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(54) COMPUTER-IMPLEMENTED METHOD FOR GROUPING MEDICAL CLAIMS INTO EPISODE TREATMENT GROUPS

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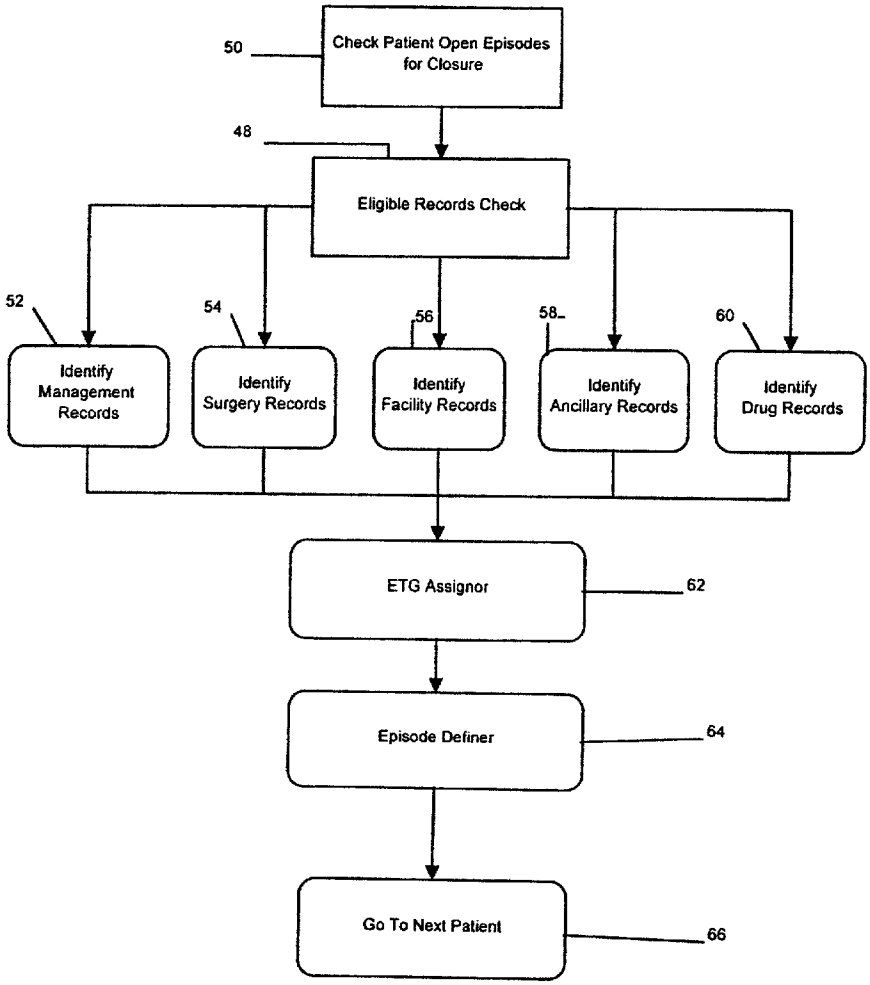
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(52) **U.S. Cl.** **705/2**

(57) **ABSTRACT**

A computer-implemented method for profiling medical claims to assist health care managers in determining the cost-efficiency and service quality of health care providers. The method allows an objective means for measuring and quantifying health care services. An episode treatment group (ETG) is a patient classification unit, which defines groups that are clinically homogenous (similar cause of illness and treatment) and statistically stable. The ETG grouper methodology uses service or segment-level claim data as input data and assigns each service to the appropriate episode. The program identifies concurrent and recurrent episodes, flags records, creates new groupings, shifts groupings for changed conditions, selects the most recent claims, resets windows, makes a determination if the provider is an independent lab and continues to collect information until an absence of treatment is detected.



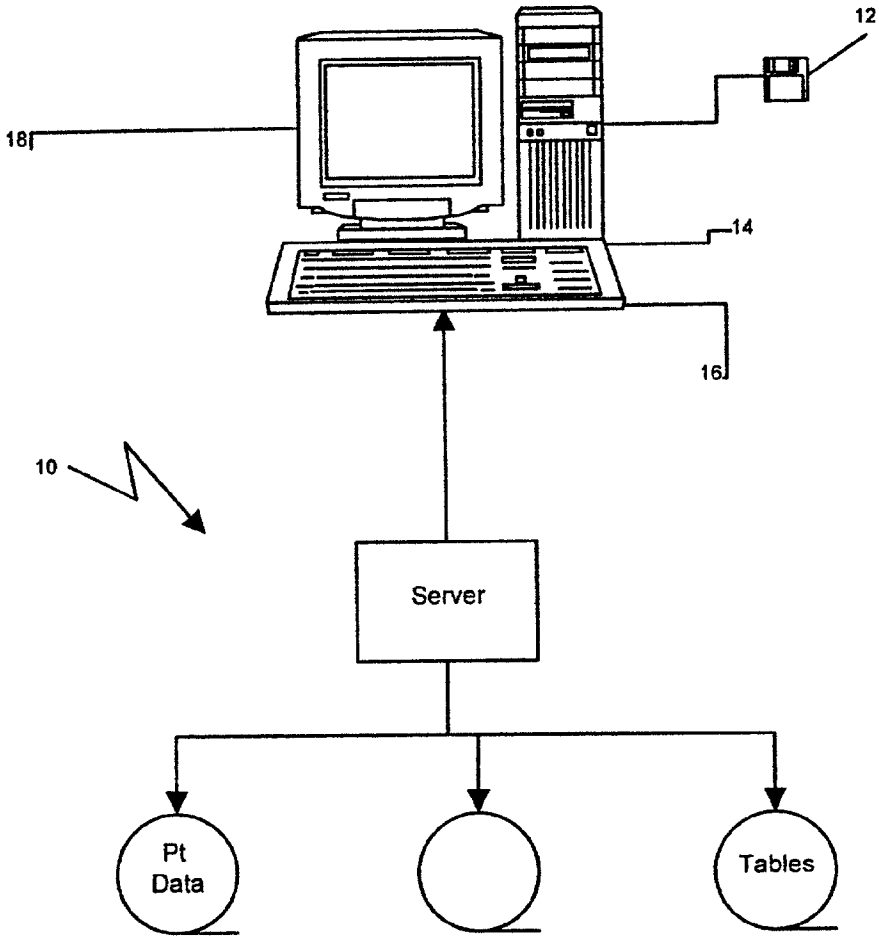
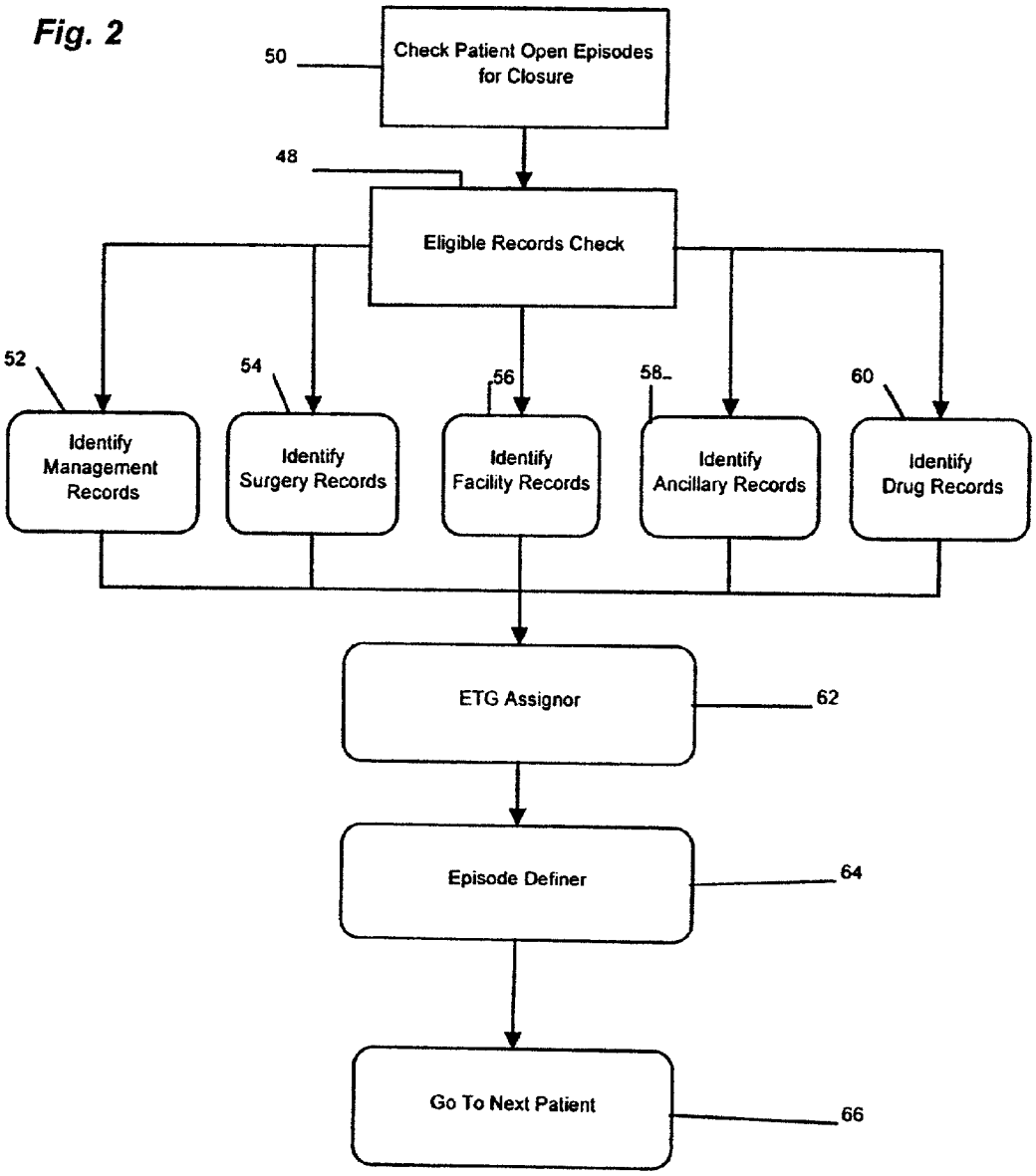


Fig. 1

Fig. 2


Check Patient Open Episodes for Closure
50
48
Eligible Records Check
52
Identify Management Records
54
Identify Surgery Records
56
Identify Facility Records
58
Identify Ancillary Records
60
Identify Drug Records
ETG Assignor
62
Episode Definer
64
Go To Next Patient
66

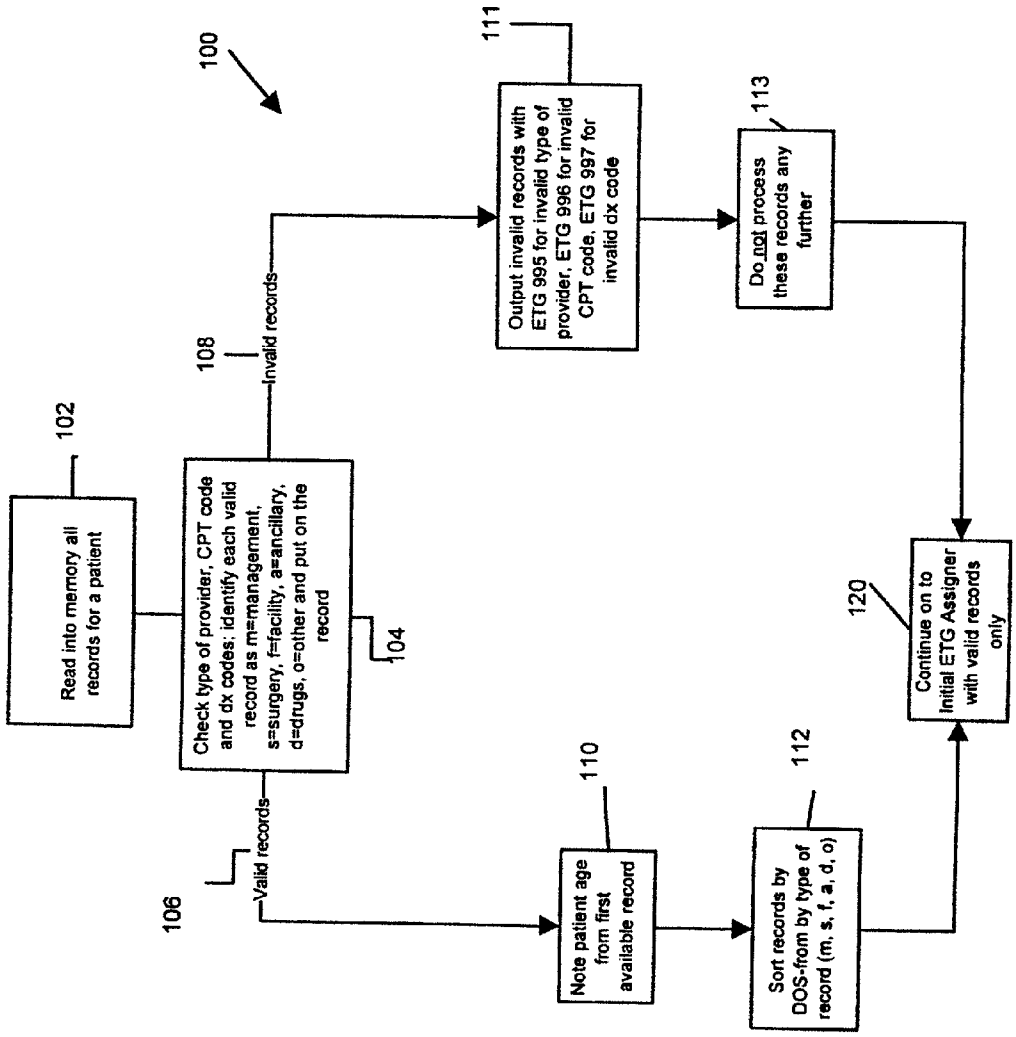

100
102
Read into memory all records for a patient
104
Check type of provider, CPT code and dx codes: identify each valid record as m=management, s=surgery, f=facility, a=ancillary, d=drugs, o=other and put on the record
106
Valid records
108
Invalid records
110
Note patient age from first available record
111
Output invalid records with ETG 995 for invalid type of provider, ETG 996 for invalid CPT code, ETG 997 for invalid dx code
112
Sort records by DOS-from by type of record (m, s, f, a, d, o)
113
Do not process these records any further
120
Continue on to Initial ETG Assigner with valid records only

Fig. 3

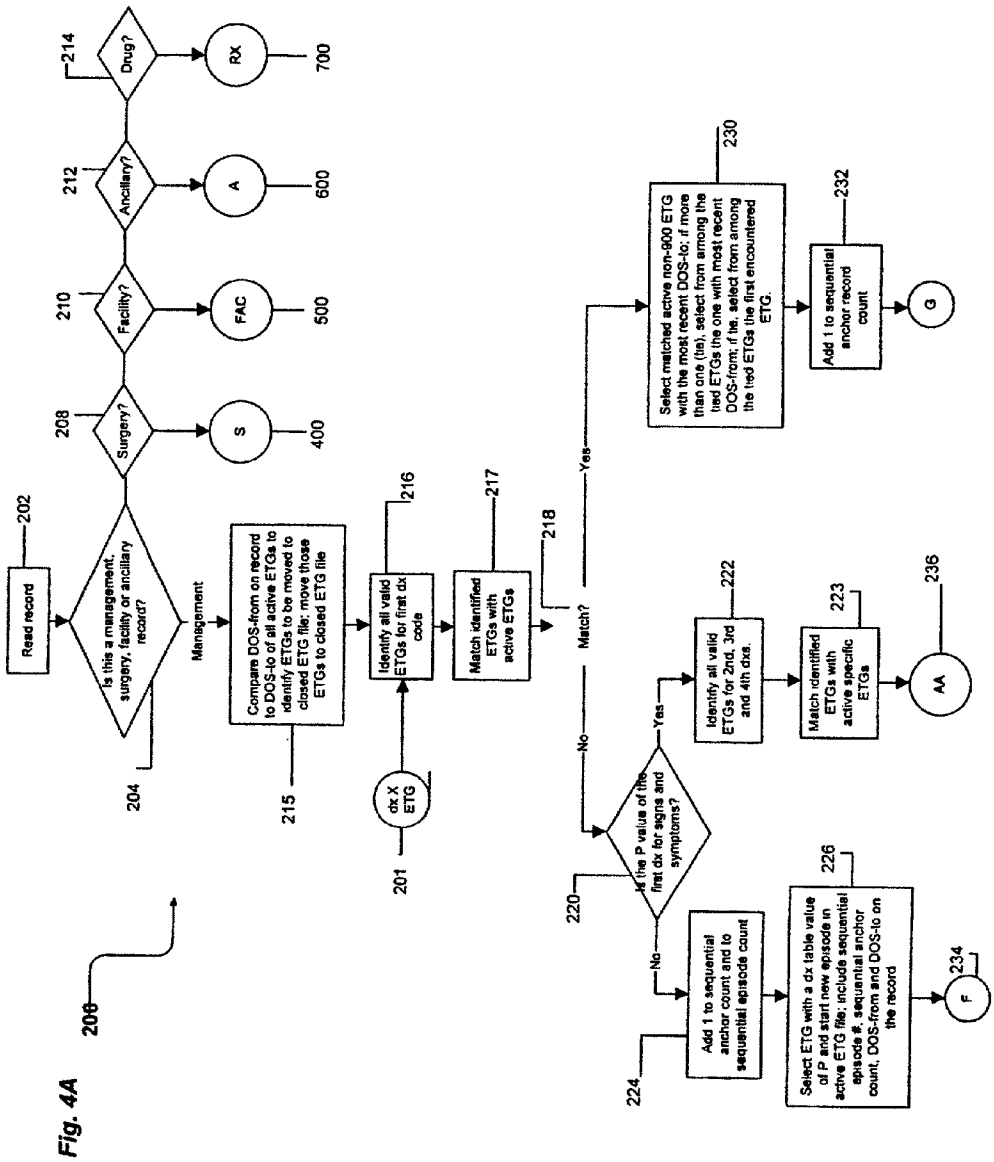

206
Read record
202
Is this a management, surgery, facility or ancillary record?
204
Management
Surgery?
208
S
400
Facility?
210
FAC
500
Ancillary?
212
A
600
Drug?
214
RX
700
Compare DOS-from on record to DOS-to of all active ETGs to identify ETGs to be moved to closed ETG file; move those ETGs to closed ETG file
215
Identify all valid ETGs for first dx code
216
dx X ETG
201
Match identified ETGs with active ETGs
217
Match?
218
Yes
No
Select matched active non-900 ETG with the most recent DOS-to; if more than one (tie), select from among the tied ETGs the one with most recent DOS-from; if tie, select from among the tied ETGs the first encountered ETG.
230
Add 1 to sequential anchor record count
232
G
Is the P value of the first dx for signs and symptoms?
220
Yes
No
Identify all valid ETGs for 2nd, 3rd and 4th dxs.
222
Match identified ETGs with active specific ETGs
223
AA
236
Add 1 to sequential anchor count and to sequential episode count
224
Select ETG with a dx table value of P and start new episode in active ETG file; include sequential episode #, sequential anchor count, DOS-from and DOS-to on the record
226
F
234

Fig. 4A

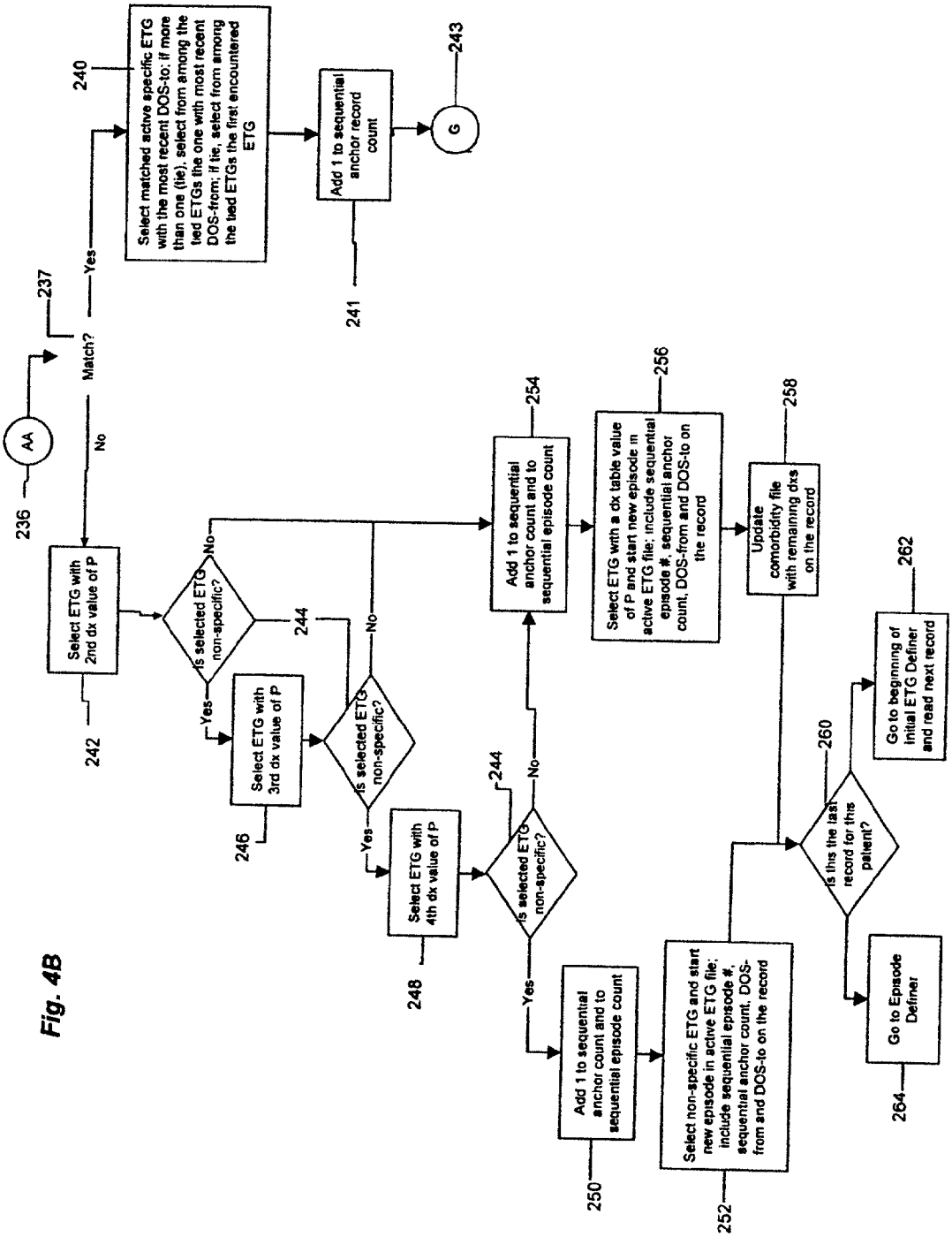

AA
236
Match?
237
Yes
No
240
Select matched active specific ETG with the most recent DOS-to; if more than one (tie), select from among the tied ETGs the one with most recent DOS-from; if tie, select from among the tied ETGs the first encountered ETG
Add 1 to sequential anchor record count
241
G
243
Select ETG with 2nd dx value of P
242
Is selected ETG non-specific?
Yes
No
244
Select ETG with 3rd dx value of P
246
Is selected ETG non-specific?
Yes
No
Select ETG with 4th dx value of P
248
Is selected ETG non-specific?
Yes
No
Add 1 to sequential anchor count and to sequential episode count
250
Add 1 to sequential anchor count and to sequential episode count
254
Select ETG with a dx table value of P and start new episode in active ETG file; include sequential episode #, sequential anchor count, DOS-from and DOS-to on the record
256
Select non-specific ETG and start new episode in active ETG file; include sequential episode #, sequential anchor count, DOS-from and DOS-to on the record
252
Update comorbidity file with remaining dxs on the record
258
Is this the last record for this patient?
260
Go to beginning of Initial ETG Definer and read next record
262
Go to Episode Definer
264

