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Quality Performance Drivers of Health Care

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I.Introduction

Quality is always an important issue for health care institutions to address. In academic field, most of research discussed about the quality performance drivers based on one or two factors. However, in practical societies, there are numbers of factors influencing on the quality of health service, such as physician factors, treatment process factors, and patient factors. This paper tries to examine how the three factors mentioned above to influence the quality of health care.

We select two kinds of health cares--cataract surgery and intense care unit as analyzing samples. Cataract surgery is quite popular surgery among elder people. The clinical process of cataract surgery is already standardized and is included in the case payment categories in Taiwan health care system. However, the processes of intensive care are so complex, and the severity of the patients in intensive care is various. We can get more thorough understanding the quality performance drivers of health care by comparing the drivers of one simple and one complicated diseases.

II. Literature Review

There is no commonly accepted definition for quality of health care, although amounts of quality concepts and measures were proposed over the past 50 years (Donabedian, 1985). The quality of health care includes the availability of healthcare, the outcome of treatment, the interrelationship between medical team and patients, and the medical environment. We address the quality performance of healthcare on the outcome of treatment, because there are more objective criteria to define better outcome of treatment. Furthermore, healthcare is trying to improve the physical status of people. The better outcome means the improvement of physical status, which is the main goal of the healthcare institutions.

The Donabedian (1980) defined quality of health care based on the structure, the process, and the outcome. In his model, structure quality refers to the characteristics

of the healthcare organization and has effect on the process of delivering the service. The process quality can affect the probability of achieving good outcome. Sedatole (1999) classified the structure quality of healthcare into business units' and service agents' factors; and the process quality of healthcare into the service and patients' factors. In this paper, three categories of factors to drive quality of healthcare outcomes, excluding the business unit factors, because I collected the data from one hospital.

There are various and complex procedures in different healthcare services, depending on the diagnosis, and the severity of disease. Taking cataract surgery an example, 18% of the population of the Unites State is suffering from the cataract. The cataract surgery is one of the most common operations and is included in the DRG in Taiwan National Health Insurance. The National Health Insurance has set the standardized procedures for the cataract surgery because the treatment of cataract is simple and standardized. However, the healthcare service in the intensive care units is more sophisticate. Patients with various diagnoses need the intensive care and the procedures in the intensive care show more technical complexity in the intensive care.

In general, there are two kind of operation methods (extracapsular cataract extraction, or phacoemulsification) for treatment of cataract. Powe, etc (1994) analyzed 90 papers from 1979 to 1991 and noted that those two operation methods made no significant difference on the complication rate and the postoperative visual acuity. The complication rate of cataract surgery occurring in hospital or ophthalmologic clinical was no significant difference (Wegener, 1998). Some preoperative characters of patients can be used to predict the poor quality outcome of cataract surgery. Age, the co-existing other ophthalmologic diseases can be used to predict the outcome of the cataract surgery (Schein,1995).

The quality outcome of intensive care unit is an important issue due to the

expensive cost spent on patients. Previous studies of quality performance drivers of intensive care mainly focused on hospital factors and patient factors. The patients in the intensive care unit receiving plenty of treatments. However, there is no research discussing the effect of the treatment factors on the outcome of intensive care. Pollack (1994) studied the hospital factors of pediatric intensive care unit and noted that the patients in the intensive care unit with specialists had better survival rate. Furthermore, patients in the intensive care unit with teaching course plan had lower mortality rate (Pollack, 1997). Patients in the intensive care unit with more admissions had lower mortality rate and shorter admission stay (Tilford, 2000). The patients with gastrointestinal and neurological diagnoses clinical were noted that they had higher readmission rate (Chen, 2000).

III. Hypotheses Development

We try to evaluate the quality performance drivers by physician factors, treatment factors, and patient factors in intensive care unit and cataract surgery in this paper, also we try to compare the quality performance drivers between those two sets of healthcare services.

The framework of this study is shown in Figure 1.

