patient with the required

additional specialists at the first available specialist appointment times -

no matter how far in the future this may be. In general, this system is

used where patients are primarily from the local area, as in the case of

hospital outpatient departments. In an emergency, the patient is worked-in

to the schedule that day, but it is hoped that there will be few emergencies.

The second approach is to reserve blocks of time in every specialist

category to fill the average need for additional specialist consultations

each day. As a patient requires an additional consultation, one appointment

time from this set of unassigned times is allocated to him. In general,

this is used in group practices where many patients may be arriving from

distant cities and should be seen by all specialists as soon as possible.

There are undesirable features in both of these approaches. In the

"future-scheduling system", there is a cost to the patient in the return

trips he must make to the clinic. (Some outpatient departments also charge

a daily registration fee, thus increasing the cost of this system to the

patient). The psychological costs of having to wait for a complete

evaluation of his condition are difficult to quantify, but clearly exist.

Where the "consultation block time reservation " system is utilized,

a different set of problems is incurred. First, it is almost certain that, through randomness of patient arrival and specialist need, particular specialists may have minimal calls for their services on a given day. This represents a loss to the clinic in terms of its primary resource - doctor time.

On the other hand, some specialists each day will be overloaded with patients. Four recognizable costs occur when this happens. First, even in this system there may still be the monetary and psychic costs to the patient suggested in the paragraph above if a particular specialist's load is so great that it is still necessary to postpone some patients to future dates. Second, even if the patient is taken the same day, in an overloaded schedule the patient will usually incur a "waiting" cost as he finds himself waiting far beyond his appointed time. Third, the patient may incur the uncertain costs of a shortened, somewhat hurried, examination. And, finally, there is a cost of stress to the physician as he battles his way through a too-heavy schedule.

The Scheduling System at the Lahey Clinic

A different approach to the problem of scheduling patients through a network of specialists has been taken for many years at the Lahey Clinic in Boston. Founded by Dr. Frank H. Lahey in 1925, the Clinic currently has a staff of approximately 100 physicians, divided into a dozen major specialties and more than 20 recognized subspecialties. Between five and six hundred patients visit the Clinic daily. Of this number, about eighty are new patients who have not previously been seen by any Clinic doctor.

The Lahey scheduling system is different from those previously described in that patients are scheduled before they enter the Clinic to exactly

those specialists whom it is felt the patient should see. The decision,
both as to which specialists should be seen and the order in which they
should be seen, is made by one of a group of approximately twenty appoint-
ment secretaries who comprise the Clinic's Central Appointment Office.

Working with information elicited from the patients or referring
doctors, the appointment secretaries schedule patient both to physicians
and for any of approximately eight major tests.[1] New patients, especially
those from a distance, are scheduled by the Appointment Office for all
appointments which they will have, i.e., both initial and secondary con-
sultations. An attempt is made to schedule the patient to the appropriate
subspecialty within a department (e.g. cardiac or vascular within internal
medicine). In addition, an effort is made to direct the patient to the
particular physician sub-subspecialist who is especially interested and
expert in any one disease or problem troubling the patient.

The system has been reasonably successful. Working with a wide
variety of scheduling rules which assist in performing the transformation from
symptoms to schedules, the secretaries appear to schedule conservatively,
but reasonably accurately.

An Efficiency Measurement of the Lahey System

The need for more efficient scheduling to specialists was shown by
an analysis of the appointments of a group of 100 new patients who were
fully scheduled by the Appointment Office. For this group, a total of 170
appointments were made. Of these, 12 were cancelled by the initial physician
who saw the patient. Some 25 additional specialist consultations were
added within the initial examination cycle.

1. None of these tests may be scheduled to be performed before the patient
has seen a doctor, however.

In this actual-experience study, the effectiveness of the scheduling process could be ascertained only for the secondary specialist consultations. (The patient had to go to the initial physician with whom he was scheduled. Only through changes made by the initial physician in the subsequent schedule could scheduling inefficiencies be noted). Therefore, subtracting the initial physician visits, we found 70 <u>secondary</u> <u>specialist</u> <u>consultations</u> scheduled. The patients ultimately kept 58 of these, with 25 more added. Thus, 61 percent (58/95) of the secondary specialist consultations <u>ultimately</u> <u>scheduled</u> <u>in</u> <u>total</u> for the patients were correctly <u>prescheduled</u>.[1]

<u>The Alternative "Consultation Block Reservation System"-An Efficiency Estimate</u>

This secondary specialist scheduling efficiency compares rather well with its major alternative, the "consultation block time reservation system" described previously. To ascertain this, a Monte-Carlo simulation of the efficiency of merely reserving blocks of specialist consultation time, with no attempt to preschedule individual patients, was run. The following assumptions were made:

      1. Daily new patient arrivals would average 79 and would be distributed normally with a standard deviation of 13. (These figures were taken directly from Clinic records).