Fig. 4B

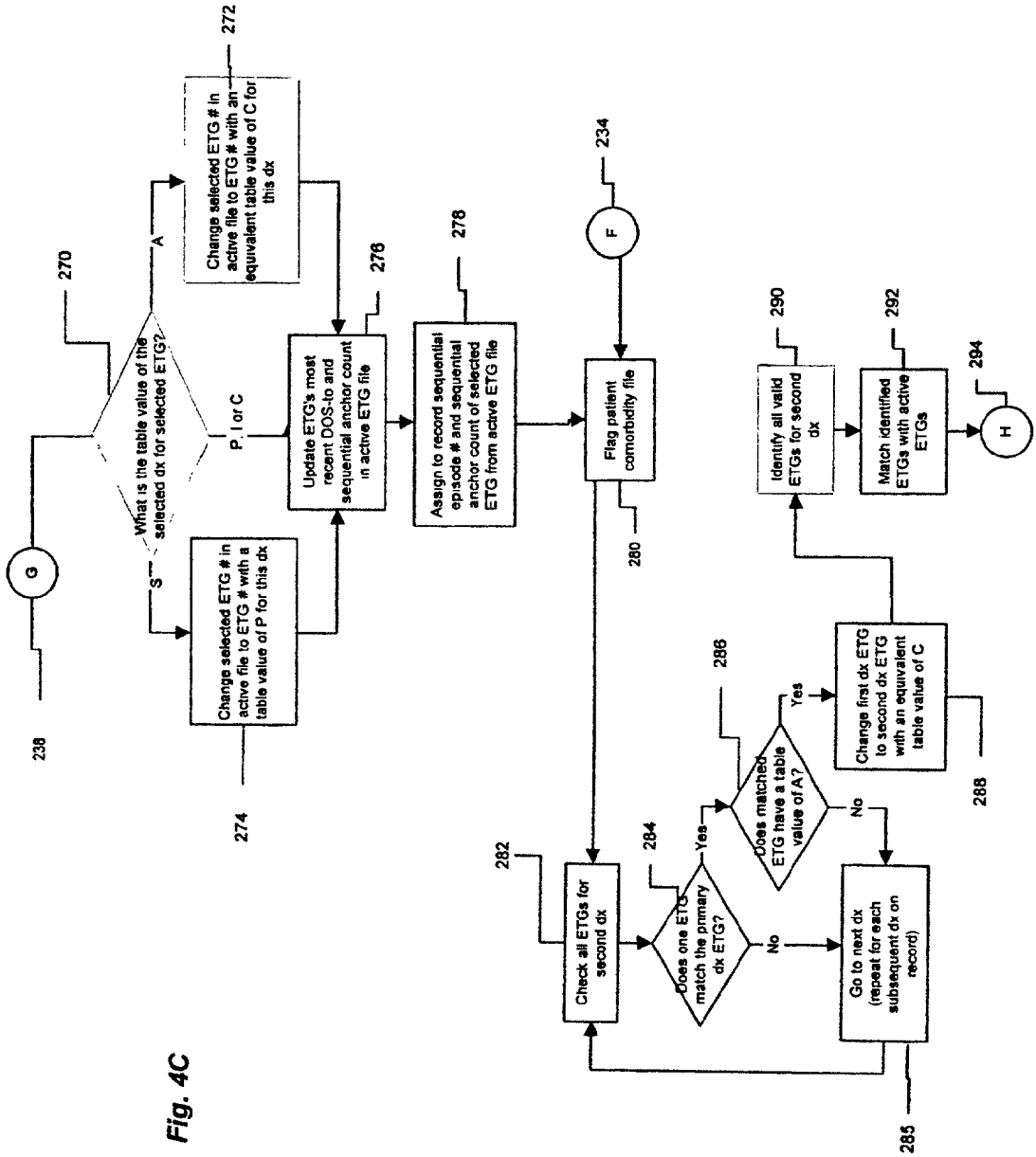

238
G
270
What is the table value of the selected dx for selected ETG?
A
Change selected ETG # in active file to ETG # with an equivalent table value of C for this dx
272
P, I or C
Update ETG's most recent DOS-to and sequential anchor count in active ETG file
276
S
Change selected ETG # in active file to ETG # with a table value of P for this dx
274
Assign to record sequential episode # and sequential anchor count of selected ETG from active ETG file
278
F
234
Flag patient comorbidity file
280
Check all ETGs for second dx
282
Does one ETG match the primary dx ETG?
284
Yes
No
Does matched ETG have a table value of A?
286
Yes
No
Change first dx ETG to second dx ETG with an equivalent table value of C
288
Go to next dx (repeat for each subsequent dx on record)
285
Identify all valid ETGs for second dx
290
Match identified ETGs with active ETGs
292
H
294

Fig. 4C

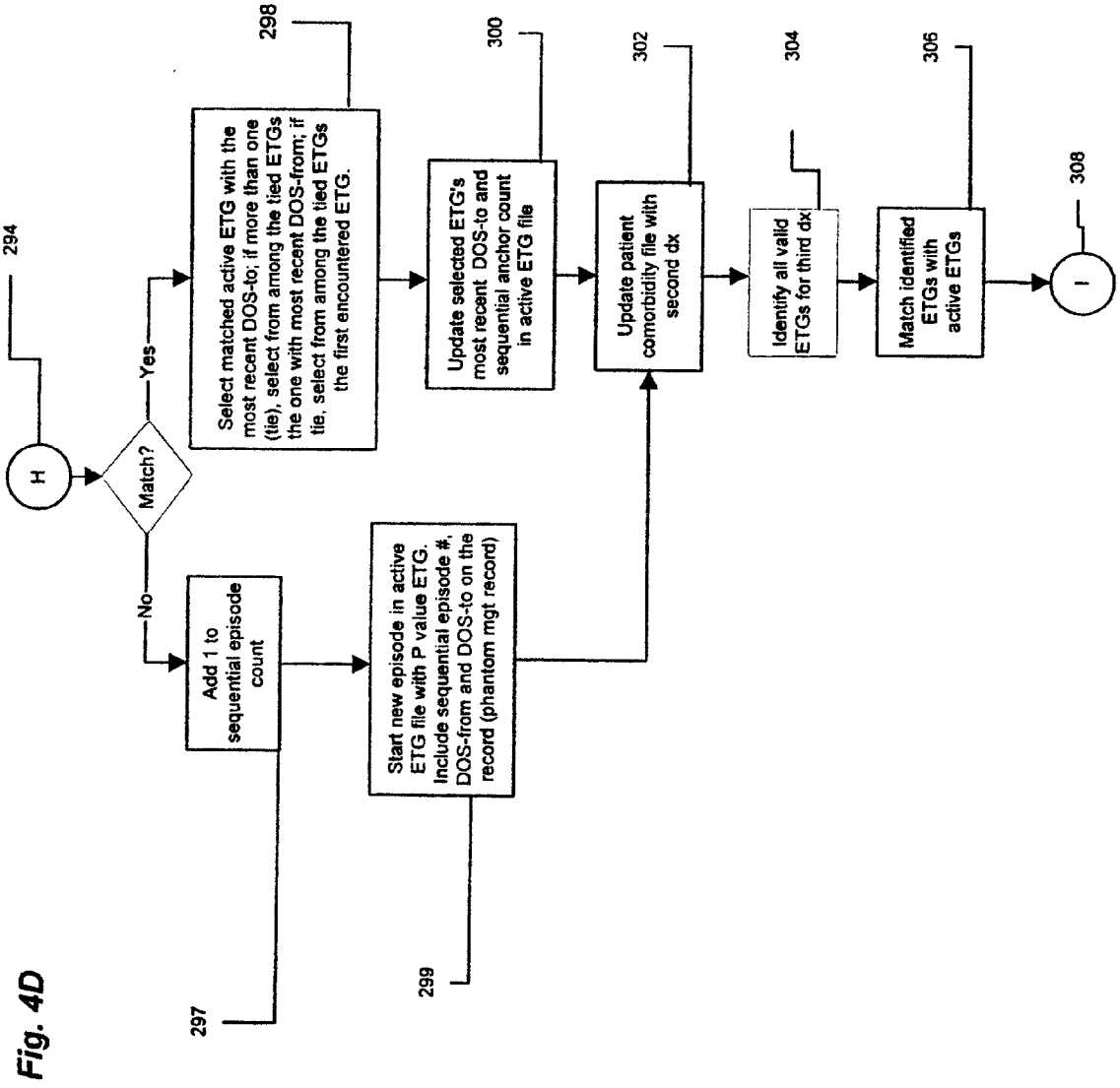

294
H
Match?
Yes
No
298
Select matched active ETG with the most recent DOS-to; if more than one (tie), select from among the tied ETGs the one with most recent DOS-from; if tie, select from among the tied ETGs the first encountered ETG.
300
Update selected ETG's most recent DOS-to and sequential anchor count in active ETG file
302
Update patient comorbidity file with second dx
304
Identify all valid ETGs for third dx
306
Match identified ETGs with active ETGs
308
I
Add 1 to sequential episode count
297
Start new episode in active ETG file with P value ETG. Include sequential episode #, DOS-from and DOS-to on the record (phantom mgt record)
299

Fig. 4D

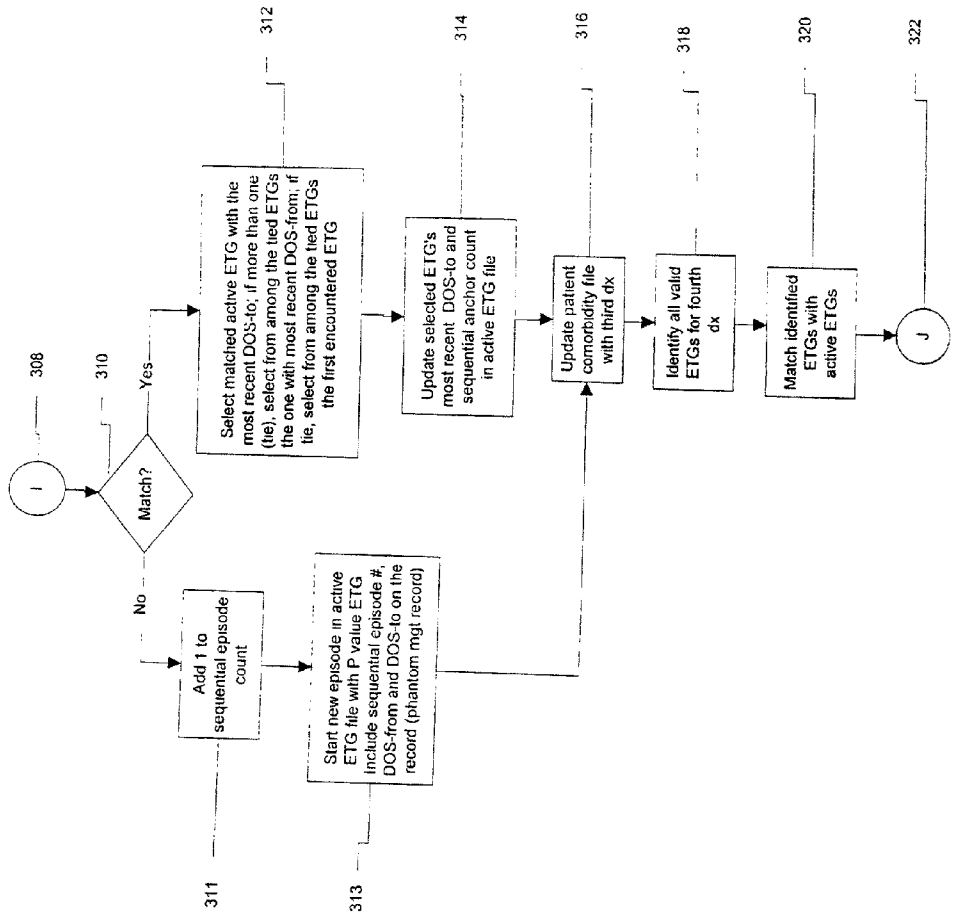

I
308
310
Match?
Yes
No
Select matched active ETG with the most recent DOS-to; if more than one (tie), select from among the tied ETGs the one with most recent DOS-from; if tie, select from among the tied ETGs the first encountered ETG
312
Update selected ETG's most recent DOS-to and sequential anchor count in active ETG file
314
Update patient comorbidity file with third dx
316
Identify all valid ETGs for fourth dx
318
Match identified ETGs with active ETGs
320
J
322
Add 1 to sequential episode count
311
Start new episode in active ETG file with P value ETG Include sequential episode #, DOS-from and DOS-to on the record (phantom mgt record)
313

Fig. 4E

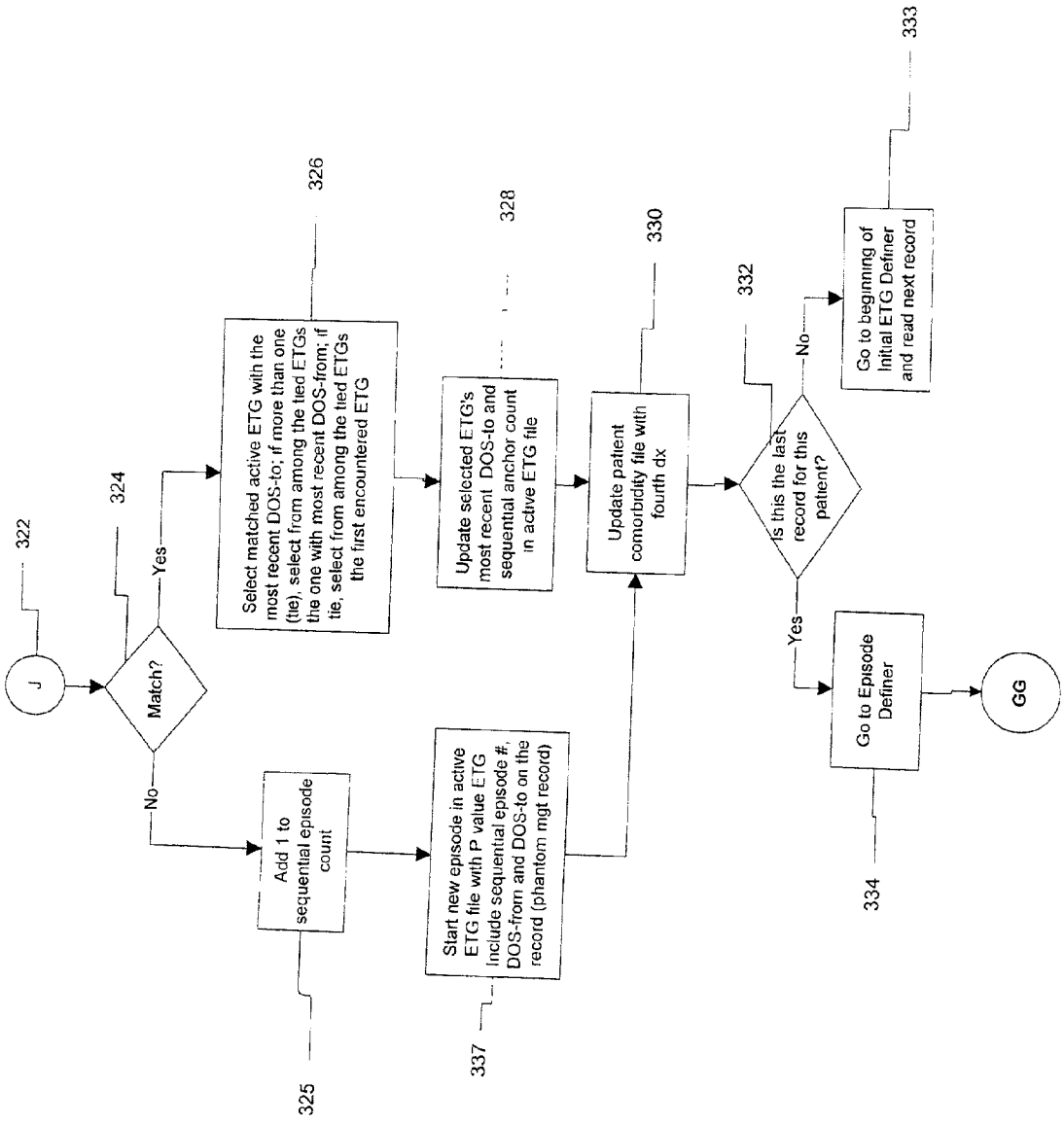

J
322
Match?
324
Yes
No
Select matched active ETG with the most recent DOS-to; if more than one (tie), select from among the tied ETGs the one with most recent DOS-from; if tie, select from among the tied ETGs the first encountered ETG
326
Add 1 to sequential episode count
325
Start new episode in active ETG file with P value ETG include sequential episode #, DOS-from and DOS-to on the record (phantom mgt record)
337
Update selected ETG's most recent DOS-to and sequential anchor count in active ETG file
328
Update patient comorbidity file with fourth dx
330
Is this the last record for this patient?
332
Yes
No
Go to Episode Definer
334
Go to beginning of Initial ETG Definer and read next record
333
GG

Fig. 4F

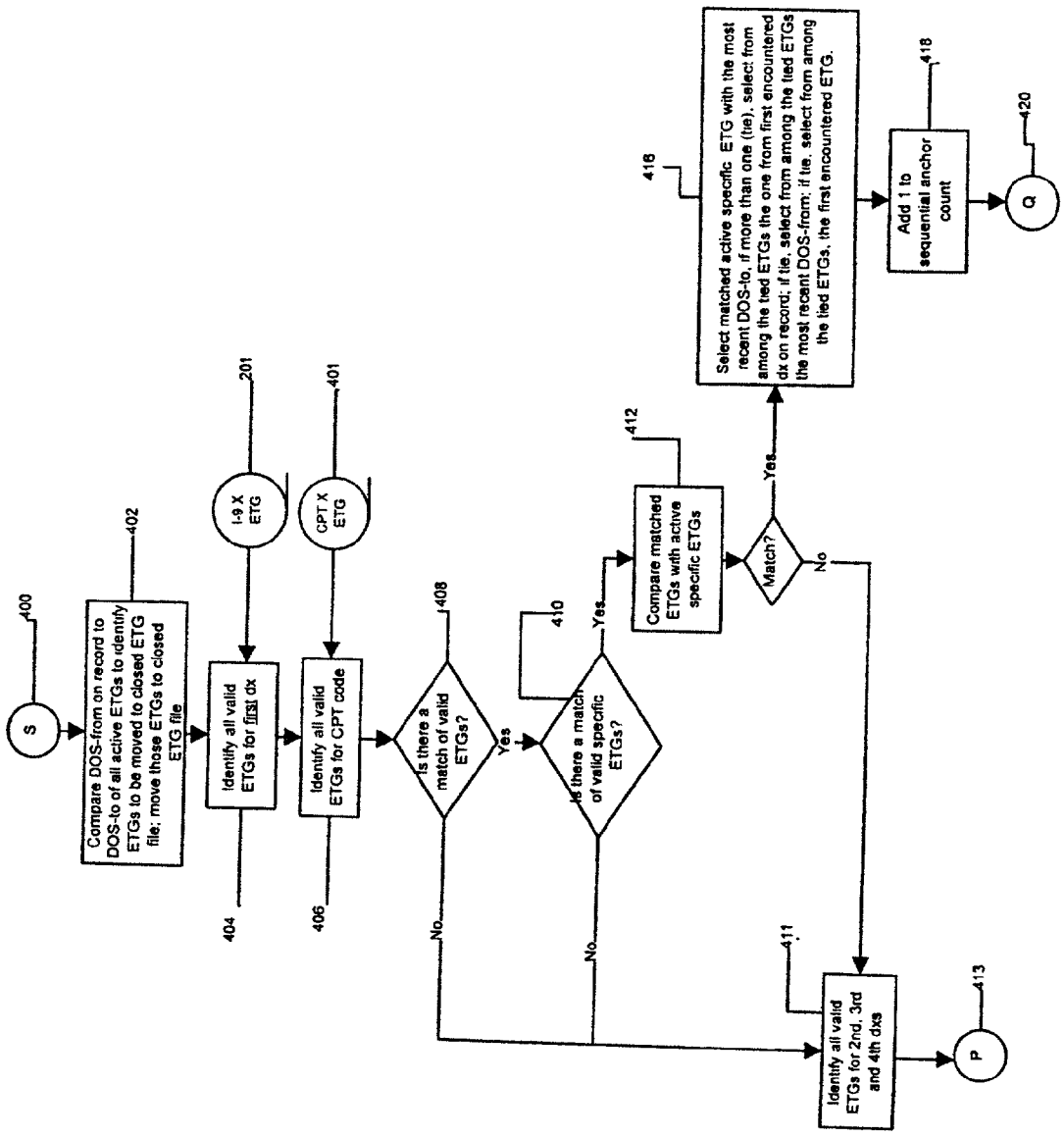

S
400
Compare DOS-from on record to DOS-to of all active ETGs to identify ETGs to be moved to closed ETG file; move those ETGs to closed ETG file
402
I-9 X ETG
201
CPT X ETG
401
Identify all valid ETGs for first dx
404
Identify all valid ETGs for CPT code
406
Is there a match of valid ETGs?
408
Yes
No
Is there a match of valid specific ETGs?
410
Yes
No
Compare matched ETGs with active specific ETGs
412
Match?
Yes
No
Select matched active specific ETG with the most recent DOS-to, if more than one (tie), select from among the tied ETGs the one from first encountered dx on record; if tie, select from among the tied ETGs the most recent DOS-from; if tie, select from among the tied ETGs, the first encountered ETG.
416
Add 1 to sequential anchor count
418
Q
420
Identify all valid ETGs for 2nd, 3rd and 4th dxs
411
P
413

Fig. 5A

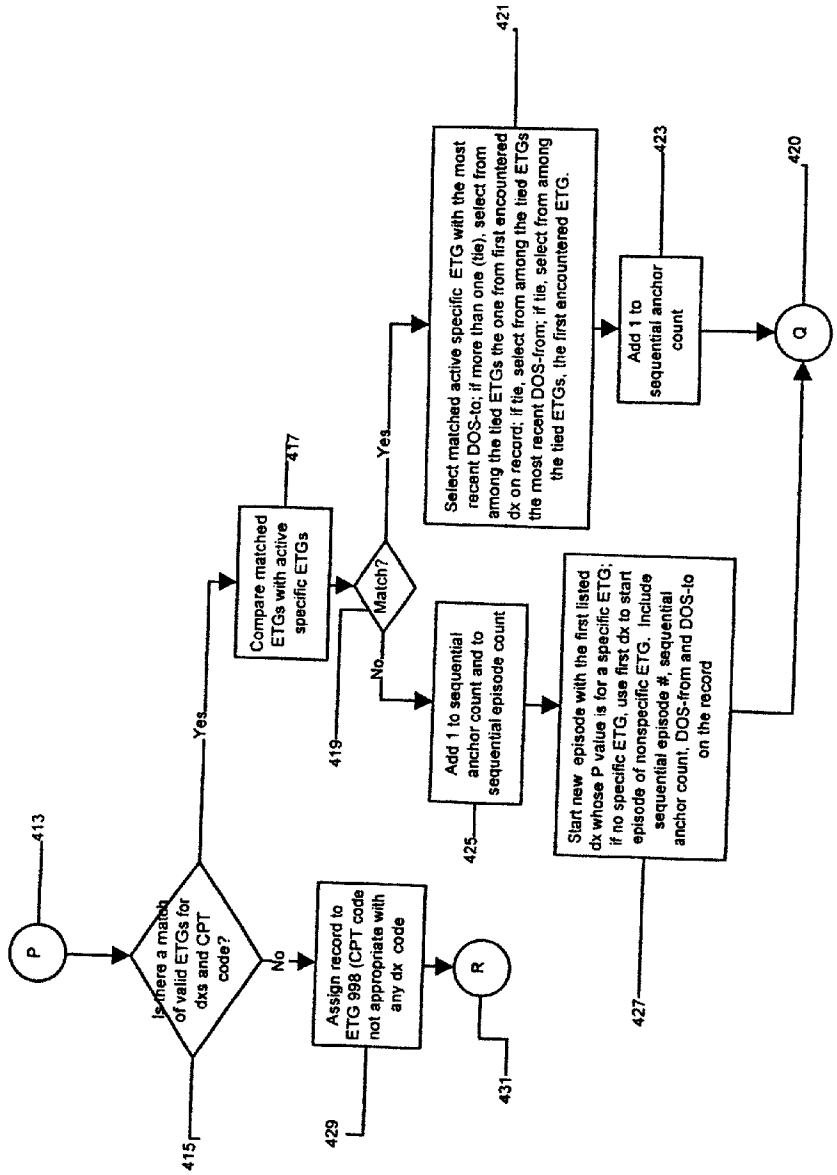

P
413
Is there a match of valid ETGs for dxs and CPT code?
Yes
No
415
Compare matched ETGs with active specific ETGs
417
Match?
Yes
No
419
Select matched active specific ETG with the most recent DOS-to; if more than one (tie), select from among the tied ETGs the one from first encountered dx on record; if tie, select from among the tied ETGs the most recent DOS-from; if tie, select from among the tied ETGs, the first encountered ETG.
421
Add 1 to sequential anchor count
423
Q
420
Add 1 to sequential anchor count and to sequential episode count
425
Start new episode with the first listed dx whose P value is for a specific ETG; if no specific ETG, use first dx to start episode of nonspecific ETG. Include sequential episode #, sequential anchor count, DOS-from and DOS-to on the record
427
Assign record to ETG 998 (CPT code not appropriate with any dx code
429
R
431

Fig. 5B

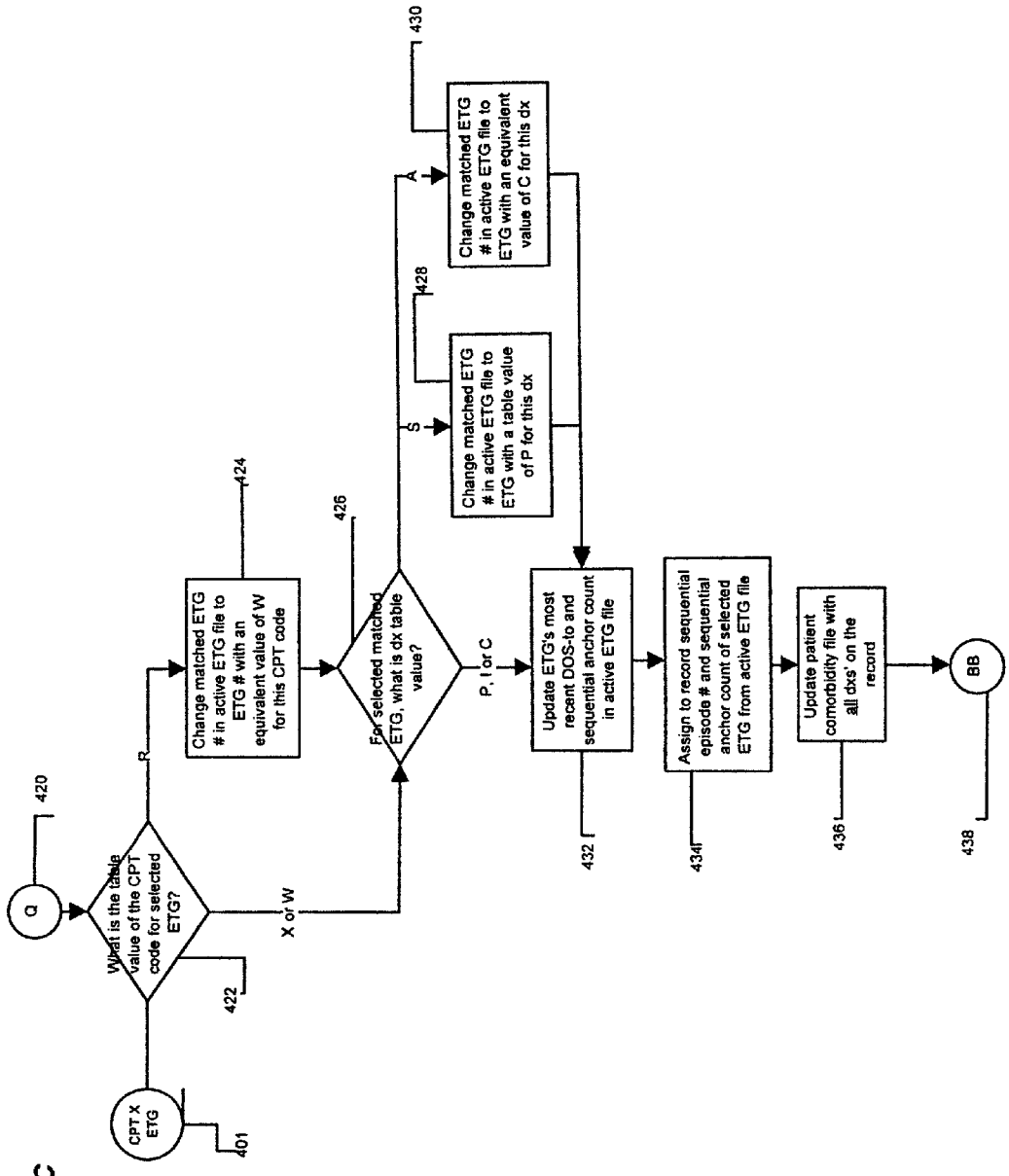

CPT X ETG
401
What is the table value of the CPT code for selected ETG?
422
R
X or W
Change matched ETG # in active ETG file to ETG # with an equivalent value of W for this CPT code
424
For selected matched ETG, what is dx table value?
426
S
A
P, I or C
Change matched ETG # in active ETG file to ETG with a table value of P for this dx
428
Change matched ETG # in active ETG file to ETG with an equivalent value of C for this dx
430
Update ETG's most recent DOS-to and sequential anchor count in active ETG file
432
Assign to record sequential episode # and sequential anchor count of selected ETG from active ETG file
434
Update patient comorbidity file with all dxs' on the record
436
BB
438
Q
420