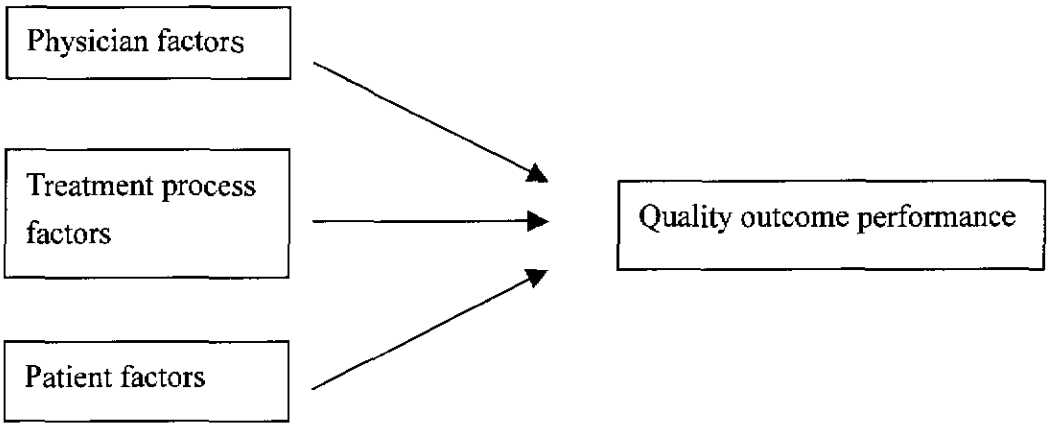

Figure1: The framework of this research

The hypotheses of this study are as followings:

1. The more experience the physicians have, the better quality outcome is.

2. The less complex the treatment process is, the better quality outcome is.

3. The younger the patients are, the better quality outcome is.

4. The better physical status the patients, the better quality outcome is

5. It is easier to find quality drivers from the simple diseases (cataract surgery) than from the complicated ones (intensive care).

IV. Sampling

We collected the 754 patient data of the cataract surgery cases from September 1999 till March 2000,including the postoperative follow-up. We also collected the 180 patient data of intensive care cases two periods (from June 1999 till September 1999 and from August 2000 till December 2000), including the post-intensive care. The data was from one of large hospitals in Taiwan, Taipei.

V. Variables of the Simple Disease – Cataract Surgery

1. Independent variables

(1) Physician factors

a. the experience of physicians: CASENO

I collect the case number of the cataract surgeries that the ophthalmologists performed in the latest two years and use the case number as the surrogate for the experience of physicians. The more cataract surgery cases the ophthalmologists practiced, the more experience the ophthalmologists have. The experience of the physician positively affected the outcome of the laser surgery in ophthalmologic clinicals. (Sedatole, 1999)

(2) Treatment factors

a. The operation methods: Extrac

Two kind of extraction methods, extracapsular cataract extraction and phacoemulsification, are involved in the cataract surgery. The operation processes are

different between these two extraction methods. As a result, the operation methods should affect the quality performance.

Extrac=0, extracapsular cataract extraction

Extrac=1, phacoemulsification

(3) Patient factors

a. The age of the patients: AGE

The age of the patients has influences the post-operation outcome. (Schein,1995) The older patients who received the cataract surgery had more chance to get endophthalmitis. (Powe, 1994) We included the age of the patients to be one of the quality performance drivers.

b. The co-existence of other ophthalmologic diseases of the patients: PREDX

The patients with the co-existing other ophthalmologic diseases had more chance to get poor operation outcome after receiving cataract surgery. (Schein, 1995) We included the co-existence of other ophthalmologic diseases of the patients to be one of the quality performance drivers.

PREDX＝0, patients without the co-existence of other ophthalmologic diseases of the patients.

PREDX＝1, patients with the co-existence of other ophthalmologic diseases of the patients.

2. Dependent variables—quality performance indicators of cataract surgery

Four quality performance indicators were used to evaluate the outcome of cataract surgery after discussion with ophthalmologists in the research hospital.