      2. Requests for specialists would be uniformly distributed among specialties and would vary directly with the number of physicians in the specialty. Time would be reserved in these proportions for the average number of patients expected within each specialty.

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1. Nothing can be ascertained from this study as to the quality of initial specialist choice. As we will observe later, it was probably far from optimal. But, importantly, it was not so bad as to cause the attending physicians to cancel or add more appointments than described above.

3. Each patient would average one secondary specialty.
(A random number generator picked the specialty for each patient from the weighted uniform distribution.)

4. Patients would be scheduled for secondary consultations on the same day as the initial visit.

Considerable inefficiency was illustrated in this system of reserving time for the mean expected number of consultations in each specialty. There were three reasons for this inefficiency, randomness in the number of patients attending the clinic each day; randomness in patient need to be seen by particular specialties from day to day; and relatively small patient volumes distributed over many specialties.

One hundred patient days were simulated. On the average 46 of the 79 available secondary consultation times were filled each day with patients directed to these specialties. In addition, there was an average need for 35 additional places each day in specialties which had a demand for more than their reserved number of patient appointment times.

Thus, of 114 specialty consultations ultimately scheduled each day (79 held plus 35 additional needed), only for 46 was time reserved correctly beforehand. By the same measure used to evaluate the preceding system, this alternative to the current scheduling system was only 41 percent effective. The efficiency, of course, increases steadily, as one allows patients to be scheduled the day ahead, two days ahead, etc..

The Underlying Lack - Adequate Information

Our initial studies showed that the spread between the efficiency of the alternative systems could be even further improved. One analysis of scheduling errors showed that approximately 40 percent of additional appointments were caused by the simple failure of the appointment secretary to elicit

enough basic pertinent information from the patient (8). In each case, the missing information was obtained by the physician during the patient's initial appointment. Importantly, in all of these cases, the gathering of this information appeared to require only the simple asking of routine questions by the physician rather than diagnostic ability. Examples of these cases are shown in Figure 1.

Previous Symptom-Gathering Systems

The existance of several differing medical symptom gathering systems at the time of our investigation provided an indication that additional information could be usefully obtained from the patient before his visit to the physician. Three alternative types of systems appeared particularly pertinent. Although designed primarily as diagnostic aids, the three utilized methods which, it appeared, could be adjusted for scheduling purposes. These systems were the Cornell Medical Index (9); the data gathering system used at the Kaiser-Permanente Medical Group (10) in California; and three on-line computer history-taking systems (11, 12, 13).

The Cornell Medical Index, the precursor of most symptom-gathering systems, has undergone many revisions since its initial versions developed two decades ago. Currently composed of approximately 150 yes-no questions, it is a paper questionnaire usually filled out by the patient at the clinic. The questionnaire is then provided, without further processing, as a diagnostic aid to the attending physician.

The Kaiser-Permanente symptom-gathering system provides a computer processed history for the physician. The symptom information is obtained from the patient as he proceeds through Kaiser's multi-phasic screening laboratory prior to a physician appointment. At one station, to provide his

- A limited amount of branching capability to enable the patient to skip questions not applicable to him. (One level of branching was eventually found to be sufficient).

- No increase in patient time spent at the Clinic.

- The ability to discern what the patient felt to be his most important problem - his chief complaint.

- Relative inexpensiveness - since it was to be used for a large volume of patients.

- The capability of storing symptom data for subsequent clinical research purposes.

Many of these desired attributes appeared to rule out an on-line system. A computer-processable paper questionnaire, which included some branching ability and a free-form "chief complaint" section was therefore designed. Sample pages are shown by Figure 2.

The initial version of the questionnaire drew heavily from the on-line questionnaire form developed by Drs. Grossman and Barnett at the Laboratory for Computer Science of Massachusetts General Hospital. The adaptation of the questionnaire from its on-line to an off-line version was performed by the authors with the direct collaboration of several physicians on the Lahey Clinic staff under the leadership of Dr. G. O. Bell, Chairman of the Department of Internal Medicine.