Fig. 5C

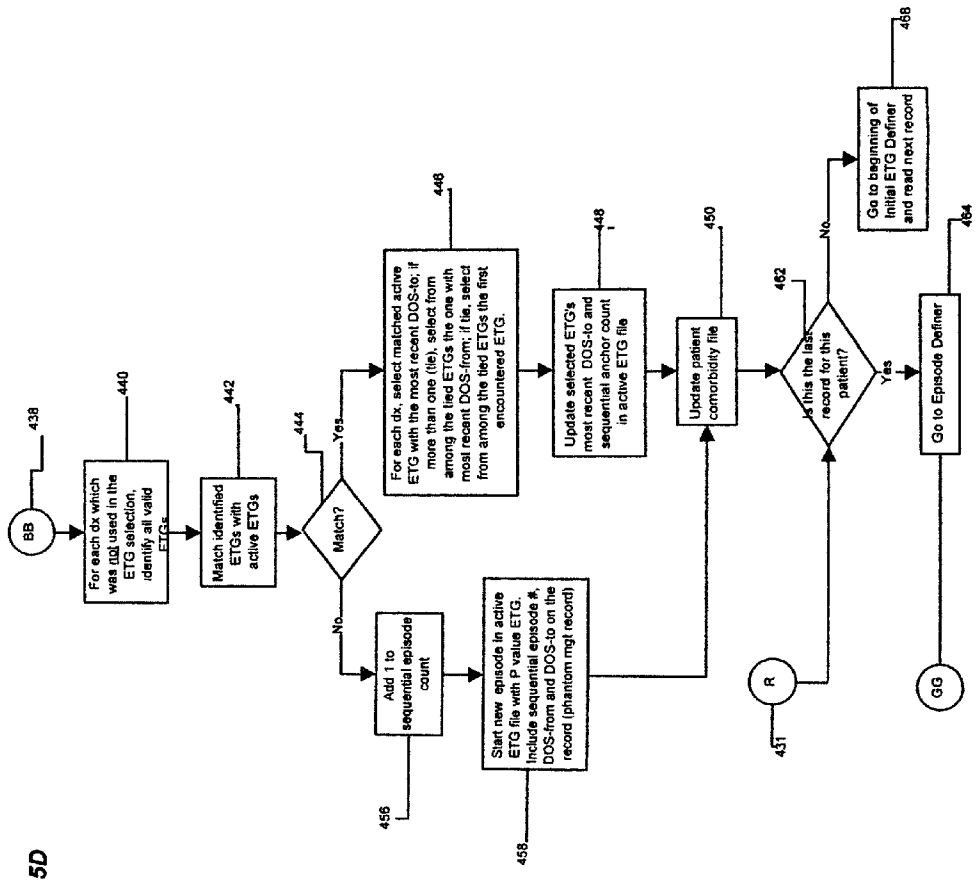

BB
438
For each dx which was not used in the ETG selection, identify all valid ETGs
440
Match identified ETGs with active ETGs
442
Match?
444
Yes
No
For each dx, select matched active ETG with the most recent DOS-to; if more than one (tie), select from among the tied ETGs the one with most recent DOS-from; if tie, select from among the tied ETGs the first encountered ETG.
446
Update selected ETG's most recent DOS-to and sequential anchor count in active ETG file
448
Update patient comorbidity file
450
Is this the last record for this patient?
452
Yes
No
Go to beginning of Initial ETG Definer and read next record
468
Go to Episode Definer
464
GG
R
431
Add 1 to sequential episode count
456
Start new episode in active ETG file with P value ETG. Include sequential episode #, DOS-from and DOS-to on the record (phantom mgt record)
458

Fig. 5D

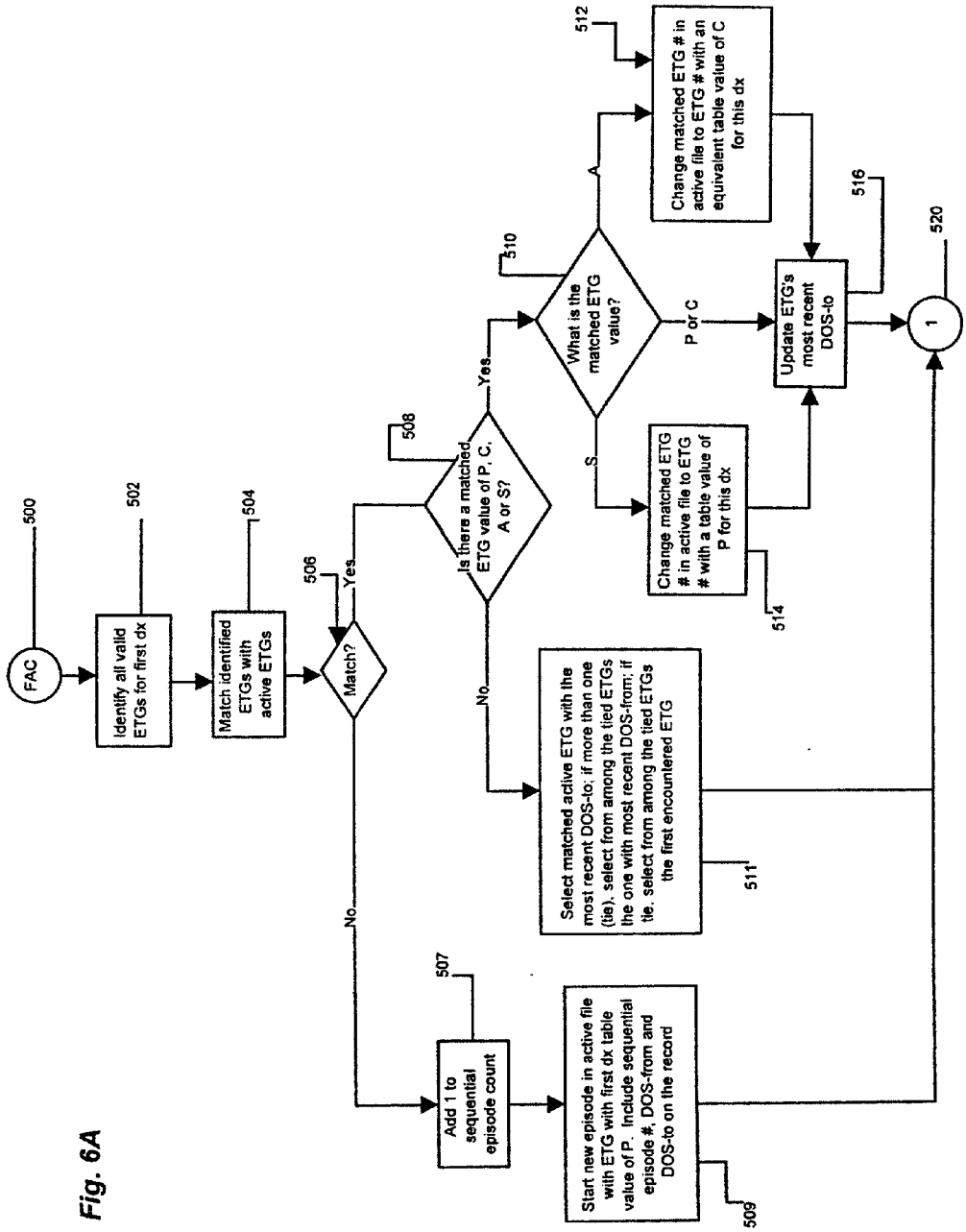

FAC
500
Identify all valid ETGs for first dx
502
Match identified ETGs with active ETGs
504
Match?
506
Yes
No
Is there a matched ETG value of P, C, A or S?
508
Yes
No
What is the matched ETG value?
510
A
S
P or C
Change matched ETG # in active file to ETG # with an equivalent table value of C for this dx
512
Change matched ETG # in active file to ETG # with a table value of P for this dx
514
Update ETG's most recent DOS-to
516
1
520
Select matched active ETG with the most recent DOS-to; if more than one (tie), select from among the tied ETGs the one with most recent DOS-from; if tie, select from among the tied ETGs the first encountered ETG
511
Add 1 to sequential episode count
507
Start new episode in active file with ETG with first dx table value of P. Include sequential episode #, DOS-from and DOS-to on the record
509

Fig. 6A

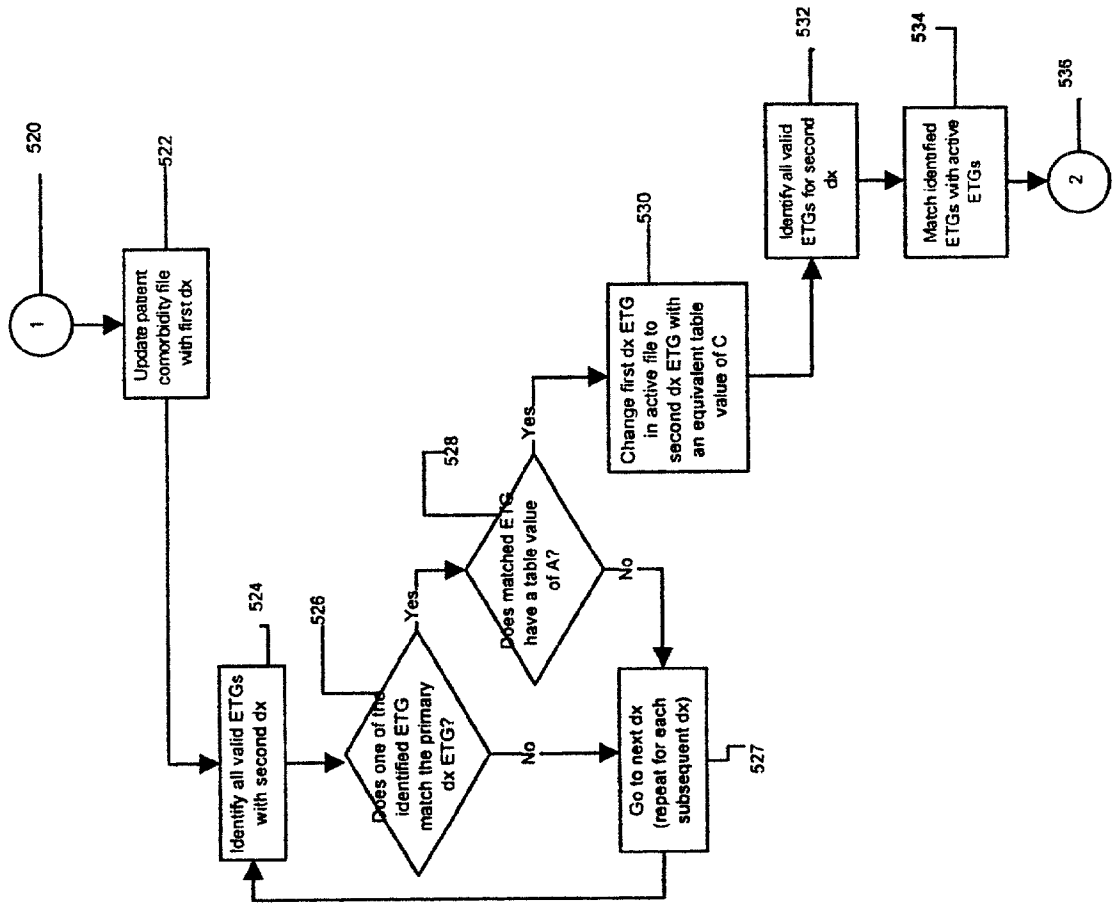
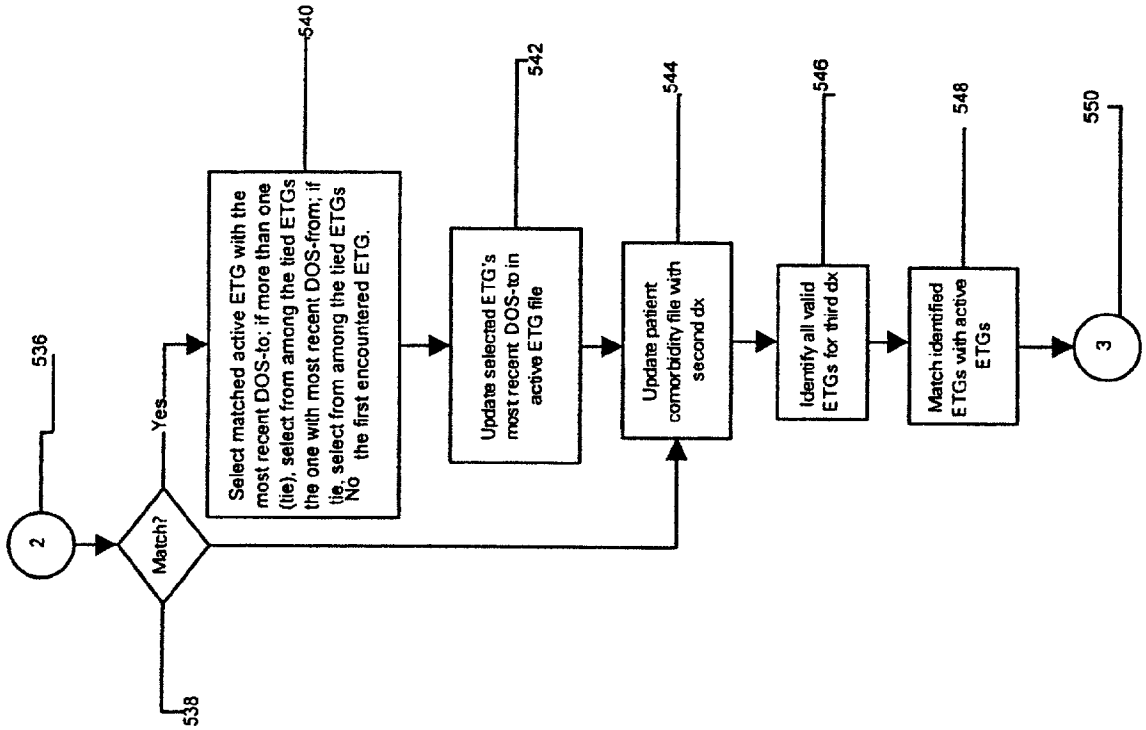

520
1
522
Update patient comorbidity file with first dx
524
Identify all valid ETGs with second dx
526
Does one of the identified ETG match the primary dx ETG?
Yes
528
Does matched ETG have a table value of A?
Yes
530
Change first dx ETG in active file to second dx ETG with an equivalent table value of C
532
Identify all valid ETGs for second dx
534
Match identified ETGs with active ETGs
535
2
No
No
527
Go to next dx (repeat for each subsequent dx)

Fig. 6B

Fig. 6C


2
536
Match?
Yes
538
Select matched active ETG with the most recent DOS-to; if more than one (tie), select from among the tied ETGs the one with most recent DOS-from; if tie, select from among the tied ETGs No the first encountered ETG.
540
Update selected ETG's most recent DOS-to in active ETG file
542
Update patient comorbidity file with second dx
544
Identify all valid ETGs for third dx
546
Match identified ETGs with active ETGs
548
3
550

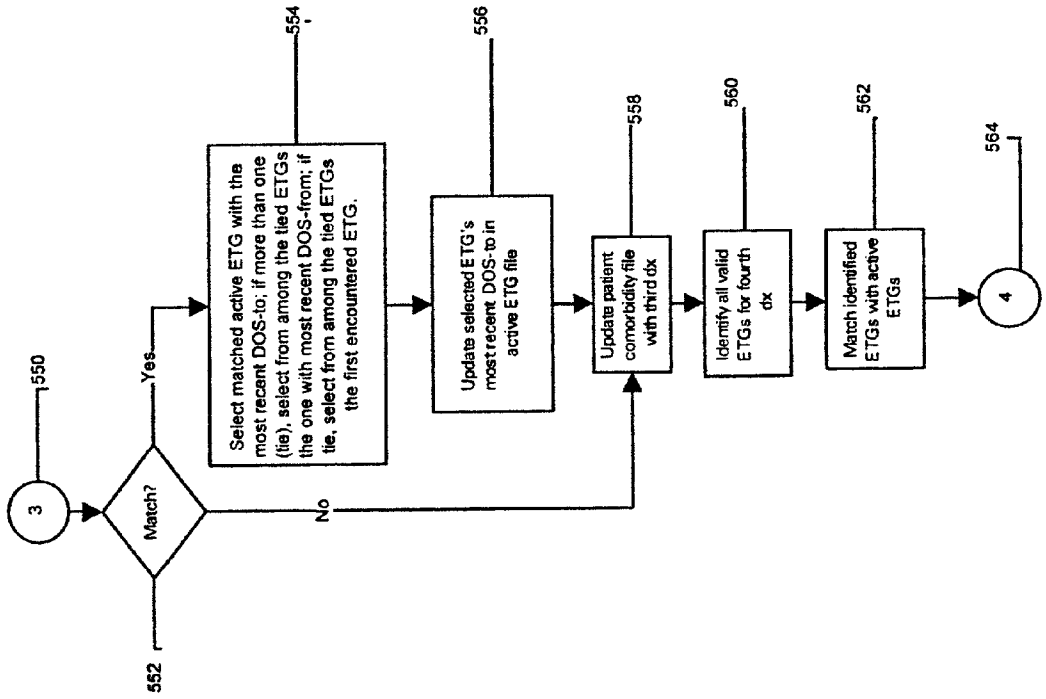

3
550
Match?
Yes
No
552
Select matched active ETG with the most recent DOS-to; if more than one (tie), select from among the tied ETGs the one with most recent DOS-from; if tie, select from among the tied ETGs the first encountered ETG.
554
Update selected ETG's most recent DOS-to in active ETG file
556
Update patient comorbidity file with third dx
558
Identify all valid ETGs for fourth dx
560
Match identified ETGs with active ETGs
562
4
564

Fig. 6D

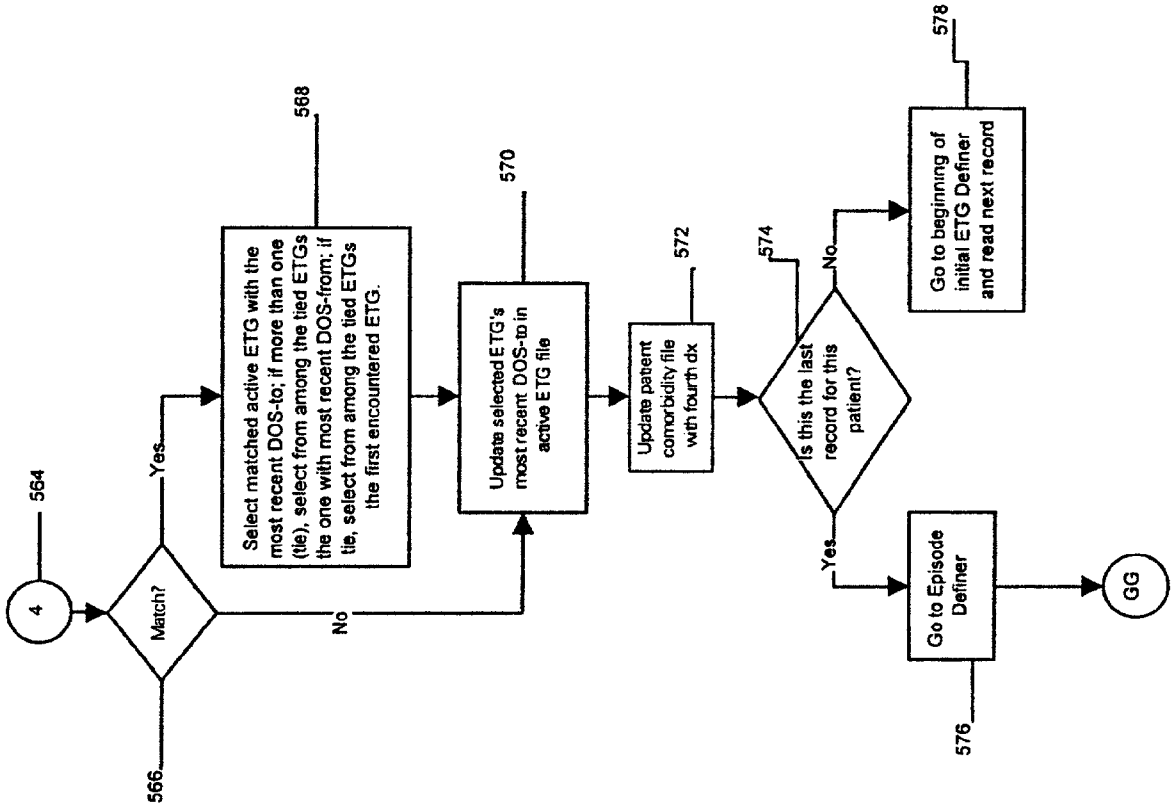

4
564
Match?
566
Yes
No
Select matched active ETG with the most recent DOS-to; if more than one (tie), select from among the tied ETGs the one with most recent DOS-from; if tie, select from among the tied ETGs the first encountered ETG.
568
Update selected ETG's most recent DOS-to in active ETG file
570
Update patient comorbidity file with fourth dx
572
Is this the last record for this patient?
574
No
Yes
Go to beginning of initial ETG Definer and read next record
578
Go to Episode Definer
576
GG

Fig. 6E

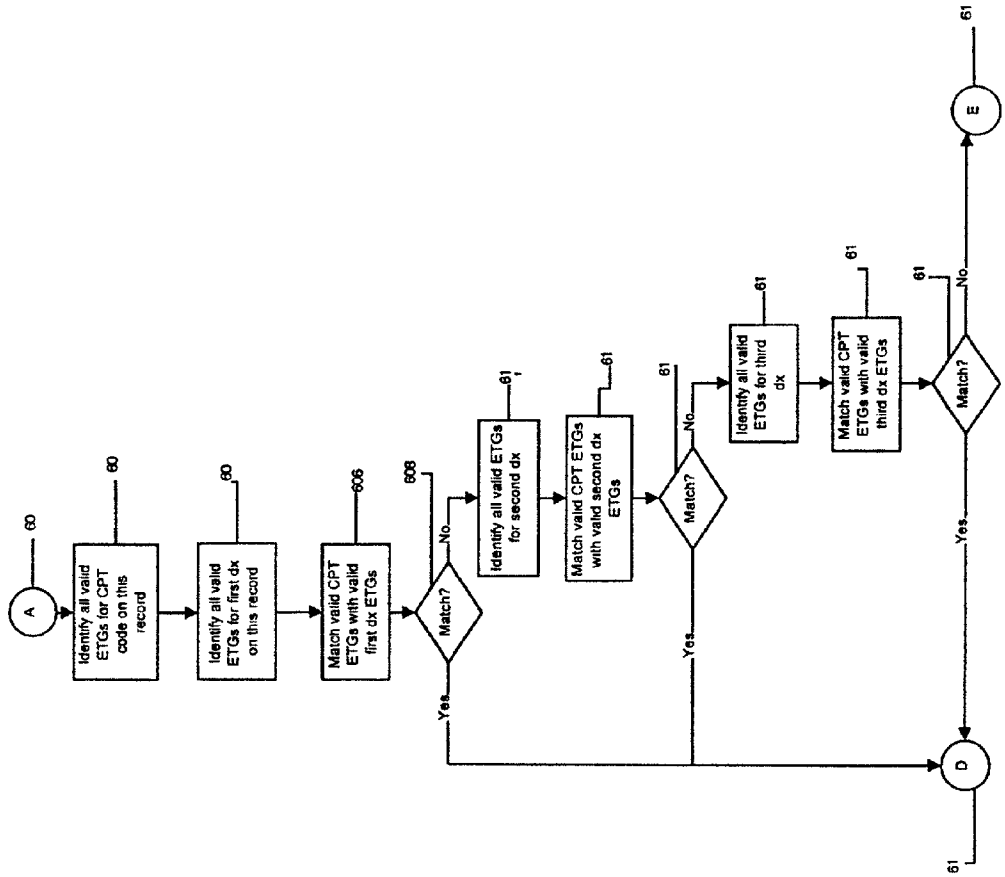

A
60
Identify all valid ETGs for CPT code on this record
60
Identify all valid ETGs for first dx on this record
60
Match valid CPT ETGs with valid first dx ETGs
606
Match?
608
No
Yes
Identify all valid ETGs for second dx
61
Match valid CPT ETGs with valid second dx ETGs
61
Match?
61
No
Yes
Identify all valid ETGs for third dx
61
Match valid CPT ETGs with valid third dx ETGs
61
Match?
61
No
Yes
E
61
D
61