Now in its third version, the questionnaire has a total of approximately 200 questions with some 400 possible answers. The questionnaire is sent out to all new patients who are initially registered to be seen by the departments of internal medicine, gastroenterology, orthopedic surgery, and psychiatry. Extension to new patients in other specialty departments is expected.

The patient fills out the form in his own home where he has access to all possible pertinent data, such as past medical reports, familial medical data, etc. Since, in general, new patients are scheduled from 2-3 weeks in advance, the patient may delay for a few days and still return the form in time for processing. He is asked to return the questionnaire immediately, however, and most patients do. With approximately 2,000 questionnaires distributed to patients by the end of 1968, the rate of return of the form each month has constantly exceeded 90 percent. Surveys' of patient attitudes toward filling out the questionnaire reveal an almost universal positive reaction.

Upon arriving back at the Clinic, the questionnaire is routed to a computer "control" group. It is checked for obvious failures in filling out the form. Control information is added, and "yes" answers are keypunched.

In accordance with the dual objectives of the form, there are two major outputs of the system. The first (Figure 3) is a listing of positive history and current symptoms arranged by medical system. The effectiveness and efficiency of this type of output are currently being evaluated at the Lahey Clinic and the Massachusetts General Hospital. Although the opinion of the device varies among the staff of the Clinic, the majority are currently favorable.

The second system output, shown in Figure 4, is that of the specialist-assignment system. Points are allocated to each specialty for each symptom checked in the affirmative, and the point total by specialty is obtained.

Figure 5 provides an example of this symptom scoring. It is a print-out of a sample of two cards used to load the file which performs the scoring. Points allocated to a department for a particular symptom are based on the subjective judgement of Dr. Hershberg and the other physicians associated

with the project. For example, (Figure 5) if the patient answers "yes" to
the questions "Do you get pain, discomfort, tightness, or pressure in your
chest which re-occurs at least every month?", his score is increased for
the allergy specialty by one point, for the cardiology specialty by two
points, for chest by two points, for gastroenterology, neurology, and
psychiatry by one point. If he should then affirm that the pain occurs in
the middle of the chest under the breastbone, he is given three additional
points for cardiology since this symptom has major diagnostic significance
in cardiac-based chest pain.

Special attention is paid to the psychiatry score. At present, this
total is used more as an "index of confusion" or of functional disease
to assist in the scheduling process (as shown below) rather than as an
indication to schedule the psychiatry department. There are several questions
included which bear directly upon the neurotic personality. Examples of
these are "Do you often feel that life is not worth living?" and "Are you
anxious, worried, fearful or tense most of the time?". Answering this
group of questions positively will provide a high psychiatry score. However,
the patient who answers only an occasional direct psychiatry question in
the affirmative, but who also checks "yes" to a large number of diverse
symptoms will also produce a high index of confusion or "psychiatry" score.

Scheduling Algorithm

The actual scheduling procedure is a combination of three items,
1) any specialist request, 2) the chief complaint, and 3) the computer scoring
system. The inclusion of specialists requested by or for the patient is done
for obvious reasons. Many patients are referred and particular specialists
may have the confidence of the referring physician. The chief complaint,

where it is clearly stated and significant, is utilized to ensure that
the patient sees a doctor in the specialty in which he considers his major
problems to lie.

The current scheduling algorithm utilizes the rules shown in Figure
6. A scheduling "ladder" is created from the three sources of information.
Where present, the specialist request is given first place. The chief
complaint, if clearly determined, is given second place. The three top
computer derived specialty scores are then placed in positions three to five.

A simple set of heuristics is next used to eliminate and reorder the
five potential specialty schedulings. Although fully spelled out in Figure
6, the scheduling rules may be summarized as follows. First, multiple entries
for the same specialty are struck off. All entries on the ladder including
and below the psychiatry specialty are eliminated. Adjustments are then
made where specialty scores on the computer print-out are too high or too
low to justify accepting all specialties as ranked (rules B-4, B-5). (Rule
B-4, for example, precludes the scheduling of specialties for which a patient
has only a minimum indication of need). The lower of "similar" specialties,
such as cardiology and vascular, are then eliminated (rules B6-8). Finally,
a rearrangment of the order of appointments is made to schedule the patient
initially into the departments of internal medicine or gastroenterology,
where any of these included specialties is indicated. This final step
is performed since these two departments are more adequately prepared to
perform full initial examinations.

The result is a schedule for the patient. Two examples of the system
are shown in Figure 7.