Fig. 7A

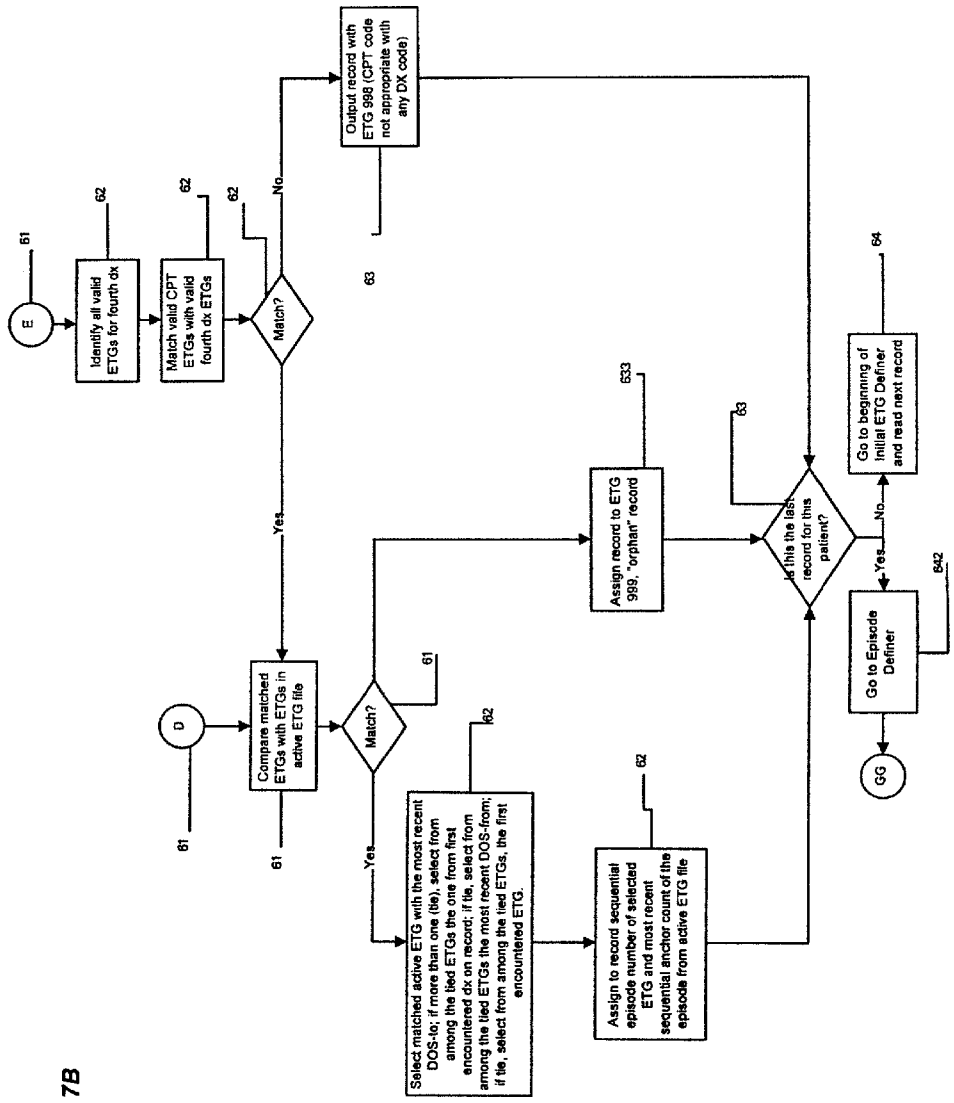

E
61
Identify all valid ETGs for fourth dx
62
Match valid CPT ETGs with valid fourth dx ETGs
62
Match?
62
No
Output record with ETG 998 (CPT code not appropriate with any DX code)
63
Yes
D
61
Compare matched ETGs with active ETG file
61
Match?
61
Yes
Select matched active ETG with the most recent DOS-to; if more than one (tie), select from among the tied ETGs the one from first encountered dx on record; if tie, select from among the tied ETGs the most recent DOS-from; if tie, select from among the tied ETGs, the first encountered ETG.
62
Assign to record sequential episode number of selected ETG and most recent sequential anchor count of the episode from active ETG file
62
Assign record to ETG 999, "orphan" record
633
Is this the last record for this patient?
63
No
Go to beginning of Initial ETG Definer and read next record
64
Yes
Go to Episode Definer
642
GG

Fig. 7B

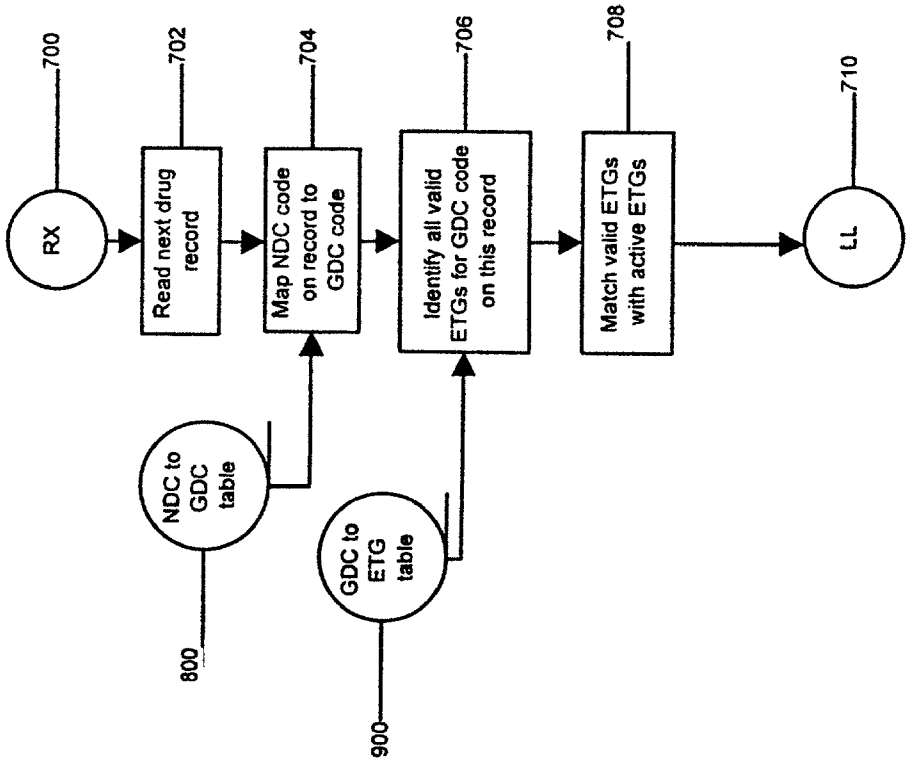

700
RX
702
Read next drug record
704
Map NDC code on record to GDC code
706
Identify all valid ETGs for GDC code on this record
708
Match valid ETGs with active ETGs
710
LL
NDC to GDC table
800
GDC to ETG table
900

Fig. 8A

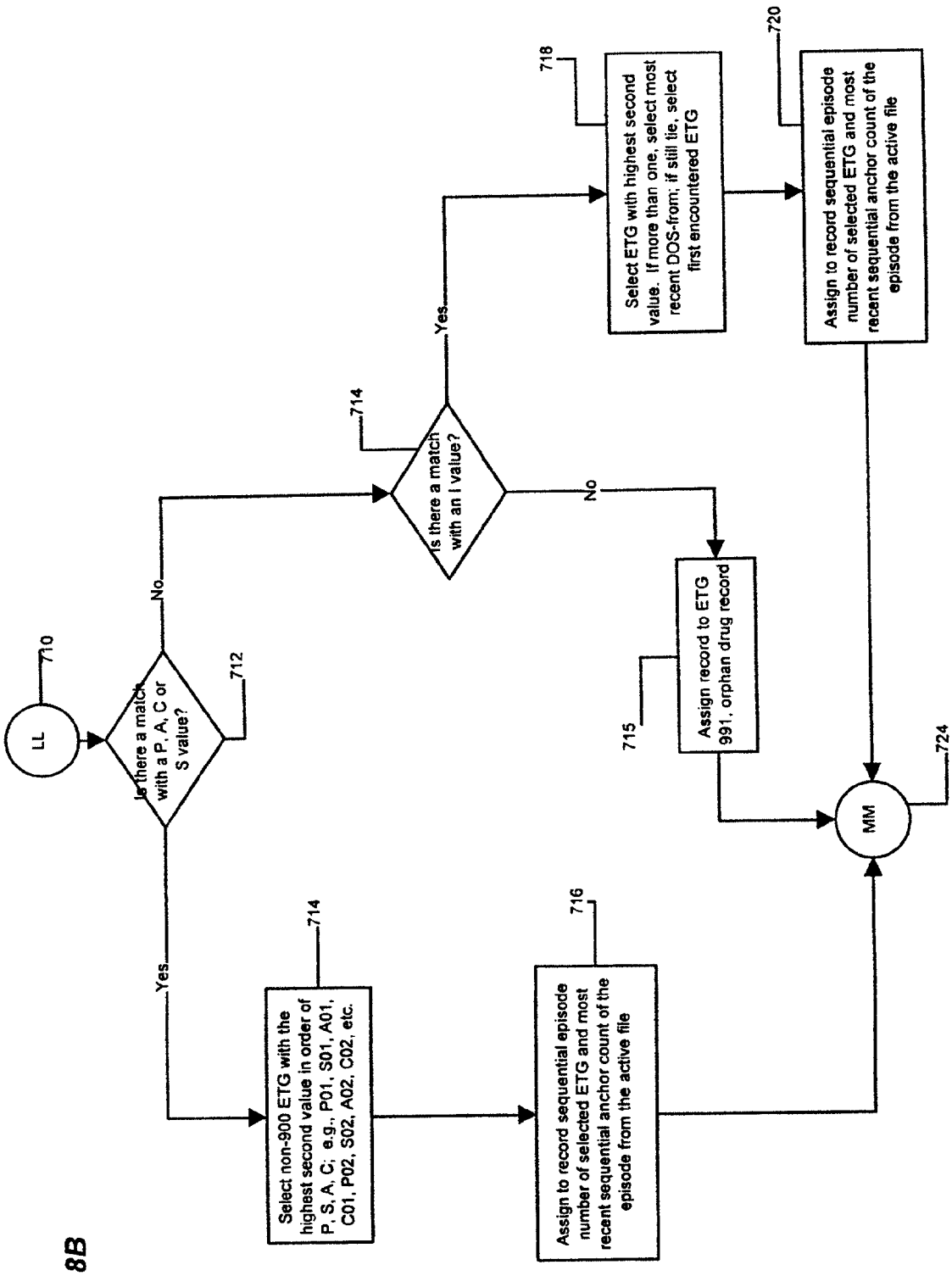

LL
710
Is there a match with a P, A, C or S value?
712
No
Yes
Is there a match with an i value?
714
No
Yes
Select ETG with highest second value. If more than one, select most recent DOS-from; if still tie, select first encountered ETG
718
Assign to record sequential episode number of selected ETG and most recent sequential anchor count of the episode from the active file
720
Assign record to ETG 991, orphan drug record
715
Select non-900 ETG with the highest second value in order of P, S, A, C; e.g., P01, S01, A01, C01, P02, S02, A02, C02, etc.
714
Assign to record sequential episode number of selected ETG and most recent sequential anchor count of the episode from the active file
716
MM
724

Fig. 8B

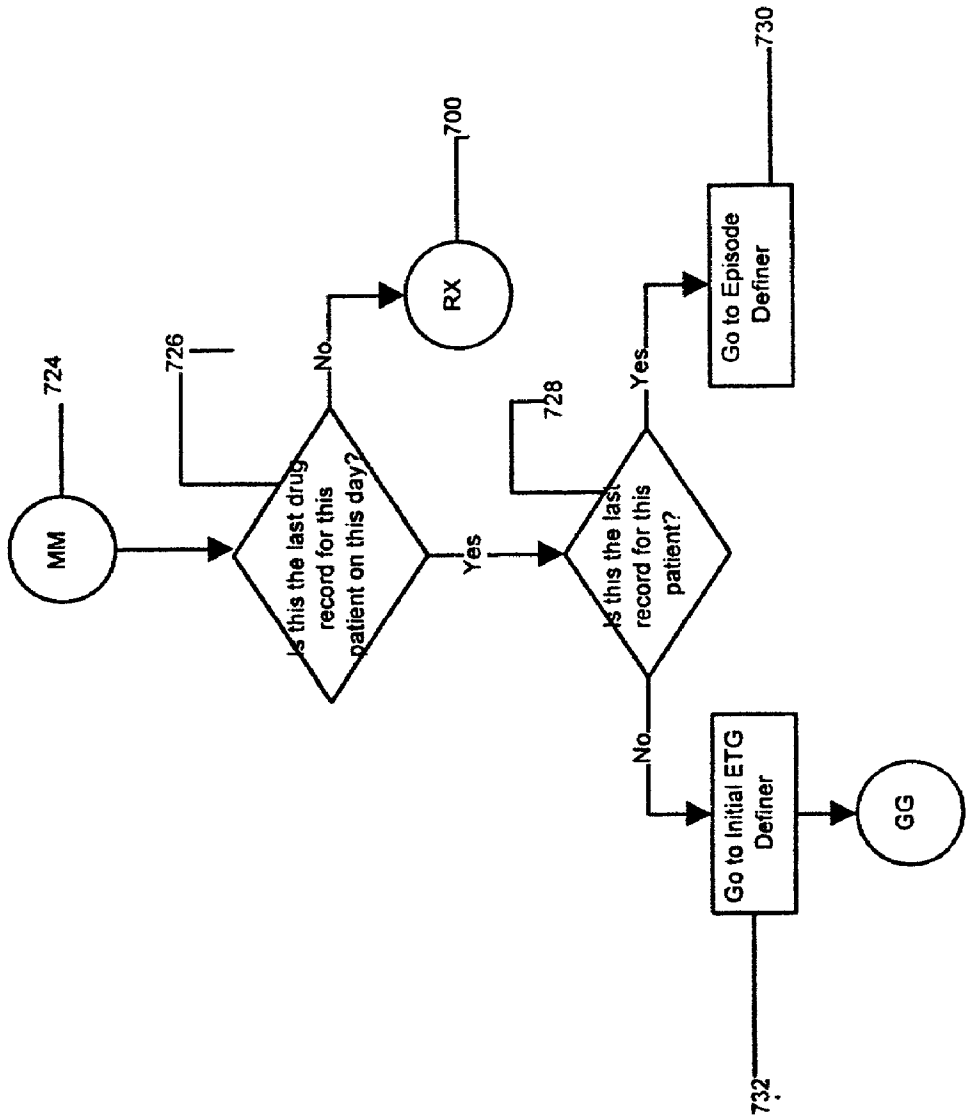

724
MM
726
Is this the last drug record for this patient on this day?
No
700
RX
Yes
728
Is this the last record for this patient?
Yes
730
Go to Episode Definer
No
Go to Initial ETG Definer
732
GG

Fig. 8C

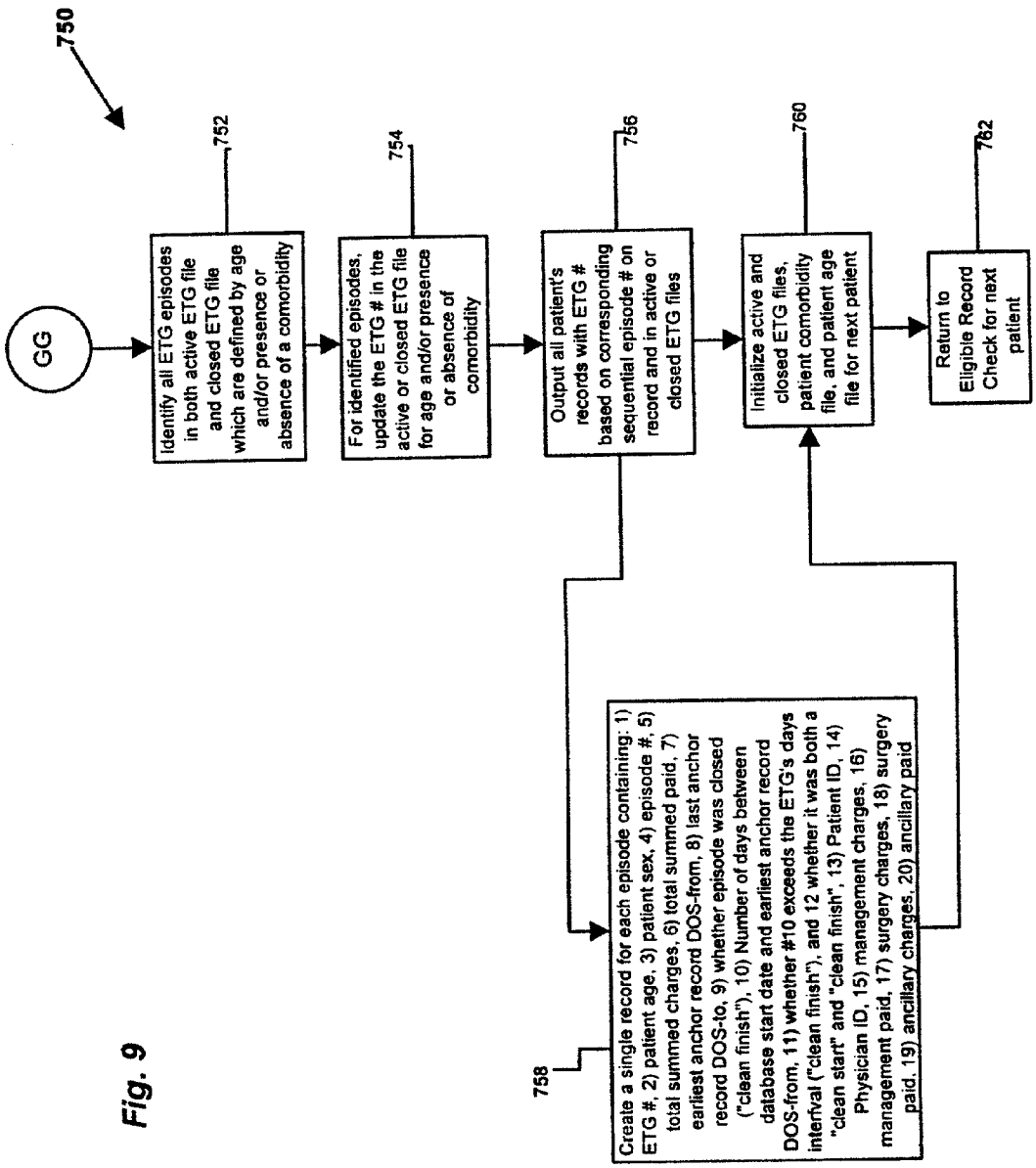

750
GG
752
Identify all ETG episodes in both active ETG file and closed ETG file which are defined by age and/or presence or absence of a comorbidity
754
For identified episodes, update the ETG # in the active or closed ETG file for age and/or presence or absence of comorbidity
756
Output all patient's records with ETG # based on corresponding sequential episode # on record and in active or closed ETG files
760
Initialize active and closed ETG files, patient comorbidity file, and patient age file for next patient
762
Return to Eligible Record Check for next patient
758
Create a single record for each episode containing: 1) ETG #, 2) patient age, 3) patient sex, 4) episode #, 5) total summed charges, 6) total summed paid, 7) earliest anchor record DOS-from, 8) last anchor record DOS-to, 9) whether episode was closed ("clean finish"), 10) Number of days between database start date and earliest anchor record DOS-from, 11) whether #10 exceeds the ETG's days interval ("clean finish"), and 12 whether it was both a "clean start" and "clean finish", 13) Patient ID, 14) Physician ID, 15) management charges, 16) management paid, 17) surgery charges, 18) surgery paid, 19) ancillary charges, 20) ancillary paid

Fig. 9

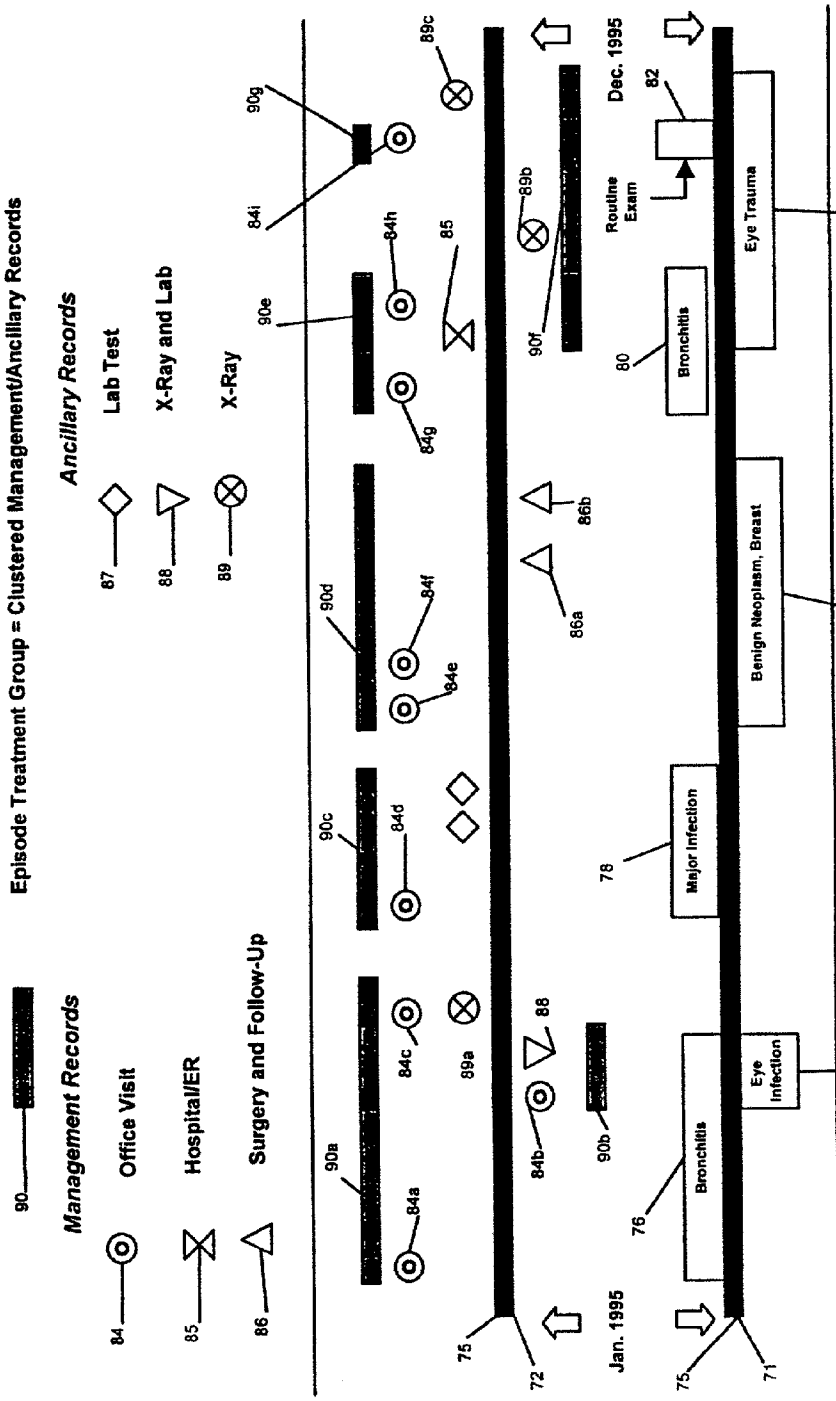

90 Episode Treatment Group = Clustered Management/Ancillary Records
Management Records
84 Office Visit
85 Hospital/ER
86 Surgery and Follow-Up
Ancillary Records
87 Lab Test
88 X-Ray and Lab
89 X-Ray
Jan. 1995
Dec. 1995
Routine Exam
Bronchitis
Major Infection
Eye Infection
Benign Neoplasm, Breast
Eye Trauma
71
72
75
76
77
78
79
80
81
82
84a
84b
84c
84d
84e
84f
84g
84h
84i
85
86a
86b
88
89a
89b
89c
90a
90b
90c
90d
90e
90f
90g

Fig. 10

ETG	.....	265	266	.....	400	401	402	404	....
Dx Code									
162					C1	P	A1	S	
2122					I	I	I	P	
...									
...									
...									
...									
...									
414.8		P	S						
415		I	P						

Fig. 11

	....	ETG	ETG	ETG	ETG	....
Surgery Code	...	400	401	402	404	....
31766		W2	R2	W1	R1	

Fig. 12

NDC	GDC
...	
...	
00002510501	40973
00002510501	40973
61392028990	35472
00002505818	39713
00002505818	39713
61392028990	35472
61392028990	35472
0000203529	16192
0000203529	16192
61392028990	35472

Fig. 13

GDC	ETG	RANK
40973	450	P1
39713	329	I1
39713	328	P1
39713	373	P7
39713	390	A7
39713	374	S7
16192	900	P1
40973	450	P2
35472	46	P6
35472	648	S7

Fig. 14

COMPUTER-IMPLEMENTED METHOD FOR GROUPING MEDICAL CLAIMS INTO EPISODE TREATMENT GROUPS

REFERENCE TO RELATED APPLICATIONS

[0001] This patent application is a divisional application of U.S. patent application Ser. No. 09/188,986 filed Nov. 9, 1998, which is a continuation patent application of U.S. patent application Ser. No. 08/493,728, filed on Jun. 22, 1995, issued as U.S. Pat. No. 5,835,897 on Nov. 10, 1998.

FIELD OF THE INVENTION

[0002] The present invention relates generally to computer-implemented methods for processing medical claims information. More particularly, the present invention relates to a computer-implemented method for receiving input data relating to a person's medical claim, establishing a management record for the person, establishing episode treatment groups to define groupings of medical episodes of related etiology, correlating subsequent medical claims events to an episode treatment group and manipulating episode treatment groups based upon time windows for each medical condition and co-morbidities.

BACKGROUND OF THE INVENTION

[0003] Due to an increase in health care costs and inefficiency in the health care system, health care providers and service management organizations need health care maintenance systems which receive input medical claim data, correlate the medical claim data and provide a means for quantitatively and qualitatively analyzing provider performance. Because of the complex nature of medical care service data, many clinicians and administrators are not able to efficiently utilize the data. A need exists for a computer program that transforms inpatient and out patient claim data to actionable information, which is logically understood by clinicians and administrators.

[0004] Performance is quickly becoming the standard by which health care purchasers and informed consumers select their health care providers. Those responsible for the development and maintenance of provider networks search for an objective means to measure and quantify the health care services provided to their clients. Qualitative and quantitative analysis of medical provider performance is a key element for managing and improving a health care network. Operating a successful health care network requires the ability to monitor and quantify medical care costs and care quality. Oftentimes, success depends on the providers' ability to identify and correct problems in their health care system. A need exists, therefore, for an analytical tool for identifying real costs in a given health care management system.

[0005] To operate a more efficient health care system, health care providers need to optimize health care services and expenditures. Many providers practice outside established utilization and cost norms. Systems that detect inappropriate coding, eliminate potentially inappropriate services or conduct encounter-based payment methodology are insufficient for correcting the inconsistencies of the health care system. When a complication or comorbidity is encountered during the course of treatment, many systems do not reclassify the treatment profile. Existing systems do not adjust for casemix, concurrent conditions or recurrent conditions. A system that compensates for casemix should identify the types of illnesses treated in a given population, determine the extent of resource application to specific types of illnesses, measure and compare the treatment patterns among individual and groups of health care providers and educate providers to more effectively manage risk. When profiling claims, existing systems establish classifications that do not contain a manageable number of groupings, are not clinically homogeneous or are not statistically stable. A need exists, therefore, for a patient classification system that accounts for differences in patient severity and establishes a clearly defined unit of analysis.

[0006] For many years, computer-implemented programs for increasing health care efficiency have been available for purchase. Included within the current patent literature and competitive information are many programs that are directed to the basic concept of health care systems.

[0007] The Mohlenbrock, et al. patent, U.S. Pat. No. 4,667,292, issued in 1987, discloses a medical reimbursement computer system which generates a list identifying the most appropriate diagnostic-related group (DRG) and related categories applicable to a given patient for inpatient claims only. The list is limited by a combination of the characteristics of the patient and an initial principal diagnosis. A physician can choose a new designation from a list of related categories while the patient is still being treated. The manually determined ICD-9 numbers can be applied to an available grouper computer program to compare the working DRG to the government's DRG.

[0008] The Mohlenbrock, et al. patent, U.S. Pat. No. 5,018,067, issued in 1991, discloses an apparatus and method for improved estimation of health resource consumption through the use of diagnostic and/or procedure grouping and severity of illness indicators. This system is a computer-implemented program that calculates the amount of payment to the health provider by extracting the same input data as that identified in the Mohlenbrock '292 Patent teaching the DRG System. The system calculates the severity of the patient's illness then classifies each patient into sub-categories of resource consumption within a designated DRG. A computer combines the input data according to a formula consisting of constants and variables. The variables are known for each patient and relate to the number of ICD codes and the government weighing of the codes. The software program determines a set of constants for use in the formula for a given DRG that minimizes variances between the actual known outcomes and those estimated by use of the formula. Because it is based upon various levels of illness severity within each diagnosis, the results of this system provide a much more homogenous grouping of patients than is provided by the DRGs. Providers can be compared to identify those providers whose practice patterns are of the highest quality and most cost efficient. A set of actual costs incurred can be compared with the estimated costs. After the initial diagnosis, the system determines the expected costs of treating a patient.

[0009] The Schneiderman patent, U.S. Pat. No. 5,099,424, issued in 1992, discloses a model user application system for clinical data processing that tracks and monitors a simulated out-patient medical practice using database management software. The system allows for a database of patients and

the entry of EKG and/or chest x-ray (CXR) test results into separate EKG/CXR records as distinct logical entities. This system requires entry of test results that are not part of the medical claim itself. If not already present, the entry creates a separate lab record that may be holding blood work from the same lab test request. Portions of the information are transferred to the lab record for all request situations. Although the lab record data routine is limited to blood work, each time the routine is run, historical parameter data are sent to a companion lab record along with other data linking both record types. The system also includes a revision of the system's specialist record and the general recommendation from an earlier work for more explicit use in information management.

[0010] The Tawil patent, U.S. Pat. No. 5,225,976, issued in 1993, discloses an automated health benefit processing system. This system minimizes health care costs by informing the purchasers of medical services about market conditions of those medical services. A database includes, for each covered medical procedure in a specific geographic area, a list of capable providers and their charges. A first processor identifies the insured then generates a treatment plan and the required medical procedures. Next, the first processor retrieves information related to the medical procedures and appends the information to the treatment plan. A second processor generates an actual treatment record including the actual charges. A third processor compares the plan and the actual records to determine the amounts payable to the insured and the provider.

[0011] The Ertel patent, U.S. Pat. No. 5,307,262, issued in 1994, discloses a patient data quality review method and system. The system performs data quality checks and generates documents to ensure the best description of a case. The system provides file security and tracks the cases through the entire review process. Patient data and system performance data are aggregated into a common database that interfaces with existing data systems. Data profiles categorize data quality problems by type and source. Problems are classified as to potential consequences. The system stores data, processes it to determine misreporting, classifies the case and displays the case-specific patient data and aggregate patient data.

[0012] The Holloway, et al. patent, U.S. Pat. No. 5,253,164, issued in 1993, discloses a system and method for detecting fraudulent medical claims via examination of service codes. This system interprets medical claims and associated representation according to specific rules and against a predetermined CPT-4 code database. A knowledge base interpreter applies the knowledge base using the rules specified. The database can be updated as new methods of inappropriate coding are discovered. The system recommends appropriate CPT codes or recommends pending the claims until additional information is received. The recommendations are based on the decision rules that physician reviewers have already used on a manual basis.

[0013] The Cummings patent, U.S. Pat. No. 5,301,105, issued in 1994, discloses an all care health management system. The patient-based system includes an integrated interconnection and interaction of essential health care participants to provide patients with complete support. The system includes interactive participation with the patients employers and banks. The system also integrates all aspects of the optimization of health-inducing diet and life style factors and makes customized recommendations for health-enhancing practices. By pre-certifying patients and procedures, the system enhances health care efficiency and reduces overhead costs.

[0014] The Dorne patent, U.S. Pat. No. 5,325,293, issued in 1994, discloses a system and method for correlating medical procedures and medical billing codes. After an examination, the system automatically determines raw codes directly associated with all of the medical procedures performed or planned to be performed with a particular patient. The system allows the physician to modify the procedures after performing the examination. By manipulating the raw codes, the system generates intermediate and billing codes without altering the raw codes.

[0015] The Kessler, et al. patent, U.S. Pat. No. 5,324,077, issued in 1994, discloses a negotiable medical data draft for tracking and evaluating medical treatment. This system gathers medical data from ambulatory visits using a medical data draft completed by the provider to obtain payment for services, to permit quality review by medical insurers. In exchange for immediate partial payment of services, providers are required to enter data summarizing the patient's visit on negotiable medical drafts. The partial payments are incentives to providers for participating in the system.

[0016] The Torma, et al. patent, U.S. Pat. No. 5,365,425, issued in 1994, discloses a method and system for measuring management effectiveness. Quality, cost and access are integrated to provide a holistic description of the effectiveness of care. The system compares general medical treatment databases and surveyed patient perceptions of care. Adjustments based on severity of illness, case weight and military costs are made to the data to ensure that all medical facilities are considered fairly.

[0017] Health Chex's PEER-A-MED computer program is a physician practice profiling system that provides case-mix adjusted physician analysis based on a clinical severity concept. The system employs a multivariate linear regression analysis to appropriately adjust for case-mix. After adjusting for the complexity of the physician's caseload, the system compares the relative performance of a physician to the performance of the peer group as a whole. The system also compares physician utilization performance for uncomplicated, commonly seen diagnosis. Because the full spectrum of clinical care that is rendered to a patient is not represented in its databases, the system is primarily used as an economic performance measurement tool. This system categorizes the claims into general codes including acute, chronic, mental health and pregnancy. Comorbidity and CPT-4 codes adjust for acuity level. The codes are subcategorized into twenty cluster groups based upon the level of severity. The system buckets the codes for the year and contains no apparent episode building methodology. While the PEER-A-MED system contains clinically heterogeneous groupings, the groupings are not episode-based and recurrent episodes cannot be accounted.

[0018] Ambulatory Care Groups (ACG) provides a patient-based system that uses the patient and the analysis unit. Patients are assigned to an diagnosis group and an entire year's claims are bucketed into thirty-one diagnosis groups. By pre-defining the diagnosis groups, this is a bucketing-type system and claim management by medical

episode does not occur. The system determines if a claim is in one of the buckets. Because different diseases could be categorized into the same ACG, this system is not clinically homogeneous. An additional problem with ACGs is that too many diagnosis groups are in each ACG.

[0019] Ambulatory Patient Groups (APGs) are a patient classification system designed to explain the amount and type of resources used in an ambulatory visit. Patients in each APG have similar clinical characteristics and similar resource use and cost. Patient characteristics should relate to a common organ system or etiology. The resources used are constant and predictable across the patients within each APG. This system is an encounter-based system because it looks at only one of the patient's encounters with the health care system. This system mainly analyzes outpatient hospital visits and does not address inpatient services.

[0020] The GMIS system uses a bucketing procedure that profiles by clumps of diagnosis codes including 460 diagnostic episode clusters (DECs). The database is client specific and contains a flexible number and type of analytic data files. This system is episode-based, but it does not account for recurrent episodes, so a patient's complete data history within a one-year period is analyzed as one pseudo-episode. Signs and symptoms do not cluster to the actual disease state, e.g. abdominal pain and appendicitis are grouped in different clusters. This system does not use CPT-4 codes and does not shift the DEC to account for acuity changes during the treatment of a patient.

[0021] Value Health Sciences offers a value profiling system, under the trademark VALUE PROFILER, which utilizes a DB2 mainframe relational database with 1,800 groups. The system uses ICD9 and CPT-4 codes, which are bucket codes. Based on quality and cost-effectiveness of care, the system evaluates all claims data to produce case-mix-adjusted profiles of networks, specialties, providers and episodes of illness. The pseudo-episode building methodology contains clinically pre-defined time periods during which claims for a patient are associated with a particular condition and designated provider. The automated practice review system analyzes health care claims to identify and correct aberrant claims in a pre-payment mode (Value Coder) and to profile practice patterns in a post-payment mode (Value Profiler). This system does not link signs and symptoms and the diagnoses are non-comprehensive because the profiling is based on the exclusion of services. No apparent shifting of episodes occurs and the episodes can only exist for a preset time because the windows are not recurrent.

[0022] The medical claim profiling programs described in foregoing patents and non-patent literature demonstrate that, while conventional computer-implemented health care systems exist, they each suffer from the principal disadvantage of not identifying and grouping medical claims on an episodic basis or shifting episodic groupings based upon complications or co-morbidities. The present computer-implemented health care system contains important improvements and advances upon conventional health care systems by identifying concurrent and recurrent episodes, flagging records, creating new groupings, shifting groupings for changed clinical conditions, selecting the most recent claims, resetting windows, making a determination if the provider is an independent lab and continuing to collect information until an absence of treatment is detected.

SUMMARY OF THE INVENTION

[0023] Accordingly, it is a broad aspect of the present invention to provide a computer-implemented medical claims profiling system.

[0024] It is a further object of the present invention to provide a medical claims profiling system that allows an objective means for measuring and quantifying health care services.

[0025] It is a further object of the present invention to provide a medical claims profiling system that includes a patient classification system based upon episode treatment groups.

[0026] It is a further object of the present invention to provide a medical claims profiling system that groups claims to clinically homogeneous and statistically stable episode treatment groups.

[0027] It is a further object of the present invention to provide a medical claims profiling system that includes claims grouping utilizing service or segment-level claim data as input data.

[0028] It is a further object of the present invention to provide a medical claims profiling system that assigns each claim to an appropriate episode.

[0029] It is a further object of the present invention to provide a medical claims profiling system that identifies concurrent and recurrent episodes.

[0030] It is a further object of the present invention to provide a medical claims profiling system that shifts groupings for changed clinical conditions.

[0031] It is a further object of the present invention to provide a medical claims profiling system that employs a decisional tree to assign claims to the most relevant episode treatment group.

[0032] It is a further object of the present invention to provide a medical claims profiling system that resets windows of time based upon complications, co-morbidities or increased severity of clinical conditions.

[0033] It is a further object of the present invention to provide a health care system that continues to collect claim information and assign claim information to an episode treatment group until an absence of treatment is detected.

[0034] It is a further object of the present invention to provide a health care system that creates orphan records.

[0035] It is a further object of the present invention to provide a health care system that creates phantom records.

[0036] The foregoing objectives are met by the present system that allows an objective means for measuring and quantifying health care services based upon episode treatment groups (ETGs). An episode treatment group (ETG) is a clinically homogenous and statistically stable group of similar illness etiology and therapeutic treatment. ETG grouper method uses service or segment-level claim data as input data and assigns each service to the appropriate episode.

[0037] ETGs gather all in-patient, ambulatory and ancillary claims into mutually exclusive treatment episodes, regardless of treatment duration, then use clinical algorithms

to identify both concurrent and recurrent episodes. ETG grouper method continues to collect information until an absence of treatment is detected for a predetermined period of time commensurate with the episode. For example, a bronchitis episode will have a sixty-day window, while a myocardial infarction may have a one-year window. Subsequent records of the same nature within the window reset the window for an additional period of time until the patient is asymptomatic for the pre-determined time period.

[0038] ETGs can identify a change in the patient's condition and shift the patient's episode from the initially defined ETG to the ETG that includes the change in condition. ETGs identify all providers treating a single illness episode, allowing the user to uncover specific treatment patterns. After adjusting for case-mix, ETGs measure and compare the financial and clinical performance of individual providers or entire networks.

[0039] Medical claim data is input as data records by data entry into a computer storage device, such as a hard disk drive. The inventive medical claims profiling system may reside in any of a number of computer system architectures, i.e., it may be run from a stand-alone computer or exist in a client-server system, for example a local area network (LAN) or wide area network (WAN).

[0040] Once relevant medical claim data is input, claims data is processed by loading the computer program into the computer system memory. During set-up of the program onto the computer system, the computer program will have previously set pointers to the physical location of the data files and look-up tables written to the computer storage device. Upon initialization of the inventive computer program, the user is prompted to enter an identifier for a first patient. The program then checks for open episodes for the identified patient, sets flags to identify the open episodes and closes any episodes based upon a predetermined time duration from date of episode to current date. After all open episodes for a patient are identified, the new claims data records are read to memory and validated for type of provider, CPT code and ICD-9 (dx) code, then identified as a management, surgery, facility, ancillary, drug or other record.

[0041] As used herein, "Management records" are defined as claims that represent a service by a provider engaging in the direct evaluation, management or treatment or a patient. Examples of management records include office visits and therapeutic services. Management records serve as anchor records because they represent focal points in the patient treatment as well as for related ancillary services.

[0042] "Ancillary records" are claims which represent services which are incidental to the direct evaluation, management and treatment of the patient. Examples of ancillary records include X-ray and laboratory tests.

[0043] "Surgery records" are specific surgical claims. Surgery records also serve as anchor records.

[0044] "Facility records" are claims for medical care facility usage. Examples of facility records include hospital room charges or outpatient surgical room charges.

[0045] "Drug records" are specific for pharmaceutical prescription claims.

[0046] "Other records" are those medical claim records which are not management, surgery, ancillary, facility or drug records.

[0047] Invalid records are flagged and logged to an error output file for the user. Valid records are then processed by an ETG Assignor Sub-routine and, based upon diagnosis code, is either matched to existing open episodes for the patient or serve to create new episodes.

[0048] Management and surgery records serve as "anchor records." An "anchor record" is a record which originates a diagnosis or a definitive treatment for a given medical condition. Management and surgery records serve as base reference records for facility, ancillary and drug claim records relating to the diagnosis or treatment which is the subject of the management or surgery record. Only management and surgery records can serve to start a given episode.

[0049] If the record is a management record or a surgery record, the diagnosis code in the claim record is compared with prior related open episodes in an existing look-up table for a possible ETG match. If more than one open episode exists, the program selects the most recent open episode. A positive match signifies that the current episode is related to an existing open episode. After the match is determined, the time window is reset for an additional period of time corresponding to the episode. A loop shifts the originally assigned ETG based on the additional or subsequent diagnoses. If any of the additional or subsequent diagnoses is a defined co-morbidity diagnosis, the patient's co-morbidity file updated. If no match between the first diagnosis code and an open episode is found, a new episode is created.

[0050] Grouping prescription drug records requires two tables, a NDC (National Drug Code) by GDC (Generic Drug Code) table and a GDC by ETG table. Because the NDC table has approximately 200,000 entries, it has been found impracticable to directly construct an NDC by ETG table. For this reason the NDC by GDC table serves as a translation table to translate NDCs to GDCs and construct a smaller table based upon GDCs. Reading, then from these tables, the NDC code in the claim data record is read and translated to a GDC code. The program then identifies all valid ETGs for the GDC codes in the claim data record then matches those valid ETGs with active episodes.

[0051] These and other objects, features and advantages of the present invention will become more apparent to those skilled in the art from the following more detailed description of the non-limiting preferred embodiment of the invention taken with reference to the accompanying Figures.

BRIEF DESCRIPTION OF THE DRAWINGS

[0052] Briefly summarized, a preferred embodiment of the invention is described in conjunction with the illustrative disclosure thereof in the accompanying drawings, in which:

[0053] **FIG. 1** is a diagrammatic representation of a computer system used with the computer-implemented method for analyzing medical claims data in accordance with the present invention.

[0054] **FIG. 2** is a flow diagram illustrating the general functional steps of the computer implemented method for analyzing medical claims data in accordance with the present invention.

[0055] **FIG. 3** is a flow diagram illustrating an Eligible Record Check routine which validates and sorts patient claim data records.

[0056] **FIGS. 4A** to **4F** are flow diagrams illustrating the Management Record Grouping Sub-routine of the ETG Assignor Routine in accordance with the computer-implemented method of the present invention.

[0057] FIGS. **5A-5D** are flow diagrams illustrating a Surgery Record Grouping Sub-routine of the ETG Assignor Routine in accordance with the computer-implemented method of the present invention.

[0058] FIGS. **6A-6E** are flow diagrams illustrating a Facility Record Grouping Sub-routine of the ETG Assignor Routine in accordance with the computer-implemented method of the present invention.

[0059] FIGS. **7A-B** are flow diagrams illustrating an Ancillary Record Grouping Sub-routine of the ETG Assignor Routine in accordance with the computer-implemented method of the present invention.

[0060] FIGS. **8A-8C** are flow diagrams illustrating a Drug Record Grouping Sub-routine of the ETG Assignor Routine in accordance with the computer-implemented method of the present invention.

[0061] **FIG. 9** is a flow diagram illustrating the Episode Definer Routine in accordance with the computer-implemented method of the present invention.

[0062] **FIG. 10** is diagrammatic timeline illustrating a hypothetical patient diagnosis and medical claims history during a one year period and grouping of claim records as management records and ancillary records with cluster groupings.

[0063] **FIG. 11** is a diagrammatic representation of a I-9 Diagnosis Code (dx) X ETG table illustrating predetermined table values called by the Episode Definer Routine of the present invention.

[0064] **FIG. 12** is a diagrammatic representation of an I-9 Diagnosis Code 9 (dx) X CPT Code table illustrating predetermined table values called by the Episode Definer Routine of the present invention.

[0065] **FIG. 13** is a diagrammatic representation of a National Drug Code (NDC) to Generic Drug Code (GDC) conversion table illustrating predetermined Generic Drug Code values called by the Drug Record Grouping Sub-routine of the Episode Definer Routine of the present invention.

[0066] **FIG. 14** is a diagrammatic representation of a Generic Drug Code (GDC) to Episode Treatment Group (ETG) table illustrating predetermined table values called by the Drug Record Grouping Sub-routine of the Episode Definer Routine of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0067] Referring particularly to the accompanying drawings, the basic structural elements of a health care management system of the present invention are shown. Health care management system consists generally of a computer system **10**. Computer system **10** is capable of running a computer program **12** that incorporates the inventive method is shown in **FIG. 1**. The computer system **10** includes a central processing unit (CPU) **14** connected to a keyboard 16 which allows the user to input commands and data into the CPU **14**. It will be understood by those skilled in the art that CPU **14** includes a microprocessor, random access memory (RAM), video display controller boards and at least one storage means, such as a hard disk drive or CD-ROM. The computer system **10** also contains a video display **18** which displays video images to a person using the computer system **10**. The video display screen **18** is capable of displaying video output in the form of text or other video images.

[0068] Episode Treatment Groups (ETGs) are used to define the basic analytical unit in the computer-implemented method of the present invention. ETGs are episode based and conceptually similar to Diagnostic Related Groups (DRGs), with a principal difference being that DRGs are inpatient only. ETGs encompass both inpatient and outpatient treatment.

[0069] Using ETGs as the basic episodic definer permits the present invention to track concurrently and recurrently occurring illnesses and correctly identify and assign each service event to the appropriate episode. Additionally, ETGs account for changes in a patient's condition during a course of treatment by shifting from the initially defined ETG to one which includes the changed condition once the changed condition is identified.

[0070] The inventive medical claims profiling system defines Episode Treatment Groups (ETGs). The number of ETGs may vary, depending upon the definitional specificity the health care management organization desires. Presently, the inventive system defines 558 ETGs, which are assigned ETG Numbers 1-900 distributed across the following medical areas: Infectious Diseases, Endocrinology, Hematology, Psychiatry, Chemical Dependency, Neurology, Ophthalmology, Cardiology, Otolaryngology, Pulmonology, Gastroenterology, Hepatology, Nephrology, Obstetrics, Gynecology, Dermatology, Orthopedics and Rheumatology, Neonatology, Preventative and Administrative and Signs and Isolated Signs, Symptoms and Non-Specific Diagnoses or Conditions. Under the presently existing system, ETG **900** is reserved to "Isolated Signs, Symptoms and Non-Specific Diagnoses or Conditions," and is an ETG designation used where the diagnosis code is incapable of being assigned to another ETG. A listing of exemplary ETGs for typical episodes is found at Table 1, below. Those skilled in the art will understand, however, that the number of ETGs may change, the ETG numbering system is variable, the ETG classifications may be defined with relatively broader or narrower degrees of specificity and the range of medical specialties may be greater or fewer, as required may be require by the management organization in their medical claims data analysis protocols.

[0071] An episode may be considered a low outlier or high outlier. Low outliers are episodes with dollar values below the minimum amount which is specific to each ETG. Examples of low outliers include patients which drop from a plan during mid-episode and patients who use out-of-network providers and do not submit claims. High outliers are those episodes with high dollar values greater than the 75th percentile plus 2.5 times the interquartile range, based upon a predefined database. The low and high outlier points

are pre-determined and hard-coded into the inventive system and will vary across analysis periods.

[0072] If no ICD-9 (diagnosis code) on a given record matches the CPT-4 code, i.e., a diagnosis of bronchitis and a CPT of knee x-ray, an invalid code segment results. The inventive system outputs invalid records and discontinues the processing of these records. An invalid ICD-9 code is assigned to ETG **997**, an invalid CPT-4 code is assigned to ETG **996** and an invalid provider type is assigned to ETG **995**. A sequential anchor count and a sequential episode count are incremented after each ETG assignment. Active open and closed ETG files include ETG number, sequential episode number, most recent anchor from date of service and most recent sequential anchor record count. An alternative embodiment creates a single record for each individual episode containing ETG number, patient age, patient sex, episode number, total charges, total payments, earlier anchor record, last anchor record, whether the episode was closed ("clean finish"), number of days between database start date and earliest anchor record, whether a number of days between database start date and earliest anchor record exceeds the ETG's days interval, patient identification, physician identification, management charges, management paid, surgery charges, surgery paid, ancillary charges and ancillary paid.

[0073] The inventive system uses clinical algorithms to identify both concurrent and recurrent episodes. Subsequent episodes of the same nature within a window reset the window for an additional period of time until the patient is asymptomatic for a pre-determined time period. If an ETG matches a prior ETG, a recurrent ETG is created and the window is reset. The most recent claim is selected if more than one matched claim exists. If the ETG does not match an active ETG, a new concurrent ETG is created.

[0074] Comorbidities, complications or a defining surgery could require an update of the patient's condition to an ETG requiring a more aggressive treatment profile. ETG's changes in the patient's clinical condition and shift the patient's episode from the initially defined ETG to an ETG which includes the change in clinical condition.

[0075] If the claim is an ancillary record and it does not match an active ETG it is designated an "orphan" ancillary record.

[0076] Termination of an episode is detected by an absence of treatment for a period of time commensurate with the episode.

[0077] If the claim is a prescription drug record, two pre-defined tables written to the computer data storage medium, are read. The first of the tables is a National Drug Code (NDC) by Generic Drug Code (GDC) table. The GDC code is equivalent to the Generic Drug Code table known in the art. This table acts as a translator table to translate a large number of NDCs to a smaller set of GCNs. A second pre-defined table is employed and is constructed as a GDC by ETG table. The GDC by ETG table is used, in conjunction with the NDC by GDC translator table, to identify all valid ETGs for a particular NDC code in the claim record.

[0078] To determine specific treatment patterns and performance contributions, the computer-implemented method identifies all providers treating a single illness episode. If a network of providers contains Primary Care Physicians (PCP), the ETGs clearly identify each treatment episode by PCP. Financial and clinical performance of individual providers or entire networks may be monitored and analyzed. To monitor health care cost management abilities of providers, components of a provider's treatment plan may be analyzed by uncovering casemix-adjusted differences in direct patient management, the use of surgery and the prescribing of ancillary services. By identifying excessive utilization and cost areas, continuous quality improvement protocols are readily engineered based on internally or externally derived benchmarks. After adjusting for location and using geographically derived normative charge information, ETG-based analysis compares the cost performance of providers or entire networks. By using geographically derived utilization norms, the present invention forms the methodology base for measuring both prevalence and incidence rates among a given population by quantifying health care demand in one population and comparing it to external utilization norms. This comparison helps to identify health care providers who practice outside established utilization or cost norms.