Experimental Results

To test the system, four physicians were asked to determine the chief complaints for a total of 175 patients. The algorithm described above was then "run" for each patient to determine the "system's" choice of appointments. The four physicians, only one of whom is connected with the project, were also asked to determine, using all evidence available in the medical record after the patient had left the Clinic, those specialties with which the patient should have been scheduled. Both the "system's" choice of specialties and the appointment office personnel's choice of specialties for these patients were then compared with the hindsight judgement of the physicians. The results significantly favored the new system.

Some 330 different specialties were selected for the 175 patients. As shown by Table 1, the system and the appointment office secretaries both agreed with the physicians' final determination on 128 of these. On an additional 95, the system agreed with the physicians but the appointment office did not. The appointment office agreed with the final physician determination of applicable specialties in 38 cases for which the system chose wrongly. For 69 specialty choices both the appointment office and the system disagreed with the physicians' verdicts. The difference on a Chi-square test of proportions is significant at the one percent level.

TABLE 1

Agreement of System, Appointment Office

and Final Physician Determination of Specialties Required

All Agreed	128
System and Final Physician Determination Agreed but not Appointment Office	95
Appointment Office and Final Physician Determination Agreed but not System	38
All Disagreed	69
	330

It should be noted that in this analysis, the appointment office's selection of appointments dropped from the 61 percent correct cited earlier to approximately 50 percent. This is accounted for by the fact that there are differences in comparing actual secondary consultation efficiency with both initial and secondary hypothesized specialist choices. One major difference is the fact that in the _actual_ situation, a relatively poor choice of specialty is often adequately handled by the physician to whom the patient is assigned.[1] In reality, then, all physicians are generalists to some extent. For this reason, we expect that the new system's results will be   better in practice. We are currently beginning to utilize the system for the actual scheduling of patients to gain experience with it.

Summary

A questionnaire has been developed which is mailed to the patient

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1. This may also affect the current system/block system simulation 61 to 41 percent difference cited earlier. But we would not expect it to make much more than the ten percentage point difference noted here.

when he receives his initial clinic appointment. After computer processing, the questionnnaire output is used for two purposes; 1) to provide a patient-recorded history to the physician, and 2) to schedule the patient to the most applicable specialists. The scheduling system in tests thus far performs significantly better than the current clinic scheduling method which, in turn, is more effective than a secondary consultation block time reservation system which was simulated with actual clinic volumes.

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performs significantly better than the current clinic scheduling method
which, in turn, is more effective than a secondary consultation block time
reservation system which has simulated with actual clinic volumes.

FIGURE 1

SCHEDULING ERRORS CAUSED BY INSUFFICIENT INFORMATION

1. A 20-year-old patient who was quite deaf asked for a "general checkup." An added appointment with ENT was necessary.

2. A patient had been taking medication for a thyroid condition for years but did not mention it. A consultation was added with a thyroid specialist.

3. A male patient had a very bothersome urinary problem. It was not mentioned to a female appointment secretary. Consultation with urologist added.

4. A heart condition was not stated to the appointment secretary, although the patient's doctor was treating it. Cardiac consultation added.

5. Patient stated hemorrhoids and sinus trouble to doctor, but not to secretary. Two appointments added.

6. Only a general checkup was asked for by the patient. A specific history of long-standing abdominal pain was, however, related to the physician. One additional consultation.

7. Endocrinology consultation added when the primary doctor found the patient had been taking medication for adrenal insufficiency.

8. A woman did not mention gynecologic problems until she saw the initial doctor. A male secretary had made the appointment.

FIGURE 2

LAHEY CLINIC FOUNDATION

MEDICAL HISTORY QUESTIONNAIRE

NAME _____*(handwritten)*_____*(handwritten)*_____ —
　　　　　(Last)　　　　　　　(First)　　　　　　　　　　　　　　(Middle)

CHIEF COMPLAINT

What is <u>your</u> reason for coming to the Lahey Clinic?

_____*(handwritten)*_____

SPECIALIST REQUEST

Has a specialist(s) been suggested by your doctor?___*(handwritten)*___

Is there a specialist(s) whom <u>you</u> would like to see?___*(handwritten)*___

MEDICATIONS

What medicines or drugs are you taking at present?___*(handwritten)*___

_____

For what condition(s), and how often?_____—_____

ALLERGIES AND REACTIONS

List allergies and/or reactions to drugs.___*(handwritten)*___

ADDITIONAL COMPLAINTS AND INFORMATION

List in order of their importance to <u>you</u> any other facts or problems
which you think might be significant, or relate to your current
condition.