[0079] Turning now to **FIG. 2**, there is illustrated the general operation of the computer-implemented method of the present invention. Those skilled in the art will understand that the present invention is first read from a removable, transportable recordable medium, such as a floppy disk, magnetic tape or a CD-ROM onto a recordable, read-write medium, such as a hard disk drive, resident in the CPU **14**. Upon a user's entry of appropriate initialization commands entered via the keyboard **16**, or other input device, such as a mouse or trackball device, computer object code is read from the hard disk drive into the memory of the CPU **14** and the computer-implemented method is initiated. The computer-implemented method prompts the user by displaying appropriate prompts on display **18**, for data input by the user.

[0080] Those familiar with medical claims information processing will understand that medical claims information is typically received by a management service organization on paper forms. If this is the case, a user first manually sorts claim records by patient, then input patient data through interfacing with the CPU **14** through the keyboard **16** or other input device.

[0081] Prior to being submitted to the grouping algorithm, records must be sorted by patient by chronological date of service. An Eligible Record Check routine **48** to verify the validity and completeness of the input data. As each record is read by the software, it first checks the date of service on the record and compares it to the last service date of all active episodes to evaluate which episodes have expired in terms of an absence of treatment. These episodes are closed at step **50**. Next the record is identified as either a management **52**, surgery **54**, facility **56**, ancillary **58** or drug **60** record. These types of records are categorized as follows:

[0082] "Management records" are defined as claims which represent a service by a provider engaging in the direct evaluation, management or treatment or a patient. Examples of management records include office visits, surgeries and therapeutic services. Management records serve as anchor records because they represent focal points in the patient treatment as well as for related ancillary services.

[0083] "Ancillary records" are claims which represent services which are incidental to the direct evaluation, man-

agement and treatment of the patient. Examples of ancillary records include X-ray and laboratory tests.

[0084] "Surgery records" represent surgical procedures performed by physicians and other like medical allied personnel. Like management records, surgery records also serve as anchor records.

[0085] "Facility records" are claims for medical care facility usage. Examples of facility records include hospital room charges or ambulatory surgery room charges.

[0086] "Drug records" are specific for pharmaceutical prescription claims.

[0087] A "cluster" is a grouping of one, and only one, anchor record, management or surgery, and possibly ancillary, facility and/or drug records. A cluster represents a group of services in which the focal point, and therefore the responsible medical personnel, is the anchor record. An episode is made up of one or more clusters.

[0088] After the management, surgery, facility, ancillary and drug records are identified at steps **52**, **54**, **56**, **58** and **60**, respectively, an ETG Assignor Sub-routine is executed at step **62**. The ETG Assignor Sub-routine **62** assigns patient medical claims to ETGs based one or more cluster of services related to the same episode, and provides for ETG shifting upon encountering a diagnosis code or CPT code which alters the relationship between the diagnosis or treatment coded in the claim record and an existing ETG assignment. For example, ETG's may be shifted to account for changes in clinical severity, for a more aggressive ETG treatment profile if a complication or comorbidity is encountered during the course of treatment for a given ETG or where a defining surgery is encountered during the course of treatment for a given ETG.

[0089] When the last claim data record for a given patient is processed by the ETG Assignor Routine **62**, the Episode Definer Routine is executed at step **64**. Episode Definer Routine **64** identifies all open and closed ETG episodes for the patient and appropriately shifts any episodes to a different ETG if such ETG is defined by age and/or the presence or absence of a co-morbidity. The patient records are then output to a file with each record containing the ETG number, a sequential episode number, and a sequential cluster number. Upon input of an identifier for the next patient, the processing of medical claims for the next patient is initiated at step **66** by looping back to check for eligible records for the new patient at step **48**.

[0090] Operation of the Eligible Record Check routine **100** is illustrated in **FIG. 3**. The patient records input by the user are read from the recordable read-write data storage medium into the CPU **14** memory in step **102**. From the patient records read to memory in step **102**, a record validation step **104** is carried out to check provider type, treatment code and diagnosis code against pre-determined CPT code and diagnosis code look up tables. The diagnosis code is preferably the industry standard ICD-9 code and the treatment code is preferably the industry standard CPT-4 code. All valid patient records are assigned as one of a) management record, b) ancillary record, c) surgery record, d) facility record, e) drug record or f) other record, and coded as follows:

[0091] m=management record;

[0092] a=ancillary record;

[0093] s=surgery record;

[0094] f=facility record;

[0095] d=drug record; or

[0096] o=other record.

[0097] A sort of valid records **106** and invalid records **108** from step **104** is made. For valid records **106** in step **110**, patient age is then read to memory from the first patient record from step **106**. All valid records are then sorted by record type in step **112**, i.e., record type m, a, s, f, d or o by a date of service from date (DOS-from). A sort index of all record-type sorted records from step **116** is generated and written to the hard disk, and the ETG Assignor routine **120** is initialized.

[0098] For invalid records **108** identified at step **104**, the records are assigned ETG designations reserved for records having invalid provider data, invalid treatment code, or invalid diagnosis code, e.g., ETG **995**, **996** and **997**, respectively, at step **111**. An error log file is output identifying the invalid records by reserved ETG and written to disk or displayed for the user and processing of the invalid records terminates at step **113**.

[0099] The computer-implemented method of the present invention then initializes an Episode Assignor Routine **200**, the operation of which is illustrated in FIGS. **4**A-**8**C. Episode Assignor Routine **200** consists generally of five Sub-routine modules for processing management records, surgery records, facility records, ancillary records and drug records and assigning claims to proper ETGs. FIGS. **4**A-**4**F illustrate initial identification of records as management, surgery, facility ancillary and drug records and the Management Record Grouping Sub-Routine. FIGS. **5**A-**5**E illustrate operation of the Surgery Record Grouping routine **400** for matching surgery claim records to proper ETGs. FIGS. **6**A-**6**E illustrate operation of the Facility Record Grouping routine **500** for matching facilities records to proper ETGs. FIGS. **7**A-**7** illustrate operation of the Ancillary Record Grouping routine **600** for matching ancillary records to proper ETGs. Finally, FIGS. **8**A-**8**C illustrate operation of the Drug Records Grouping routine **700** for matching drug records to proper ETGs.

[0100] Management Records

[0101] The Episode Assignor routine begins by executing a Management Records Grouping Sub-routine **200**, illustrated in FIGS. **4**A-**4**F, first reads the input claim record for a given patient in step **202**. The first processing of the input claim record entails categorizing the record as a management, surgery, facility, ancillary or drug record at step **204**. A series of logical operands **208**, **210**, **212** and **214**, read the record and determine whether the record is a management record at step **204**, a surgery record at step **208**, a facility record at step **210**, an ancillary record at step **212** or a drug record at step **214**. If an affirmative response is returned in response to logical operand **204**, grouping of the management record to an ETG is initialized and processing of the management record proceeds to step **215**. If, however, a negative response is returned in response to the logical operand **206**, logical operand **208** is executed to determine whether the record is a surgery record. If an affirmative response is returned from logical operand **208**, the Surgery

Record Grouping routine **400** is initialized. If, however, a negative response to logical operand **208** is returned, logical operand **210** is executed to determine whether the record is a facility record. If an affirmative response is returned in response to logical operand **210**, the Facility Record Grouping Sub-routine **500** is executed. If, however, a negative response is returned in response to the logical operand **210**, logical operand **212** is executed to determine whether the record is an ancillary record. If an affirmative response is returned from logical operand **212**, the Ancillary Record Grouping Sub-routine **600** is executed. If, however, a negative response to logical operand **212** is returned, logical operand **214** is executed to determine whether the record is a facility record. At this point all records except drug records have been selected. Thus, all the remaining records are drug records and the Drug Record Grouping Sub-routine **700** is executed.

[**0102**] Returning now to the initialization of the Management Record Grouping routine **200**, and in particular to step **215**. Once the record has been categorized as a management record in step **206**, the DOS-to value is compared to active episodes for the patient to determine if any active episodes should be closed. Closed episodes are moved to an archive created on the storage means, such as a hard disk or CD-ROM.

[**0103**] The management record is examined and the first diagnosis code on record is read, a diagnosis code (dx) by ETG table **201** is read from the storage means and all valid ETGs for the first diagnosis code on record are identified at step **216**. The dx by ETG table **201** consists of a table matrix having diagnosis codes on a first table axis and ETG numbers on a second table axis. At intersection cells of the dx by ETG table are provided table values which serve as operational flags for the inventive method. In accordance with the preferred embodiment of the invention, dx by ETG table values are assigned as follows:

[**0104**] P=primary, with only one P value existing per ETG;

[**0105**] S=shift;

[**0106**] I=incidental;

[**0107**] A=shift to ETG with C value; and

[**0108**] C=P, where P' is a shiftable primary value.

[**0109**] An illustrative example of a section of a dx by ETG table is found at **FIG. 11**.

[**0110**] ETG validation in step **216** occurs where for a given diagnosis code on record, the code has either a P, S, I, A or C dx-ETG table value. The ETGs identified as valid for the first diagnosis code on record in step **216**, are then matched with active open ETGs in step **217** by comparing the valid ETGs with the open ETGs identified in step **215**. A logical operand is then executed at step **218** to determine whether a match exists between the valid ETG from the management record and any open ETGs. A negative response at step **218** causes execution of another logical operand at step **220** to determine whether for the first diagnosis code is the P value in the dx-ETG table equal to the ETG for non-specific diagnosis, i.e., ETG **900**. If an affirmative response is returned at step **216**, ETG identifiers for the second to the fourth diagnosis codes in the management record are established from the dx-ETG table and the ETG identifier value is matched to active specific ETGs in step **222** and execution of the program continues as represented by designator AA **236** bridging to **FIG. 5B**. If, however, a negative response is returned from logical operand **220**, a value of one is added to the management record or anchor count and to the episode count and the ETG with a P value on the dx-ETG table is selected and a new episode is initialized. Further processing of the new episode by the program continues as represented by designator F **236** bridging to **FIG. 5C**.

[**0111**] If an affirmative response is returned at logical operand step **218**, the matched active ETG with the most recent DOS-to are selected at step **230**. If a tie is found based upon most recent DOS-to values, then the most recent DOS-from value is selected for matching with active ETGs. If a tie is found at most recent DOS-from values is found, the first encountered ETG is selected and matched. A value of one is then added to the management record or anchor record counter at step **232** and further processing continues as represented by designator G **238** bridging to **FIG. 5C**.

[**0112**] Turning now to **FIG. 4**B, which is a continuation from designator AA **236** of **FIG. 4**A, identifier ETGs for the second to fourth diagnoses in the management record are matched to active ETGs in logical operand **237**. If an affirmative response is returned in response to logical operand **237**, the matched active ETG with the most recent DOS-to is selected in step **240**. If there is a tie between two or more ETGs with the most recent DOS-to value, the most recent DOS-from ETG is selected. If, however, there is a tie between two or more active ETGs with the most recent DOS-from value, then the first encountered ETG is selected in step **240**. A value of one is then added to the sequential anchor record counter in step **241** and operation of the computer-implemented method continues as indicated by designator G **243** bridging to **FIG. 5C**.

[**0113**] From logical step **237**, if a negative response is returned, the ETG with the second diagnosis value of P is selected at step **242**, then a logical query is made to determine whether the selected ETG is a non-specific ETG, i.e., ETG **900** at step **244**. A negative response to logical query **244** causes a value of one to be added to the sequential anchor count and to the sequential episode count at step **254**. If an affirmative response to logical query **244** is returned, logical queries **246** and **248** are sequentially executed to select ETGs with the third and fourth diagnosis values of P from the dx-ETG table written on the storage means, respectively, and logical query **244** is executed to determine whether the selected ETG is the non-specific ETG, i.e., ETG **900**. If a negative response is returned to logical query **244** for the ETG selected in step **248**, a value of one is added to the sequential anchor count and to the sequential episode count in step **254**. If an affirmative response is returned from logical query **244**, a value of one is added to the sequential anchor count and the sequential episode count at step **250**.

[**0114**] From step **250**, the non-specific ETG, i.e., ETG **900** is selected and a new episode is started in the active ETG file. The updated sequential episode number, the updated sequential anchor count, the DOS-from and the DOS-to from the record are written to the new episode in the active ETG file in step **252**.

[**0115**] From step **254**, the ETG with a dx-ETG table value of P is selected and a new episode is started in the active

ETG file. The updated sequential episode number, the updated sequential anchor count, the DOS-from and the DOS-to from the record are written to the new episode in the active ETG file in step **256**. A comorbidity file written on the storage means is then updated with all the dx codes in the management record in step **258**.

[**0116**] From each of steps **252** and steps **258** a check is made to determine whether the processed management record is the last record for the patient at logical step **260**. An affirmative response returned to logical step **260** prompts the program operation to the Episode Definer Sub-routine **264**, bridging to **FIG. 9** with identifier GG, while a negative response to logical step **260** returns program operation to the beginning of the ETG Assignor routine **200** and the next patient record is read at step **262**.

[**0117**] Turning now to **FIG. 4**C, the bridge reference G **238** is continued from **FIG. 4A**. For those records having a match with an open ETG, a query is made at step **270** of the dx-ETG table **201** to determine the table value of the dx code for the selected ETG. Again, valid table values are one of P, S, I, A, or C. If the table value returned from step **270** is A, the selected ETG in the active file is changed at step **272** to the ETG number having an equivalent table value of C for the diagnosis on record. If the table value returned from step **270** is S, the selected ETG in the active file is shifted at step **274** to an ETG value having a table value of P for the diagnosis code on record. If the table value is one of P, I or C, the ETG remains the same and the selected active ETG's most recent DOS-to is updated by writing the record date to the ETG DOS-to field, and the sequential anchor count in the selected active ETG is updated to reflect writing of the record to the ETG at step **276**.

[**0118**] At step **278**, the record is then written with a sequential episode number and the sequential anchor count of the selected ETG from the selected active ETG. In this manner, the record is identified with the ETG and the specific episode. The patient's co-morbidity file is flagged with the output read from bridge designator F at step **234**. A patient's comorbidity file is a predefined list of diagnoses which have been identified as comorbidities. If during the course of grouping a patient's records, a management record is encountered which is a comorbidity diagnosis, the ETG for that diagnosis is flagged or "turned on" in the comorbidity file. Then, during the execution of the Episode Definer Routine, all the patient's episodes with an ETG which can shift based on the presence of a comorbidity and which are "turned on" are appropriately shifted to the ETG "with comorbidity".

[**0119**] A loop beginning at step **282** is then executed to determine whether the ETG assigned by the first diagnosis code should be shifted to another ETG based upon the second, third and fourth diagnoses on record. At step **282**, the second diagnosis is read from the patient's claim record and all valid ETGs for the second diagnosis are read from the dx-ETG table **201**. A logical operand **284** is executed to determine whether one of the valid ETGs for the second diagnosis matches the primary diagnosis ETG. If a negative response is returned to logical operand **284**, a loop back at step **285** is executed to step **282** for the next sequential diagnosis code on record, i.e., the third and forth diagnosis codes on record. If an affirmative response is returned to the logical operand **284**, the a logical operand **286** queries the table value of the matched ETG to determine if a value of A is returned from the dx-ETG table. If a negative response is returned, the loop back step **285** is initialized. If an affirmative response is returned, the first dx ETG is flagged for change to a second dx ETG having an equivalent table value of C for the second diagnosis code on record at step **288** and all valid ETGs for the current diagnosis code on record are identified at step **290** from the dx-ETG table. The identified C-value ETG is then matched with any open active ETGs at step **292**. Program operation then continues at bridge H **292** to **FIG. 4D**.

[**0120**] At **FIG. 4D** the continued operation of the Management Grouping Sub-routine from bridge H **292** of **FIG. 4C**. Logical operand **296** queries the open active ETGs to determine whether a valid match with the identified C-value ETG exists. If a negative response is returned to logical operand **296**, a value of 1 is added to the sequential episode count at step **297** and a new episode having a P value ETG is started in the patient's master active ETG file at step **299**. The new episode is written with a sequential episode number, DOS-from and DOS-to values and forms a phantom management record. A phantom record is an anchor record, management or surgery, with more than one diagnosis, which is assigned to one episode and its corresponding ETG based on one diagnosis, but can start a new episode(s) or update the most recent date of another active episode(s) based on other diagnoses on the record.

[**0121**] If an affirmative response is returned from logical operand **296**, the matched active ETG with the most recent DOS-to value is selected at step **298**. If a tie is found based upon most recent DOS-to values, then the most recent DOS-from value is selected for matching with active ETGs. If a tie is found at most recent DOS-from values is found, the first encountered ETG is selected and matched. The selected ETG's most recent DOS-to and sequential anchor count are updated in the patient's master active ETG file in step **300**.

[**0122**] For either the new episode created at step **299** or the updated ETG from step **300**, the patient's co-morbidity file is then updated with the second diagnosis code on-record at step **302**. Processing then continues to identify all valid ETGs for a third diagnosis code on record at step **304** and the identified valid ETGs from step **304** are compared to the active ETGs in the patient's master active ETG file in step **306**.

[**0123**] Bridge I **308** continues to **FIG. 4**E, and a logical operand **310** is executed to query the patient's master active ETG file to determine whether a match exists between the valid ETGs identified in step **304** with any active ETG from the patients master active ETG file. If a negative response is returned to logical operand **310**, a value of 1 is added to the sequential episode count at step **311** and a new episode having a P value ETG is started in the patient's master active ETG file at step **313**. The new episode is written with a sequential episode number, DOS-from and DOS-to values and forms a phantom management record.

[**0124**] If an affirmative response is returned from logical operand **310**, the matched active ETG with the most recent DOS-to value is selected at step **312**. Again a decisional hierarchy is executed. If a tie is found based upon most recent DOS-to values, then the most recent DOS-from value is selected for matching with active ETGs. If a tie is found at most recent DOS-from values is found, the first encoun-

tered ETG is selected and matched. The selected ETG's most recent DOS-to and sequential anchor count are updated in the patient's master active ETG file in step **314**.

[**0125**] For either the new episode created at step **311** or the updated ETG from step **314**, the patient's co-morbidity file is then updated with the third diagnosis code on-record at step **316**. Processing then continues to identify all valid ETGs for a fourth diagnosis code on record at step **318** and the identified valid ETGs from step **3318** are compared to the active ETGs in the patient's master active ETG file in step **320**. Bridge reference I **322**, bridges to **FIG. 4F**.

[**0126**] Turning to **FIG. 4F, a** logical operand **324** is executed to query the patient's master active ETG file to determine whether a match exists between the valid ETGs identified in step **320** with any active ETG from the patients master active ETG file. If a negative response is returned to logical operand **324**, a value of 1 is added to the sequential episode count at step **325** and a new episode having a P value ETG is started in the patient's master active ETG file at step **337**. The new episode is written with a sequential episode number, DOS-from and DOS-to values and forms a phantom management record.

[**0127**] If an affirmative response is returned from logical operand **324**, the matched active ETG with the most recent DOS-to value is selected at step **326**. Again a decisional hierarchy is executed. If a tie is found based upon most recent DOS-to values, then the most recent DOS-from value is selected for matching with active ETGs. If a tie is found at most recent DOS-from values is found, the first encountered ETG is selected and matched. The selected ETG's most recent DOS-to and sequential anchor count are updated in the patient's master active ETG file in step **328**.

[**0128**] For either the new episode created at step **337** or the updated ETG from step **324**, the patient's co-morbidity file is then updated with the fourth diagnosis code on-record at step **330**. A check is then made to determine whether the processed record is the last record for the patient by execution of logical operand **332** and reading the input claim records from the storage means. If logical operand **332** returns an affirmative value, the ETG Definer Sub-routine is called at step **334**, as represented by bridge reference GG. If, however, a negative response is returned to logical operand **332**, program execution returns to the step **204** of the Episode Assignor routine **200** and the next patient claim record is read from the storage means.

[**0129**] Surgery Records

[**0130**] Grouping of Surgery Records to ETGs is governed by the Surgery Record Grouping Sub-routine **400**, the operation of which is illustrated in FIGS. **5**A-**5**D.

[**0131**] For those patient claim records identified as Surgery Records at step **208**, the DOS-from value on-record is compared with the DOS-to value read from the patient master active ETG file at step **402**. This identifies and flags those active ETGs which are to be closed, the flagged ETGs are then moved to the patient master closed ETG file. The first diagnosis code on-record is then read and compared to the dx-ETG table **201** to identify all possible valid ETGs for the first diagnosis code on-record in step **404**.

[**0132**] Surgery records are coded with treatment codes (CPT codes). Each surgery record has a single CPT code value. The CPT code on-record is then read, and compared to a CPT by ETG table **401** previously written to the storage means. The CPT-ETG table will have pre-determined table values. For example, in accordance with the preferred embodiment of the invention, the CPT-ETG table **401** has table values of R, W and X, where R is a value shiftable to W and X is a validator value. All valid ETGs for the on-record CPT code are identified by this comparison at step **406**. A logical operand **408** is then executed to determine whether there is a match of valid ETGs returned from the dx-ETG table **201** and the CPT-ETG table **401**. If an affirmative response is returned to logical operand **408**, a second logical operand **410** is executed to determine whether a match of valid specific ETGs exists. Again, if an affirmative response is returned from second logical operand **410**, the valid specific ETGs matched in step **410** are then compared at step **414** with the open active ETGs for the patient read from the patient's master active ETG file at step **412**. If an affirmative response is returned from step **414**, the matched ETG with the most recent DOS-to is selected at step **416** and a value of 1 is added to the sequential anchor count in the selected ETG at step **418**. In step **416**, if a tie is found based upon most recent DOS-to values, then a decisional hierarchy is followed to select the most recent DOS-from value for matching with active ETGs. If a tie is found at most recent DOS-from values is found, the first encountered ETG is selected and matched.

[**0133**] If a negative response is returned to any of logical operands **408**, **410** or **414**, second, third and fourth dx codes on-record are read and all possible valid ETGs are read in step **411** from the dx-ETG table **201**. Further processing of the valid ETGs output from step **411** is continued at **FIG. 5B** identified by bridge reference P, **413**.

[**0134**] Turning to **FIG. 5B, a** logical operand **415** compares the valid ETGs for the second, third and fourth dx codes with the valid ETGs for the CPT code on-record in step **411**. If a negative response is returned from logical operand **415**, the patient claim record is assigned to an ETG reserved for match errors between dx code and CPT code, e.g., ETG **998**, and further processing of the match error ETG bridges at reference R, **431**, to **FIG. 5D**.

[**0135**] If an affirmative response is returned from logical operand **415**, the matched ETGs are compared with active ETGs read from the patient master active ETG file at step **417** and logical operand **419** is executed at step **419** to determine whether any valid matches between matched ETGs and active ETGs. If a negative response is returned to logical operand **419**, a value of 1 is added to the sequential anchor count and to the sequential episode count at step **425** and a new episode is started at step **437** with the first dx code on-record having a P value for a specific ETG in the dx-ETG table **201**. If no specific ETG has a P value, a non-specific ETG having a P value for the dx code on record is used to start the new episode. The new episode is started by writing the sequential episode number, the sequential anchor count, the DOS-from and the DOS-to values on the record.

[**0136**] If an affirmative response is returned from logical operand **419**, the matched specific ETG with the most recent DOS-to is selected at step **421**. If a tie is found based upon most recent DOS-to values, then the most recent DOS-from value is selected for matching with active ETGs. If a tie is found at most recent DOS-from values is found, the first

encountered ETG is selected and matched. A value of 1 is added to the sequential anchor count at step **423**. Processing the new episode started at step **427** or of the selected matched specific ETG at step **421** continues to bridge Q, **420**, continued at **FIG. 5C**.

[**0137**] Turning to **FIG. 5**C, bridged from reference Q, **420**, logical operand **422** is executed which reads the CPT-ETG table **401** and determines the table value of the selected ETG from step **421** and step **427** based on the CPT value on-record. If a table value of R is returned from the read of the CPT-ETG table **401** at step **422**, the matched ETG in the master active ETG file is shifted at step **424** to the ETG with an equivalent value of W for the CPT code on-record. If a table value of X or W is returned from step **422** or from step **242**, the dx-ETG table **201** is read at step **426** and the dx code for the selected matched ETG from the CPT-ETG table **401** or the shifted ETG from step **424** is read. From the dx-ETG table **201**, if a value of S is returned, the matched ETG in the patient master active ETG file is shifted at step **428** to the ETG with a table value of P for the dx code on-record. If a table value of A is returned, the matched ETG in the patient master active ETG file is changed in step **430** to an equivalent value of C for the dx code on-record. If a table value of P, I or C is returned either from logical operand **426**, or from the ETG change step **428** or the ETG shift step **430**, the DOS-to and the sequential anchor count of the ETG in the patient master active ETG file are updated in step **432**. The patient claim record is then assigned and written with the sequential episode number and the sequential anchor count of the selected ETG at step **434**. The patient co-morbidity file is then updated with all diagnosis codes on-record at step **436**.

[**0138**] **FIG. 5D** bridges from **FIG. 5C** with bridge reference BB, **438**. In **FIG. 5**D, the diagnosis codes on-record which were not used in the ETG selection described above, are then read from the patient claim record to identify all possible valid ETGs in the dx-ETG table **201**. The identified possible valid ETGs are then matched against the patient master active ETG file in step **442** and logical operand **444** is executed to validate the matches. If an affirmative response is returned to logical operand **444**, for each matched dx code on-record, the matched active ETG with the most recent DOS-to is selected at step **446**. If a tie is found based upon most recent DOS-to values, then the most recent DOS-from value is selected for matching with active ETGs. If a tie is found at most recent DOS-from values is found, the first encountered ETG is selected and matched. The selected ETG's most recent DOS-to value is updated to the date of the patient medical claim, and the sequential anchor count in the active ETG is updated in step **448**.