_____*(handwritten)*_____

_____

_____

HOSPITALIZATIONS

List hospitalizations for any illnesses, operations, or accidents.

YEAR	REASON
1954	*appendectomy*
1962	*Childbirth*
—	

FIGURE 2 (cont)
SAMPLE QUESTIONNAIRE PAGE

HAVE YOU HAD ANY OF THE
FOLLOWING CONDITIONS IN
THE LAST 5 YEARS

    Frequent night sweats that
      completely drench
      your clothes . . . . YES___ 155   NO___

    Hay fever, or frequent
      sneezing spells . . . . . . YES___ 156   NO___

    Pneumonia . . . . YES___ 157   NO___
    Frequent Bronchitis . . . . . YES___ 158   NO___
    Pleurisy . . . . YES___ 159   NO___
    Bronchial asthma . . . . . . YES___ 160   NO___
    Emphysema . . . . YES___ 161   NO___

HAVE YOU HAD ANY OF THE FOLLOWING

    Tuberculosis . . . . YES___ 167   NO___
    Close contact with people
      who had tuberculosis (in-
      cluding anyone in your fam-
      ily) . . . . YES___ 168   NO___
    A positive tuberculosis skin
      test . . . . YES___ 169   NO___
    A chest x-ray within the last
      two years that was reported
      as being abnormal . . . . . YES___ 170   NO___

DO YOU GET PAIN, DISCOMFORT,   xx 190
TIGHTNESS, OR PRESSURE IN YOUR
CHEST WHICH REOCCURS AT LEAST
EVERY MONTH . . . . YES___ 191   NO___   THEN OMIT
                                                             QUESTIONS
  HOW OFTEN DOES IT OCCUR   192-215
    Once a month . . . . YES___ 192   NO___
    Every 2 or 3 weeks . . . . . YES___ 193   NO___
    More than once a week . . . . YES___ 194   NO___
    Every day . . . . YES___ 195   NO___

  IS THE CHEST PAIN OR DISCOMFORT
  LOCATED
    In the middle of your chest,
      under the breastbone . . . YES___ 198   NO___
    On the left side only . . . . YES___ 199   NO___
    On the right side only . . . YES___ 200   NO___
    On both sides . . . . YES___ 201   NO___

  IS THE PAIN OR DISCOMFORT MADE
  WORSE BY BREATHING DEEPLY . . . YES___ 202   NO___

FIGURE 3
PHYSICIAN PRINT-OUT

PATIENT NO   PATIENT NAME   M.Q. 5/68   RUN DATE

   T000273   DOE, MARY   03/03/69

 AGE — 32 YEARS   SEX — F

 FAMILY HISTORY
 ISTED FAMILIAL DISEASE.

 SOCIAL HISTORY
 RIED. HIGH SCHOOL GRADUATE. HOUSEWIFE. PT HAS SMOKED CIGARETTES-
 E THAN 10 YRS. 1 TO 2 PKS/DAY. ALCOHOLIC CONSUMPTION-
 RINK OR TWO A DAY.

 ENT WEIGHT LOSS.

 HEENT SYSTEM
 ES SINUSITIS.

 RESPIRATORY SYSTEM
 ERCULOSIS CONTACT.

 CARDIOVASCULAR SYSTEM
 ES CHEST PAIN EVERY DAY, LOCATED SUBSTERNALLY, IN RIGHT CHEST ONLY,
 PITATIONS AT REST. NOTES PEDAL EDEMA. LEG PAINS WITH WALKS.
 IT UPON RESTING. NOTES VARICOSE VEINS. FINGER COLD REACTION.
 ITORY HEART MURMUR.

 GASTROINTESTINAL SYSTEM
 IGESTION ONCE/MONTH. HISTORY BLACK STOOLS, WHILE ON IRON THERAPY.
 CTHER ABD. SURG.

 MUSCULOSKELETAL SYSTEM
 JOINT STIFFNESS.

 GENITOURINARY SYSTEM
 ES INCONTINENCE. NOCTURIA FOR AT LEAST 1 YR.

 HEMATOLOGY

 ENDOCRINE SYSTEM
 KN TEXTURE CHANGE. HX HYPOTHYROIDISM.

 DERMATOLOGY
 HIVES. HAS NEW SKIN GROWTH. ALLERGY TO COSMETICS.

 NEUROLOGICAL SYSTEM
 T NERVOUS. PT. THINKS COMPLAINTS FUNCTIONAL. INSOMNIA NOTED.

 FEMALE SYSTEMS
 A BREAST PAIN. HX OF PREGNANCY.

PATIENT NO	PATIENT NAME	M.Q. 5/68	RUN DATE
T000273	DOE, MARY		03/03/69

ALLERGY	9
CARDIOLOGY	23
CHEST	12
DERMATOLOGY	8
ENDOCRINOLOGY	4
HEMATOLOGY	0
ANTIBIOTIC THERAPY	0
NEUROLOGY	1
PSYCHIATRY	17
RENAL	6
RHEUMATOLOGY	7
THYROID	15
VASCULAR	15
EAR, NOSE & THROAT	2
GASTROENTEROLOGY	10
GENITOURINARY	5
GYNECOLOGY	8
NEUROSURGERY	0
ORTHOPEDIC SURGERY	2
SURGERY	7
OPTHALMOLOGY	0
THORACIC SURGERY	0

ROL TOTAL # 14058

FIGURE 5
SYMPTOM-SCORING EXAMPLES

swer
nber   Print-Out   Specialty Scores

191   NOTES CHEST PAIN-   1220000110000010000000

198   LOCATED SUBSTERNALLY.-   0300000000000000000000

FIGURE 6

RULES FOR SCHEDULING PATIENTS

Review the brief present illness form, the computer print-out, and the
subspecialty scores.

A. Set Up the Ladder:

1. If a doctor has been requested by name, or a particular specialty
    has been indicated on the brief present illness form (Question 3),
    place the doctor or specialty in Box 1 on ladder.

2. Place the specialty indicated by the chief complaint on the brief
    present illness form (Question 2) in Box 2 on ladder for all cases
    in which the chief complaint is clearly defined.

3. Place in descending order the three highest scores in Boxes 3-5
    on ladder.

B. Modification of Computer Scores:

To modify the entries in Boxes 1-5, the following rules should be
observed.

1. Cross out the lower entry in cases of duplication of the same
    specialty.

2. Cross out any of Boxes 3-5 in which the score is equal to or less
    than the psychiatric score. Cross out the psychiatry specialty
    if it is present.

3. If the highest score in Box 3 is less than 14 points:
    - and there is an entry in Box 1 or Box 2, cross out Boxes 3-5.
    - and there is no entry·in Box 1 or Box 2, cross out all Boxes
    and schedule with any available Internal Medicine or G.I. physician

4. If the scores in Boxes 4 or 5 are less than 18 points each,
    cross them out.

5. If the scores in Boxes 3-5 exceed a total of 80 points, cross
    out Boxes 4 and 5. Exception: If all the Boxes are not crossed
    out or blank, "resurrect" the specialty in Box 4.

6. Cross out the lower of Internal Medicine and G.I. scores.

7. Cross out the lower of G.I. and Renal.

8. Within each of the following two groups, the specialty with the
    lowest score should be crossed out: (Vascular, Cardiology, Chest,
    Rheumatology), (Thyroid, Endocrine).

C. Re-Arrangement

1. Re-arrange specialties to schedule internal medicine or G.I.,
    if applicable, before another specialty.

2. Schedule in order all remaining specialties.

FIGURE 7

SYSTEM SCHEDULING EXAMPLES

Raw Data

Specialist Request	:	None	-	1
Chief Complaint	:	Cardiology	CAR	2
Computer Score	:	Cardiology 27	C̶A̶R̶	3
	:	Vascular 22	V̶A̶S̶	4
	:	Chest 13	C̶H̶E̶S̶T̶	5

Boxes 1-5 are filled in as dictated by Figure 6, Part A. Box 3 is crossed
out (Rule B1). Box 5 is then crossed out (Rule B4). Box 4 is finally
eliminated by Rule B8. The patient is scheduled only to Cardiology.

Raw Data

Specialist Request	:	None	-	1
Chief Complaint	:	Orthopedic	ORTH	2
Computer Score	:	Rheumatology 32	RHEUM	3
	:	Psychiatry 24	P̶S̶Y̶	4
	:	G.I. 20	G̶I̶	5

Boxes 1-5 are filled in as dictated by Figure 6, Part A. Boxes 4 and 5 are
eliminated by Rule B2. Rheumatology is placed above Orthopedics by Rule C1.
As no other rules apply, the patient is scheduled for an initial appointment
in the Rheumatology specialty followed by an appointment with the Orthopedics
Department.

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