[**0139**] If a negative response is returned to logical operand **444**, a value of 1 is added to sequential episode count at step **456** and a new episode having a P value ETG is started in the patient's master active ETG file at step **458**. The new episode is written with a sequential episode number, DOS-from and DOS-to values and forms a phantom surgery record. If an affirmative response is returned to logical operand **444**, the matched active ETG for each diagnosis code is selected at step **446** on the basis of the most recent DOS-to value. If a tie is found based upon most recent DOS-to values, then the most recent DOS-from value is selected for matching with active ETGs. If a tie is found at most recent DOS-from values is found, the first encountered ETG is selected and matched. The DOS-to field of the selected ETG from step **446** is updated in step **448** to the date of service on-record and the sequential anchor count in the active ETG file is updated. From either step **458** or from step **448**, the patient co-morbidity file is updated to reference the selected ETG and a check is made to determine whether the patient claim record processed in step **429**, which assigned an invalid dx-CPT code match to the record, or from step **450**, which updated the co-morbidity file, is the last record for the patient at logical operand **462**. If an affirmative response is returned to logical operand **462**, record processing proceeds to the Episode Definer Sub-routine at step **464**, bridged by reference GG, to **FIG. 9**. If, however, a negative response is returned to logical operand **462**, a loop back **468** to the beginning of the ETG Assigner routine **200** is executed and the next patient claim record is read.

[**0140**] Facility Records

[**0141**] The Facility Record Grouping Sub-routine **500** assigns facility records to ETGs on the basis of diagnosis codes on-record. The patient claim record is read and the first diagnosis code on-record is read to the dx-ETG table **201** to identify all valid ETGs for the first dx code at step **502**. The identified valid ETGs are then compared to the open active ETGs in the patient master active ETG file in step **504**. Logical operand **506** executes to determine whether any valid matches exist between identified ETGs for the dx code and the active ETGs for the patient. If a negative response is returned to step **506**, a value of 1 is added to the sequential episode count at step **507** and a new episode is started in step **509** in the patient active ETG file with the ETG corresponding to the dx-ETG table value of P. If logical operand **507** returns an affirmative response, a query of the matched ETG value is made at step **508** to determine whether the matched ETG has a table value of P, C, A or S. If a negative response is returned to step **508**, the matched active ETG with the most recent DOS-from value is selected at step **511**. If a tie is found based upon most recent DOS-to values, then the most recent DOS-from value is selected for matching with active ETGs. If a tie is found at most recent DOS-from values is found, the first encountered ETG is selected and matched. If an affirmative response is returned at step **508**, the table value of the matched ETG table value is identified at step **510**. If the table value for the matched ETG in the dx-ETG table **201** is S, the matched ETG is shifted at step **514** to the ETG having a table value of P for the dx code. If the table value for the matched ETG returns a value of A, the matched ETG in the patient master active ETG file is changed at step **512** to an ETG having an equivalent table value of C for the dx code. If a table value of either P or C is returned at step **510**, the most recent DOS-to is updated at step **516** in the ETG to the on-record claim date. Further processing of the claim record from steps **509**, **511** and **516** bridges at reference **1**, **520**, to **FIG. 6B**.

[**0142**] Turning to **FIG. 6**B, bridged from reference **1**, **520**, in **FIG. 6**A, the patient's co-morbidity file is updated with the first dx code at step **522**. A loop beginning at step **524** is then executed to determine whether the ETG assigned by the first diagnosis code should be shifted to another ETG based upon the second, third and fourth diagnoses on record. At step **524**, the second diagnosis is read from the patient's claim record and all valid ETGs for the second diagnosis are read from the dx-ETG table **201**. A logical operand **526** is

executed to determine whether one of the valid ETGs for the second diagnosis matches the primary diagnosis ETG. If a negative response is returned to logical operand **526**, a loop back at step **527** is executed to step **524** for the next sequential diagnosis code on record, i.e., the third and forth diagnosis codes on record. If an affirmative response is returned to the logical operand **524**, the logical operand **528** queries the table value of the matched ETG to determine if a value of A is returned from the dx-ETG table. If a negative response is returned, the loop back step **527** is initialized. If an affirmative response is returned, the first dx ETG is flagged for change to a second dx ETG having an equivalent table value of C for the second diagnosis code on record at step **530**. All valid ETGs for the second diagnosis code on record are identified at step **532** from the dx-ETG table. The identified ETGs are then matched with any open active ETGs at step **532**. Program operation then continues at bridge **2**, **536** to **FIG. 6C**.

[**0143**] At **FIG. 6C** the continued operation of the Facility Record Grouping Sub-routine **500** from bridge **2** of **FIG. 6***b* is illustrated. Logical operand **538** queries the open active ETGs to determine whether a valid match with the identified ETGs exists. If a negative response is returned to logical operand **538**, the patient co-morbidity file is updated with the second diagnosis code at step **544**. If an affirmative response is returned from logical operand **538**, the matched active ETG with the most recent DOS-to value is selected at step **540**. If a tie is found based upon most recent DOS-to values, then the most recent DOS-from value is selected for matching with active ETGs. If a tie is found at most recent DOS-from values is found, the first encountered ETG is selected and matched. The selected ETG's most recent DOS-to and sequential anchor count are updated in the patient's master active ETG file in step **542**.

[**0144**] Processing then continues to identify all valid ETGs for a third diagnosis code on record at step **546** and the identified valid ETGs from step **546** are compared to the active ETGs in the patient's master active ETG file in step **548**.

[**0145**] Bridge **3**, **550**, continues to **FIG. 6**D, and a logical operand **552** is executed to query the patient's master active ETG file to determine whether a match exists between the valid ETGs identified in step **548** with any active ETG from the patients master active ETG file. If a negative response is returned to logical operand **538**, the patient's comorbidity file is updated with the third diagnosis code at **558**.

[**0146**] If an affirmative response is returned from logical operand **552**, the matched active ETG with the most recent DOS-to value is selected at step **554**. Again a decisional hierarchy is executed. If a tie is found based upon most recent DOS-to values, then the most recent DOS-from value is selected for matching with active ETGs. If a tie is found at most recent DOS-from values is found, the first encountered ETG is selected and matched.

[**0147**] The patient's co-morbidity file is then updated with the third diagnosis code on-record at step **558**. Processing then continues to identify all valid ETGs for a fourth diagnosis code on record at step **560** and the identified valid ETGs from step **3318** are compared to the active ETGs in the patient's master active ETG file in step **562**. Bridge reference **4**, **564**, bridges to **FIG. 6D**.

[**0148**] Turning to **FIG. 6D, a** logical operand **566** is executed to query the patient's master active ETG file to determine whether a match exists between the valid ETGs identified in step **562** with any active ETG from the patients master active ETG file. If a negative response is returned to logical operand **566**, the patient's comorbidity file is updated with the fourth diagnosis code.

[**0149**] If an affirmative response is returned from logical operand **566**, the matched active ETG with the most recent DOS-to value is selected at step **568**. In the event of a tie, a decisional hierarchy is executed. If a tie is found based upon most recent DOS-to values, then the most recent DOS-from value is selected for matching with active ETGs. If a tie is found at most recent DOS-from values is found, the first encountered ETG is selected and matched. The selected ETG's most recent DOS-to are updated in the patient's master active ETG file in step **570** and the patient's co-morbidity file is then updated with the fourth diagnosis code on-record at step **572**. A check is then made to determine whether the processed record is the last record for the patient by execution of logical operand **574** and reading the input claim records from the storage means. If logical operand **574** returns an affirmative value, the ETG Definer Sub-routine is called at step **576**, as represented by bridge reference GG. If, however, a negative response is returned to logical operand **574**, program execution returns to the step **204** of the Episode Assignor routine **200** and the next patient claim record is read from the storage means at step **578**.

[**0150**] Ancillary Records

[**0151**] Operation of the Ancillary Record Grouping Sub-routine **600** is illustrated in FIGS. 7A-7B. Like surgery records, ancillary records are grouped to ETGs on the basis of both dx codes and CPT code on record. First all valid ETGs for the treatment or CPT code on-record are identified in step **602** from the CPT-ETG table **401**. Then all valid ETGs for the first dx code on record are identified in step **604** from the dx-ETG table **201**. The ETGs from the CPT-ETG table **401** are then compared at step **606** to the ETGs from the dx-ETG table **201** and a logical operand **608** determines whether there is an ETG match. An affirmative response returned from logical operand **608** continues record processing at bridge D, **610**, which continues on **FIG. 7B**. A negative response returned from logical operand **608** prompts a look up on the dx-ETG table to determine all valid ETGs for the second diagnosis code on record in step **611**. Step **613** again compares the valid ETGs for the CPT code on record and with the valid ETGs for the second dx code on record and a logical operand **614** is executed to match the second dx code ETG with the CPT code ETG. Again, an affirmative response returned from logical operand **614** continues record processing at bridge D, **610**, which continues on **FIG. 7B**. If a negative response is returned to logical operand **614**, a look up on the dx-ETG table occurs to determine all valid ETGs for the third diagnosis code on record in step **615**. Step **616** again compares the valid ETGs for the CPT code on record and with the valid ETGs for the third dx code on-record, which bridges E, **619**, to **FIG. 7B** for identification of all valid ETGs for the fourth dx code on-record at step **625**.

[**0152**] Step **627** then compares the valid ETGs for the CPT code on record and with the valid ETGs for the fourth dx code on record and a logical operand **629** is executed to match the fourth dx code ETG with the CPT code ETG. An affirmative response returned from logical operand **629**

continues to step **616** which compares the matched ETGs with the ETGs in the patient master active ETG file and a query is made at logical operand **618** to determine whether any valid matches exist. If a negative response is returned to logical operand **629**, the record is output to the ETG reserved for a CPT code-dx code mismatch at step **631** and a check is made at step **635** to determine whether the record is the last record for the patient.

[**0153**] If a match is found between the matched ETGs from the dx code-CPT code comparison in step **616**. The matched active ETG with the most recent DOS-to value is selected. In the event of a tie, a decisional hierarchy is executed. If a tie is found based upon most recent DOS-to values, then the most recent DOS-from value is selected for matching with active ETGs. If a tie is found at most recent DOS-from values is found, the first encountered ETG is selected. The sequential episode number of the selected ETG is assigned to the record and the most recent sequential anchor count of the episode from the active ETG file is assigned to the record at step **622**.

[**0154**] If the response to logical operand **618** is negative, the record is assigned to an orphan record ETG at step **633** and maintained in the claims records until subsequent record processing either matches the record to an ETG or the orphan record DOS-from exceeds a one-year time period, at which time the record is output to an error log file.

[**0155**] A check is then made to determine whether this record is the last record for the patient at step **635**. If logical operand **635** returns an affirmative value, the ETG Definer Sub-routine is called at step **642**, as represented by bridge reference GG. If, however, a negative response is returned to logical operand **635**, program execution returns to the step **204** of the Episode Assignor routine **200** and the next patient claim record is read from the storage means at step **644**.

[**0156**] Prescription Drug Records

[**0157**] FIGS. **8A-8C** illustrate the operation of the Drug Record Grouping Sub-routine **700**. Drug Record Grouping Sub-routine **700** references two predetermined tables previously written to the storage means. The first of the tables is a National Drug Code (NDC) by Generic Drug Code (GDC) table **800**. This table acts as a translator table to translate a large number of NDCs to a smaller set of GDCs. A second pre-defined table is employed and is constructed as a GDC by ETG table **900**. The GDC by ETG table is used, in conjunction with the NDC by GDC translator table, to identify all valid ETGs for a particular NDC code in the claim record.

[**0158**] Once identified as a drug record in the initial operation of the Episode Assignor Routine **200**, the drug record is read from storage to memory in step **702**. The NDC code on-record is converted to a GDC code by reading from the NDC-GDC table **800** in step **704**. Using the GDC number so identified, all possible valid ETGs for the GDC code are identified in step **706**. The possible valid ETGs for the GDC code are then compared to the patient master active ETG file in step **708**. Following bridge LL, **710**, to **FIG. 8B, a** logical operand is executed in step **712** based upon the comparison executed in step **708**, to determine whether a match occurs having a table value of P, A, C or S.

[**0159**] If a negative response is returned to logical operand **712**, a check is made to determine whether a match having table value I in the GDC-ETG table **900** exists in step **713**. If another negative response is returned to logical operand **713**, the record is flagged an orphan drug record and assigned to an orphan drug record ETG in step **715**. If an affirmative response is returned to logical operand **713**, the ETG with the highest second value is selected in step **718** (e.g. **I1, I2, I3** and so on). If more than one ETG having the highest second value exists, the ETG having the most recent DOS-from value is selected. If a tie is again encountered, the first encountered ETG is selected. A sequential episode number and the most recent sequential anchor count of the episode from the patient master active ETG file is assigned to the drug record for the selected ETG in step **720**.

[**0160**] If an affirmative response is returned to logical operand **712**, the ETG having the highest second value, in order of P, S, A, C is selected in step **714** (e.g. **P1**, then **P2** . . . then **S1**, then **S2** . . . and so on). The record is then assigned a sequential episode number of the selected ETG and the most recent sequential anchor count of the episode from the patient master active ETG file in step **716**.

[**0161**] Further processing of the drug record continues from steps **716, 715** and **720** through bridge MM, **724** and is described with reference to **FIG. 8C**. A check is made in step **726** to determine whether the drug record is the last drug record for the patient on the record date. If a negative response is returned, a loop back to the top of the Drug Record Grouping Sub-routine **700** is executed. If an affirmative response is returned at step **726**, a check is made to determine whether the drug record is the last record for the patient in step **728**. If logical operand **728** returns an affirmative value, the ETG Definer Sub-routine is called at step **732**, as represented by bridge reference GG. If, however, a negative response is returned to logical operand **728**, program execution returns to the step **204** of the Episode Assignor routine **200** and the next patient claim record is read from the storage means at step **730**.

[**0162**] The Episode Definer Sub-routine is illustrated with reference to **FIG. 9**. Episode Definer Routine **118** is employed to assign all non-specific claims records, i.e., those initially assigned to ETG **900**, to specific more appropriate ETGs. Episode Definer routine **750**. Once all episodes have been grouped to ETGs, all ETG episodes in both active and closed ETGs are then identified in step **752** by patient age and presence or absence of a comorbidity. The ETG number for each episode is then shifted and re-written to an ETG appropriate for the patient age and/or presence or absence of a comorbidity in step **754**. All patient records are then output in step **756** to the display, to a file or to a printer, along with their shifted ETG number, sequential episode number of the record and in patient master active and closed ETG file for the patient. The Episode Definer routine **750** then writes a single record at step **758** for each episode containing key analytical information, for example: the ETG number, patient age, patient sex, the sequential episode number, the total sum charges, the total sum paid, the earliest anchor record DOS-from value, the last anchor record DOS-to value, patient identification, physician identification, management charges, management charges paid, surgery charges, surgery charges paid, ancillary charges, and ancillary charges paid.

[**0163**] After the single record for each episode is written in step **758** for the patient, processing for the next patient

begins by initialization of the next patient master active and closed ETG file, the next patient co-morbidity file, and the patient age file in step **760** and the Eligible Record Check Routine is re-initiated for processing claims records for the next patient at step **762**.

EXAMPLE

[**0164**] **FIG. 10** provides an example of Management and Ancillary record clustering over a hypothetical time line for a single patient over a one year period from January, 1995 to December, 1995. **FIG. 10** depicts time frames of occurrences for claims classified as management records, i.e., office visit **84**, hospital or emergency room visit **85**, and surgery and surgical follow-up **86** and for claims records classified as ancillary records, i.e., laboratory tests **87**, X-ray and laboratory tests **88** and x-ray **89**. Two time lines are provided. A first timeline **71** includes the diagnosis and the time duration of the diagnosed clinical condition. A second timeline **72** includes the claim events which gave rise to the medical claims. Where claim events occur more than once, an alphabetic designator is added to the reference numeral to denote chronological order of the event. For example, the first office visit is denoted **84***a,* the second office visit is denoted **84***b,* the third denoted **84***c,* etc. Vertical broken lines denote the beginning and end of each Episode Treatment Group **90**, and facilitate correlation of the episode event, e.g., office visit, with the resulting diagnosis, e.g., bronchitis.

[**0165**] A first office visit **84***a* resulted in a diagnosis of bronchitis **76**. Office visit **84***a* started an episode **90***a* for this patient based upon the bronchitis diagnosis **76**. A second office visit **84***b* occurred concurrently with the bronchitis episode **90***a,* but resulted in a diagnosis of eye infection **77**. Because the eye infection **77** is unrelated to the open bronchitis episode ETG **90***a,* a new eye infection episode ETG **90***b* is started. An X-ray and lab test **88** was taken during the time frame of each of the bronchitis episode **90***a* and the eye infection **90***b*. Based upon the CPT-ETG table, discussed above, the X-ray and lab test **88** is assigned to the eye infection episode **90***b*. A third office visit **84***c* and x-ray **89***a* occured and related to the bronchitis episode **90***a* rather than the eye infection episode **90***b*.

[**0166**] A fourth office visit **84***d* occured and resulted in a diagnosis of major infection **78** unrelated to the bronchitis diagnosis **76**. Because the major infection **78** is unrelated to the bronchitis, the fourth office visit **84***d* opened a new ETG **90***c*. Two subsequent lab tests **87***a* and **87***b* were both assigned to the only open episode, i.e., ETG **90***c*.

[**0167**] A fifth office visit **84***e* resulted in a diagnosis of benign breast neoplasm **79**, which is unrelated to the major infection ETG **90***c*. A fifth office visit **84***e* opened a new ETG **90***d* because the benign breast neoplasm is unrelated to either the bronchitis episode ETG **90***a,* the eye infection episode ETG **90***b,* or the major infection episode **90***c*. Sixth office visit **84***f* was assigned then to the only open episode, i.e., ETG **90***d*. Similarly, the surgery and follow-up records **86***a* and **86***b* related to the benign neoplasm ETG **90***d* and are grouped to that ETG.

[**0168**] Some months later, the patient has a seventh office visit **84***g* which resulted in a diagnosis of bronchitis **80**. However, because the time period between the prior bronchitis episode **76** and the current bronchitis episode **80** exceeds a pre-determined period of time in which there was an absence of treatment for bronchitis, the bronchitis episode **90***a* is closed and the bronchitis episode **90***e* is opened. A hospital record **85** occurs as a result of an eye trauma and eye trauma **81** is the resulting diagnosis. Because the eye trauma **85** is unrelated to the bronchitis **80**, a new eye trauma ETG **90***f* is started which is open concurrently with the bronchitis ETG **90***e*. An eighth office visity **84***h* occurs during the time when both ETG **90***e* and ETG **90***f* are open. Eighth office visity **84***h* is, therefore, grouped to the ETG most relevant to the office visity **84***h,* i.e., ETG **90***e*. A subsequent x-ray record **89***b* occurs and is related to the eye trauma diagnosis and is, therefore, grouped to ETG **90***f*. Because and absence of treatment has occured for the bronchitis ETG **90***e,* that ETG **90***e* is closed.

[**0169**] Finally, while the eye trauma ETG **90***f* is open, the patient has a routine office visit **84***h* which is unrelated to the open ETG **90***f* for the eye trauma diagnosis **91**. Because it is unrelated to the open ETG **90***f,* the routine office visity **84***i* starts and groups to a new episode **90***g* which contains only one management record **84***i*. An x-ray record **89***c* occurs after and is unrelated to the routine office visity **84***i*. The only open episode is the eye trauma episode **90***f* and the x-ray record **89***c* is, therefore, grouped to the eye trauma episode **90***f*. At the end of the year, all open episodes, i.e., the eye trauma ETG **90***f* are closed.

[**0170**] It will be apparent to those skilled in the art, that the foregoing detailed description of the preferred embodiment of the present invention is representative of a type of health care system within the scope and spirit of the present invention. Further, those skilled in the art will recognize that various changes and modifications may be made without departing from the true spirit and scope of the present invention. Those skilled in the art will recognize that the invention is not limited to the specifics as shown here, but is claimed in any form or modification falling within the scope of the appended claims. For that reason, the scope of the present invention is set forth in the following claims.

TABLE 1

ETG	DESCRIPTION
1	AIDS with major infectious complication
2	AIDS with minor infectious complication
3	AIDS with inflammatory complication
4	AIDS with neoplastic complication, with surgery
5	AIDS with neoplastic complication, w/o surgery
6	HIV sero-positive without AIDS
7	Major infectious disease except HIV, with comorbidity
8	Septicemia, w/o comorbidity
9	Major infectious disease except HIV and septicemia, w/o comorbidity

TABLE 1-continued

ETG	DESCRIPTION
10	Minor infectious disease
11	Infectious disease signs & symptoms
20	Diseases of the thyroid gland, with surgery
21	Hyper-functioning thyroid gland
22	Hypo-functioning thyroid gland
23	Non-toxic goiter
24	Malignant neoplasm of the thyroid gland
25	Benign neoplasm of the thyroid gland
26	Other diseases of the thyroid gland
27	Insulin dependent diabetes, with comorbidity
28	Insulin dependent diabetes, w/o comorbidity
29	Non-insulin dependent diabetes, with comorbidity
30	Non-insulin dependent diabetes, w/o comorbidity
31	Malignant neoplasm of the pancreatic gland
32	Benign endocrine disorders of the pancreas
33	Malignant neoplasm of the pituitary gland
34	Benign neoplasm of the pituitary gland
35	Hyper-functioning adrenal gland
36	Hypo-functioning adrenal gland
37	Malignant neoplasm of the adrenal gland
38	Benign neoplasm of the adrenal gland
39	Hyper-functioning parathyroid gland
40	Hypo-functioning parathyroid gland
41	Malignant neoplasm of the parathyroid gland
42	Benign neoplasm of the parathyroid gland
43	Female sex gland disorders
44	Male sex gland disorders
45	Nutritional deficiency
46	Gout
47	Metabolic deficiency except gout
48	Other diseases of the endocrine glands or metabolic disorders, with surgery
49	Other diseases of the endocrine glands or metabolic disorders, w/o surgery
50	Endocrine disease signs & symptoms
70	Leukemia with bone marrow transplant
71	Leukemia with splenectomy
72	Leukemia w/o splenectomy
73	Neoplastic disease of blood and lymphatic system except leukemia
74	Non-neoplastic blood disease with splenectomy
75	Non-neoplastic blood disease, major
76	Non-neoplastic blood disease, minor
77	Hematology signs & symptoms
90	Senile or pre-senile mental condition
91	Organic drug or metabolic disorders
92	Autism and childhood psychosis
93	Inorganic psychoses except infantile autism
94	Neuropsychological & behavioral disorders
95	Personality disorder
96	Mental disease signs & symptoms
110	Cocaine or amphetamine dependence with complications age less than 16
111	Cocaine or amphetamine dependence with complications age 16+
112	Cocaine or amphetamine dependence w/o complications age less than 16
113	Cocaine or amphetamine dependence w/o complications age 16+
114	Alcohol dependence with complications, age less than 16
115	Alcohol dependence with complications, age 16+
116	Alcohol dependence w/o complications, age less than 16
117	Alcohol dependence w/o complications, age 16+
118	Opioid and/or barbiturate dependence, age less than 16
119	Opioid and/or barbiturate dependence, age 16+
120	Other drug dependence, age less than 16
121	Other drug dependence, age 16+
140	Viral meningitis
141	Bacterial and fungal meningitis
142	Viral encephalitis
143	Non-viral encephalitis
144	Parasitic encephalitis
145	Toxic encephalitis
146	Brain abscess, with surgery
147	Brain abscess, w/o surgery
148	Spinal abscess
149	Inflammation of the central nervous system, with surgery
150	Inflammation of the central nervous system, w/o surgery
151	Epilepsy, with surgery
152	Epilepsy, w/o surgery
153	Malignant neoplasm of the central nervous system, with surgery

TABLE 1-continued

ETG	DESCRIPTION
154	Malignant neoplasm of the central nervous system, w/o surgery
155	Benign neoplasm of the central nervous system, with surgery
156	Benign neoplasm of the central nervous system, w/o surgery
157	Cerebral vascular accident, hemorrhagic, with surgery
158	Cerebral vascular accident, hemorrhagic, w/o surgery
159	Cerebral vascular accident, non-hemorrhagic, with surgery
160	Cerebral vascular accident, non-hemorrhagic, w/o surgery
161	Major brain trauma, with surgery
162	Major brain trauma, w/o surgery
163	Minor brain trauma
164	Spinal trauma, with surgery
165	Spinal trauma, w/o surgery
166	Hereditary and degenerative diseases of the central nervous system, with surgery
167	Hereditary and degenerative diseases of the central nervous system, w/o surgery
168	Migraine headache, non-intractable
169	Migraine headache, intractable
170	Congenital and other disorders of the central nervous system, with surgery
171	Congenital and other disorders of the central nervous system, w/o surgery
172	Inflammation of the cranial nerves, with surgery
173	Inflammation of the cranial nerves, w/o surgery
174	Carpal tunnel syndrome, with surgery
175	Carpal tunnel syndrome, w/o surgery
176	Inflammation of the non-cranial nerves, except carpal tunnel, with surgery
177	Inflammation of the non-cranial nerves, except carpal tunnel, w/o surgery
178	Peripheral nerve neoplasm, with surgery
179	Peripheral nerve neoplasm, w/o surgery
180	Traumatic disorder of the cranial nerves, with surgery
181	Traumatic disorder of the cranial nerves, w/o surgery
182	Traumatic disorder of the non-cranial nerves, with surgery
183	Traumatic disorder of the non-cranial nerves, w/o surgery
184	Congenital disorders of the peripheral nerves
185	Neurological disease signs & symptoms
200	Internal eye infection with surgery
201	Internal eye infection w/o surgery
202	External eye infection, with surgery
203	External eye infection, except conjunctivitis, w/o surgery
204	Conjunctivitis
205	Inflammatory eye disease, with surgery
206	Inflammatory eye disease, w/o surgery
207	Malignant neoplasm of the eye, internal, with surgery
208	Malignant neoplasm of the eye, internal, w/o surgery
209	Malignant neoplasm of the eye, external
210	Benign neoplasm of the eye, internal
211	Benign neoplasm of the eye, external
212	Glaucoma, closed angle with surgery
213	Glaucoma, closed angle w/o surgery
214	Glaucoma, open angle, with surgery
215	Glaucoma, open angle, w/o surgery
216	Cataract, with surgery
217	Cataract, w/o surgery
218	Trauma of the eye, with surgery
219	Trauma of the eye, w/o surgery
220	Congenital anomaly of the eye, with surgery
221	Congenital anomaly of the eye, w/o surgery
222	Diabetic retinopathy, with surgery
223	Diabetic retinopathy, w/o surgery with comorbidity
224	Diabetic retinopathy, w/o surgery w/o comorbidity
225	Non-diabetic vascular retinopathy, with surgery
226	Non-diabetic vascular retinopathy, w/o surgery
227	Other vascular disorders of the eye except retinopathies, with surgery
228	Other vascular disorders of the eye except retinopathies, w/o surgery
229	Macular degeneration, with surgery
230	Macular degeneration, w/o surgery
231	Non-macular degeneration, with surgery
232	Non-macular degeneration, w/o surgery
233	Major visual disturbances, with surgery
234	Major visual disturbances, w/o surgery
235	Minor visual disturbances, with surgery
236	Minor visual disturbances, w/o surgery
237	Other diseases and disorders of the eye and adnexa
250	Heart transplant
251	AMI, with coronary artery bypass graft
252	AMI or acquired defect, with valvular procedure
253	AMI, with angioplasty

TABLE 1-continued

ETG	DESCRIPTION
254	AMI with arrhythmia, with pacemaker implant
255	AMI, with cardiac catheterization
256	AMI, anterior wall with complication
257	AMI, anterior wall w/o comlication
258	AMI, inferior wall with complication
259	AMI, inferior wall w/o complication
260	Ischemic heart disease, w/o AMI, with coronary artery bypass graft
261	Ischemic heart disease, w/o AMI, with valvular procedure
262	Ischemic heart disease, w/o AMI, with angioplasty
263	Isehemic heart disease, w/o AMI, with arrhythmia, with pacemaker implant
264	Ischemic heart disease, w/o AMI, with cardiac catheterization
265	Ischemic heart disease, w/o AMI
266	Pulmonary heart disease, w/o AMI
267	Aortic aneurysm, with surgery
268	Aortic aneurysm, w/o surgery
269	Cardiac infection, with surgery
270	Cardiac infection, w/o surgery
271	Valvular disorder, with complication
272	Valvular disorder, w/o complication
273	Major conduction disorder, with pacemaker/defibrillator implant
274	Major conduction disorder, w/o pacemaker/defibrillator implant
275	Minor conduction disorder
276	Malignant hypertension with comorbidity
277	Malignant hypertension w/o comorbidity
278	Benign hypertension with comorbidity
279	Benign hypertension w/o comorbidity
280	Cardiac congenital disorder, with surgery
281	Cardiac congenital disorder, w/o surgery
282	Major cardiac trauma, with surgery
283	Major cardiac trauma, w/o surgery
284	Minor cardiac trauma
285	Other cardiac diseases
286	Arterial inflammation, with surgery
287	Major arterial inflammation, w/o surgery
288	Minor arterial inflammation, w/o surgery
289	Major non-inflammatory arterial disease with surgery
290	Arterial embolism/thrombosis, w/o surgery
291	Major non-inflammatory arterial disease, except embolism/thrombosis, w/o surgery
292	Atherosclerosis, with surgery
293	Atherosclerosis, w/o surgery
294	Arterial aneurysm, except aorta, with surgery
295	Arterial aneurysm, except aorta, w/o surgery
296	Other minor non-inflammatory arterial disease, with surgery
297	Other minor non-inflammatory arterial disease, w/o surgery
298	Arterial trauma, with surgery
299	Arterial trauma, w/o surgery
300	Vein inflammation, with surgery
301	Embolism and thrombosis of the veins
302	Disorder of the lymphatic channels
303	Phlebitis and thrombophlebitis of the veins
304	Varicose veins of the lower extremity
305	Other minor inflammatory disease of the veins
306	Venous trauma, with surgery
307	Venous trauma, w/o surgery
308	Other diseases of the veins
309	Cardiovascular disease signs & symptoms
320	Infection of the oral cavity
321	Inflammation of the oral cavity, with surgery
322	Inflammation of the oral cavity, w/o surgery
323	Trauma of the oral cavity, with surgery
324	Trauma of the oral cavity, w/o surgery
325	Other diseases of the oral cavity, with surgery
326	Other diseases of the oral cavity, w/o surgery
327	Otitis media, with major surgery
328	Otitis media, with minor surgery
329	Otitis media, w/o surgery
330	Tonsillitis, adenoiditis or pharyngitis, with surgery
331	Tonsillitis, adenoiditis or pharyngitis, w/o surgery
332	Sinusitis and Rhinitis, with surgery
333	Sinusitis and Rhinitis, w/o surgery
334	Other ENT infection, with surgery
335	Other ENT infection, w/o surgery
336	Major ENT inflammatory conditions with surgery
337	Major ENT inflammatory conditions w/o surgery

TABLE 1-continued

ETG	DESCRIPTION
338	Minor ENT inflammatory conditions with surgery
339	Minor ENT inflammatory conditions w/o surgery
340	ENT malignant neoplasm, with surgery
341	ENT malignant neoplasm, w/o surgery
342	ENT benign neoplasm, with surgery
343	ENT benign neoplasm, w/o surgery
344	ENT congenital anomalies, with surgery
345	ENT congenital anomalies, w/o surgery
346	Hearing disorders, with surgery
347	Hearing disorders, w/o surgery
348	ENT trauma, with surgery
349	ENT trauma, w/o surgery
350	Other ENT disorders, with surgery
351	Other ENT disorders, w/o surgery
352	Otolaryngology disease signs & symptoms
371	Viral pneumonia, with comorbidity
372	Viral pneumonia, w/o comorbidity
373	Bacterial lung infections, with comorbidity
374	Bacterial lung infections, w/o comorbidity
375	Fungal and other pneumonia, with comorbidity
376	Fungal and other pneumonia, w/o comorbidity
377	Pulmonary TB with comorbidity
378	Pulmonary TB w/o comorbidity
379	Disseminated TB with comorbidity
380	Disseminated TB w/o comorbidity
381	Acute bronchitis, with comorbidity, age less than 5
382	Acute bronchitis, with comorbidity, age 5+
383	Acute bronchitis, w/o comorbidity, age less than 5
384	Acute bronchitis, w/o comorbidity, age 5+
385	Minor infectious pulmonary disease other than acute bronchitis
386	Asthma with comorbidity, age less than 18
387	Asthma with comorbidity, age 18+
388	Asthma w/o comorbidity, age less than 18
389	Asthma w/o comorbidity, age 18+
390	Chronic bronchitis, with complication with comorbidity
391	Chronic bronchitis with complication w/o comorbidity
392	Chronic bronchitis, w/o complication with comorbidity
393	Chronic bronchitis w/o complication w/o comorbidity
394	Emphysema, with comorbidity
395	Emphysema w/o comorbidity
396	Occupational and environmental pulmonary diseases, with comorbidity
397	Occupational and environmental pulmonary diseases, w/o comorbidity
398	Other inflammatory lung disease, with surgery
399	Other inflammatory lung disease, w/o surgery
400	Malignant pulmonary neoplasm, with surgery
401	Malignant pulmonary neoplasm, w/o surgery
402	Benign pulmonary neoplasm, with surgery
403	Benign pulmonary neoplasm, w/o surgery
404	Chest trauma, with surgery
405	Chest trauma, open, w/o surgery
406	Chest trauma, closed, w/o surgery
407	Pulmonary congenital anomalies, with surgery
408	Pulmonary congenital anomalies, w/o surgery
409	Other pulmonary disorders
410	Pulmonology disease signs & symptoms
430	Infection of the stomach and esophagus with comorbidity
431	Infection of the stomach and esophagus w/o comorbidity
432	Inflammation of the esophagus, with surgery
433	Inflammation of the esophagus, w/o surgery
434	Gastritis and/or duodenitis, complicated
435	Gastritis and/or duodenitis, simple
436	Ulcer, complicated with surgery
437	Ulcer, complicated w/o surgery
438	Ulcer, simple
439	Malignant neoplasm of the stomach and esophagus, with surgery
440	Malignant neoplasm of the stomach and esophagus, w/o surgery
441	Benign neoplasm of the stomach and esophagus, with surgery
442	Benign neoplasm of the stomach and esophagus, w/o surgery
443	Trauma or anomaly of the stomach or esophagus, with surgery
444	Trauma of the stomach or esophagus, w/o surgery
445	Anomaly of the stomach or esophagus, w/o surgery
446	Appendicitis, with rupture
447	Appendicitis, w/o rupture
448	Diverticulitis, with surgery

TABLE 1-continued

ETG	DESCRIPTION
449	Diverticulitis, w/o surgery
450	Other infectious diseases of the intestines and abdomen
451	Inflammation of the intestines and abdomen with surgery
452	Inflammation of the intestines and abdomen, w/o surgery
453	Malignant neoplasm of the intestines and abdomen, with surgery
454	Malignant neoplasm of the intestines and abdomen, w/o surgery
455	Benign neoplasm of the intestines and abdomen, with surgery
456	Benign neoplasm of the intestines and abdomen, w/o surgery
457	Trauma of the intestines and abdomen, with surgery
458	Trauma of the intestines and abdomen, w/o surgery
459	Congenital anomalies of the intestines and abdomen, with surgery
460	Congenital anomalies of the intestines and abdomen, w/o surgery
461	Vascular disease of the intestines and abdomen
462	Bowel obstruction with surgery
463	Bowel obstruction w/o surgery
464	Irritable bowel syndrome
465	Hernias, except hiatal, with surgery
466	Hernias, except hiatal, w/o surgery
467	Hiatal hernia, with surgery
468	Hiatal hernia, w/o surgery
469	Other diseases of the intestines and abdomen
470	Infection of the rectum or anus, with surgery
471	Infection of the rectum or anus, w/o surgery
472	Hemorrhoids, complicated, with surgery
473	Hemorrhoids, complicated, w/o surgery
474	Hemorrhoids, simple
475	Inflammation of the rectum or anus, with surgery
476	Inflammation of the rectum or anus, w/o surgery
477	Malignant neoplasm of the rectum or anus, with surgery
478	Malignant neoplasm of the rectum or anus, w/o surgery
479	Benign neoplasm of the rectum or anus, with surgery
480	Benign neoplasm of the rectum or anus. w/o surgery
481	Trauma of the rectum or anus, open, with surgery
482	Trauma of the rectum or anus, open, w/o surgery
483	Trauma of the rectum or anus, closed
484	Other diseases and disorders of the rectum and anus, with surgery
485	Other diseases and disorders of the rectum and anus, w/o surgery
486	Gastroenterology disease signs & symptoms
510	Liver Transplant
511	Infectious hepatitis, high severity with comorbidity
512	Infectious hepatitis, high severity w/o comorbidity
513	Infectious hepatitis, low severity with comorbidity
514	Infectious hepatitis, low severity w/o comorbidity
515	Non-infectious hepatitis, with complications
516	Non-infectious hepatitis, w/o complications
517	Cirrhosis, with surgery
518	Cirrhosis, w/o surgery
519	Acute pancreatitis
520	Chronic pancreatitis
521	Cholelithiasis, complicated
522	Cholelithiasis, simple, with surgery
523	Cholelithiasis, simple, w/o surgery
524	Malignant neoplasm of the hepato-biliary system, with surgery
525	Malignant neoplasm of the hepato-biliary system, w/o surgery
526	Benign neoplasm of the hepato-biliary system, with surgery
527	Benign neoplasm of the hepato-biliary system, w/o surgery
528	Trauma of the hepato-biliary system, complicated, with surgery
529	Trauma of the hepato-biliary system, complicated, w/o surgery
530	Trauma of the hepato-biliary system, simple
531	Other diseases of the hepato-biliary system, with surgery
532	Other diseases of the hepato-biliary system, w/o surgery
533	Hepatology disease signs & symptoms
550	Kidney Transplant
551	Acute renal failure, with comorbidity
552	Acute renal failure, w/o comorbidity
553	Chronic renal failure, with ESRD
554	Chronic renal failure, w/o ESRD
555	Acute renal inflammation, with comorbidity
556	Acute renal inflammation, w/o comorbidity
557	Chronic renal inflammation, with surgery
558	Chronic renal inflammation, w/o surgery
559	Nephrotic syndrome, minimal change
560	Nephrotic syndrome
561	Other renal conditions

TABLE 1-continued

ETG	DESCRIPTION
562	Nephrology disease signs & symptoms
570	Infection of the genitourinary system with surgery
571	Infection of the genitourinary system w/o surgery
572	Sexually transmitted infection of the lower genitourinary system
573	Infection of the lower genitourinary system, not sexually transmitted
574	Kidney stones, with surgery with comorbidity
575	Kidney stones, with surgery w/o comorbidity
576	Kidney stones, w/o surgery with comorbidity
577	Kidney stones, w/o surgery w/o comorbidity
578	Inflammation of the genitourinary tract except kidney stones, with surgery
579	Inflammation of the genitourinary tract except kidney stones, w/o surgery
580	Malignant neoplasm of the prostate, with surgery
581	Malignant neoplasm of the prostate, w/o surgery
582	Benign neoplasm of the prostate, with surgery
583	Benign neoplasm of the prostate, w/o surgery
584	Malignant neoplasm of the genitourinary tract, except prostate, with surgery
585	Malignant neoplasm of the genitourinary tract, except prostate, w/o surgery
586	Benign neoplasm of the genitourinary tract, except prostate with surgery
587	Benign neoplasm of the genitourinary tract, except prostate, w/o surgery
588	Trauma to the genitourinary tract, with surgery
589	Trauma to the genitourinary tract, w/o surgery
590	Urinary incontinence, with surgery
591	Urinary incontinence, w/o surgery
592	Other diseases of the genitourinary tract, with surgery
593	Other diseases of the genitourinary tract, w/o surgery
594	Urological disease signs & symptoms
610	Normal pregnancy, normal labor & delivery, with cesarean section
611	Normal pregnancy, normal labor & delivery, w/o cesarean section
612	Complicated pregnancy, with cesarean section
613	Complicated pregnancy, w/o cesarean section
614	Hemorrhage during pregnancy, with cesarean section
615	Hemorrhage during pregnancy, w/o cesarean section
616	Other condition during pregnancy, with cesarean section
617	Other condition during pregnancy, w/o cesarean section
618	Fetal problems during pregnancy, with cesarean section
619	Fetal problems during pregnancy, w/o cesarean section
620	Ectopic pregnancy, with surgery
621	Ectopic pregnancy, w/o surgery
622	Spontaneous abortion
623	Non-spontaneous abortion
624	Obstetric signs & symptoms
630	Infection of the ovary and/or fallopian tube, with surgery
631	Infection of the ovary and/or fallopian tube, w/o surgery, with comorbidity
632	Infection of the ovary and/or fallopian tube, w/o surgery, w/o comorbidity
633	Infection of the uterus, with surgery
634	Infection of the uterus, w/o surgery, with comorbidity
635	Infection of the uterus, w/o surgery, w/o comorbidity
636	Infection of the cervix, with surgery
637	Infection of the cervix, w/o surgery
638	Vaginal infection, with surgery
639	Monilial infection of the vagina (yeast)
640	Infection of the vagina except monilial
641	Inflammation of the female genital system, with surgery
642	Endometriosis, w/o surgery
643	Inflammatory condition of the female genital tract except endometriosis, w/o surgery
644	Malignant neoplasm of the female genital tract, with surgery
645	Malignant neoplasm of the female genital tract, w/o surgery
646	Benign neoplasm of the female genital tract, with surgery
647	Benign neoplasm of the female genital tract, w/o surgery
648	Conditions associated with menstruation, with surgery
649	Conditions associated with menstruation, w/o surgery
650	Conditions associated with female infertility, with surgery
651	Conditions associated with female infertility, w/o surgery
652	Other diseases of the female genital tract, with surgery
653	Other diseases of the female genital tract, w/o surgery
654	Malignant neoplasm of the breast, with surgery
655	Malignant neoplasm of the breast, w/o surgery
656	Benign neoplasm of the breast, with surgery
657	Benign neoplasm of the breast, w/o surgery
658	Other disorders of the breast, with surgery
659	Other disorders of the breast, w/o surgery
660	Gynecological signs & symptoms
670	Major bacterial infection of the skin, with surgery
671	Major bacterial infection of the skin, w/o surgery

TABLE 1-continued

ETG	DESCRIPTION
672	Minor bacterial infection of the skin
673	Viral skin infection
674	Fungal skin infection, with surgery
675	Fungal skin infection, w/o surgery
676	Parasitic skin infection
677	Major inflammation of skin & subcutaneous tissue
678	Minor inflammation of skin & subcutaneous tissue
679	Malignant neoplasm of the skin, major, with surgery
680	Malignant neoplasm of the skin, major, w/o surgery
681	Malignant neoplasm of the skin, minor
682	Benign neoplasm of the skin
683	Major burns, with surgery
684	Major burns, w/o surgery
685	Major skin trauma, except burns, with surgery
686	Major skin trauma, except burns, w/o surgery
687	Minor burn
688	Minor trauma of the skin except burn, with surgery
689	Open wound of the skin, w/o surgery
690	Minor trauma of the skin except burn and open wound, w/o surgery
691	Other skin disorders
692	Dermatological signs & symptoms
710	Infection of the large joints with comorbidity
711	Infection of the large joints w/o comorbidity
712	Infection of the small joints with comorbidity
713	Infection of the small joints w/o comorbidity
714	Degenerative orthopedic diseases with hip or spine surgery
715	Degenerative orthopedic diseases with large joint surgery
716	Degenerative orthopedic diseases with hand or foot surgery
717	Juvenile rheumatoid arthritis with complication with comorbidity
718	Juvenile rheumatoid arthritis with complication w/o comorbidity
719	Juvenile rheumatoid arthritis w/o complication with comorbidity
720	Juvenile rheumatoid arthritis w/o complication w/o comorbidity
721	Adult rheumatoid arthritis with complication with comorbidity
722	Adult rheumatoid arthritis with complication w/o comorbidity
723	Adult rheumatoid arthritis w/o complication with comorbidity
724	Adult rheumatoid arthritis w/o complication w/o comorbidity
725	Lupus, with complication
726	Lupus, w/o complication
727	Autoimmune rheumatologic disease except lupus
728	Inflammation of the joints other than rheumatoid arthritis, with comorbidity
729	Inflammation of the joints other than rheumatoid arthritis, w/o comorbidity
730	Degenerative joint disease, generalized
731	Degenerative joint disease, localized with comorbidity
732	Degenerative joint disease, localized w/o comorbidity
733	Infections of bone, with surgery
734	Infections of bone, w/o surgery
735	Maxillofacial fracture or dislocation, with surgery
736	Maxillofacial fracture or dislocation, w/o surgery
737	Pelvis fracture or dislocation, with surgery
738	Pelvis fracture or dislocation, w/o surgery
739	Hip and/or femur fracture or dislocation, with surgery
740	Hip and/or femur fracture or dislocation, open, w/o surgery
741	Hip and/or femur fracture or dislocation, closed, w/o surgery
742	Upper extremity fracture or dislocation, with surgery
743	Upper extremity fracture or dislocation, open, w/o surgery
744	Upper extremity fracture or dislocation, closed, w/o surgery
745	Lower extremity fracture or dislocation, with surgery
746	Lower extremity fracture or dislocation, open, w/o surgery
747	Lower extremity fracture or dislocation, closed, w/o surgery
748	Trunk fracture or dislocation, with surgery
749	Trunk fracture or dislocation, open, w/o surgery
750	Trunk fracture or dislocation, closed, w/o surgery
751	Malignant neoplasm of the bone and connective tissue, head and neck
752	Malignant neoplasm of the bone and connective tissue other than head and neck
753	Benign neoplasm of the bone and connective tissue, head and neck
754	Benign neoplasm of the bone and connective tissue other than head and neck
755	Internal derangement of joints, with surgery
756	Internal derangement of joints, w/o surgery
757	Major orthopedic trauma other than fracture or dislocation, with surgery
758	Major orthopedic trauma other than fracture or dislocation, w/o surgery
759	Major neck and back disorders, with surgery
760	Major neck and back disorders, w/o surgery
761	Bursitis and tendinitis, with surgery
762	Bursitis and tendinitis, w/o surgery

TABLE 1-continued

ETG	DESCRIPTION
763	Minor orthopedic disorder except bursitis and tendinitis, with surgery
764	Minor neck and back disorder, except bursitis and tendinitis, w/o surgery
765	Minor orthopedic disorder other than neck and back, except bursitis and tendinitis, w/o surgery
766	Orthopedic congenital and acquired deformities, with surgery
767	Orthopedic congenital and acquired deformities, w/o surgery
768	Orthopedic and rheumatological signs & symptoms
780	Uncomplicated neonatal management
781	Chromosomal anomalies
782	Metabolic related disorders originating the antenatal period
783	Chemical dependency related disorders originating in the antenatal period
784	Mechanical related disorders originating in the antenatal period
785	Other disorders originating in the antenatal period
786	Other major neonatal disorders, perinatal origin
787	Other minor neonatal disorders, perinatal origin
788	Neonatal signs & symptoms
790	Exposure to infectious diseases
791	Routine inoculation
792	Non-routine inoculation
793	Prophylactic procedures other than inoculation and exposure to infectious disease
794	Routine exam
795	Contraceptive management, with surgery
796	Contraceptive management, w/o surgery
797	Conditional exam
798	Major specific procedures not classified elsewhere
799	Minor specific procedures not classified elsewhere
800	Administrative services
801	Other preventative and administrative services
810	Late effects and late complications
811	Environmental trauma
812	Poisonings and toxic effects of drugs
900	Isolated signs, symptoms and non-specific diagnoses or conditions
990	Drug record, no drug module
991	Orphan drug record
992	Non-Rx NDC code
993	Invalid NDC code
994	Invalid provider type, e.g., dentist
995	Record outside date range
996	Invalid CPT-4 code
997	Invalid Dx code
998	Inappropriate Dx-CPT-4 matched record
999	Orphan record

What is claimed is:

1. A computer-implemented process for profiling medical claims including the steps of:

(a) constructing a first cluster of episode-related medical claim data, the cluster having one anchor record;

(b) grouping a second cluster of episode-related medical claim data to the first cluster of episode-related medical claim data based upon relationship of the second cluster to the medical episode represented by the first cluster; and

(c) shifting the second cluster of episode-related medical claim data to a different and distinct episode group conditioned upon a higher degree of relationship of the second cluster to the different and distinct episode group.

2. A computer-implemented process for profiling medical claims including the steps of:

(a) reading a first patient's medical claim data, input as at least one of a plurality of data records, into a computer memory;

(b) validating each of the at least one of a plurality of data records for at least one of a diagnosis code and a treatment code;

(c) reading at least one pre-defined relation between the at least one of a diagnosis code and a treatment code in the validated at least one of a plurality of data records and pre-defined medical episodes; and

(d) grouping the validated at least one of a plurality of data records to at least one of a plurality of episode treatment groups, each of the at least one of a plurality of episode treatment groups further comprising one anchor record and n data records linked thereto, the n data records being selected from the group consisting of ancillary records, facility records and prescription drug records, where n is an integer greater than or equal to 0, and having a predefined time window during which the n data records may group to the one anchor record.

3. The process as claimed in claim 2, wherein each of the at least one of a plurality of episode treatment groups contain at least one cluster.

4. The process as claimed in claim 3, wherein the at least one cluster further comprises at least one ancillary record and at least one anchor record.

5. The process as claimed in claim 2, wherein the step (d) further comprises the step of differentiating patient severity

based upon data relating to at least one of patient age, complicating conditions, comorbidities and major surgeries.

6. The process as claimed in claim 2, further comprising the step of outputting and discontinuing processing of invalid data records and comparing diagnosis and treatment code data.

7. The process as claimed in claim 6 wherein the step of outputting and discontinuing processing of invalid data records further includes the step of assigning a different episode treatment group for at least one of an invalid diagnosis code, an invalid treatment code and an invalid provider type.

8. The process as claimed in claim 2, further comprising the step of identifying valid episode treatment groups by comparing current treatment codes to prior related episodes in look-up tables.

9. The process as claimed in claim 2, further comprising the step of flagging valid claim records with a diagnosis code identifier.

10. The process as claimed in claim 9, wherein the step of flagging valid claim records further comprises the step of incrementing a sequential anchor count and a sequential episode count for each episode treatment group assignment.

11. The process as claimed in claim 2, further comprising the step of resetting the dynamic time window of the medical episode when a second at least one of a plurality of data records matches an open medical episode, the dynamic time window being reset for an additional period of time until no other data records are grouped to the open medical episode within the reset dynamic time window.

12. The process as claimed in claim 11, wherein the step of resetting the dynamic time window of the medical episode, further comprises the step of selecting a most recent claim record if more than one matched claim record exists.

13. The process as claimed in claim 2, further comprising the step of shifting a medical claim to a different one of the plurality of episode treatment groups based upon a inputting of a medical claim record including changes in patient condition comprising at least one of comorbidity, complication and defining surgery.

14. The process as claimed in claim 13, wherein the step of shifting further comprises shifting an episode treatment group originally assigned by a first diagnosis on a medical claim record based on at least one of a second, third and fourth diagnosis.

15. The process as claimed in claim 8, wherein the step of identifying valid episode treatment groups further comprises the step of comparing pharmaceutical claim data in a patient's medical claim data to open episode treatment groups for the patient by analyzing Generic Drug Codes by episode treatment group and National Drug Code by Generic Drug Codes look-up tables.

16. The process as claimed in claim 2, further comprising the step of identifying medical providers treating episodes treatment groups by identifying each episode treatment group by Primary Care Physician.

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