(1) The visual acuity after cataract surgery

When people have the visual acuity more than 0.5, they can do their daily activities without help. Postoperative Snell Visual Acuity more than 0.5 is used to differentiate the outcome of cataract surgery in past researches. (Powe, 1994, Wegener, 1998) However, the ophthalmologists in the research hospital thought there should be one more segment to clarify the postoperative outcome. Visual acuity 0.5 and 0.8 were used to separate postoperative outcome into three segments in this research.

VA＝0，postoperative Snell Visual Acuity＞0.8,

VA＝1，postoperative Snell Visual Acuity＝0.5-0.8,

VA＝2，postoperative Snell Visual Acuity＜0.5.

(2) the postoperative complications (COMP)

The occurrence of the postoperative complications (such as wound infection, and anterior capsule rupture) was use to be the outcome indicators in the past researches. (Powe, 1994, Wegener, 1998) Because the patients with the postoperative complications will need further treatment for these complications, the hospital will spend more cost on these patients.

COMP＝0，the patients without postoperative complications

COMP＝1，the patients with postoperative complications

(3) The operation time (OPTIME)(min)

The ophthalmologists in the research decided to include the operation time as one of the quality performance indicators. The operation time was collected in this research. OPTIME is defined as the time from wound incision to closure.

(4) The recovery time: (RETIME) (days)

The duration of visual acuity recovering to 0.5 is longer, the patients need more times to follow-up, and spend more cost. Therefore, the recovery time was included into the quality performance indicators in this paper. RETIME is defined as the duration of Visual Acuity recovering to 0.5.

3. Controlled variables

(1) The brand of artificial lens: LEN

After extraction of the cataract, ophthalmologists implant the artificial lens to recover the vision. The brand of artificial lens is considered one of the controlled variables to prevent the influence of the different artificial lens. Eight kinds of artificial lens are used in the research hospital.

LEN＝0, ORC

LEN＝1, Alcon

LEN＝2, Pharmacia

LEN＝3, HSM 720C

LEN＝4, Domi-Lens

LEN＝5, AMO

LEN＝6, Storz

LEN＝7, Surgidev

(2) The gender of the patients: GENDER

The gender of the patient is regard as one of the controlled variables.

GENDER＝0，male

GENDER＝1，female

(3) The preoperative visual acuity: PREVA

The preoperative visual acuity of these patients is poor. However, the preoperative visual acuity is controlled to prevent the preoperative visual acuity to affect the postoperative visual acuity. The preoperative visual acuity is separated into three groups as following:

PREVA＝0, the preoperative visual acuity＞0.8.

PREVA＝1, the preoperative visual acuity=0.5-0.8.

PREVA＝2, the preoperative visual acuity＜0.5.

VI. Variables of the Complicated diseases--Intensive Care

1. Independent variables—quality performance drivers

(1) Physician factors (Medical staff factors)

Each patient receives the care from various medical staff in the intensive care unit, for a example, physicians, nurses, and respiratory therapists. The closest relationship is between patients and nurses. However, it is not easy to collect the data of the nurse factors under individual patient basis, because patients received different nurses in each day, depending on the arrangement of nursing shift. As a result, only the physician factors were investigated in this paper.

a. the experience of physicians（EXP）(years)

The experience of physicians can diagnosis correctly the timing of discharge, then prevent the premature discharge, and decrease the readmission. (Strosberg, 1993) Laffel observed that the more experienced surgeon have lower mortality rate heart transplant. (Laffe, 1992) The duration from the time when the physician got the specialist license to patient admitting to ICU was used to surrogate of the experience of the physician.

EXP＝the duration from the time of ICU specialist license issued to patient admitting to ICU

(2) Treatment factors (service process factors)

The treatment process of the patients in intensive care is complex and various, therefore, it is not easy to analysis all the treatment process factors. Three kind of treatment were used to be the surrogate the quality performance driver in the treatment factors category.

a. The insertion of Swan-Guans: SWAN

Most of admission to intensive care unit is due to cardiopulmonary function insufficiency. Patients with severe cardiopulmonary function insufficiency need intense cardiopulmonary function monitoring. Swan-Guans is commonly used in such patients. Therefore, the insertion of Swan-Guans was used to be the surrogate of the complexity of the treatment process.

SWAN＝0，the patients without Swan-Guans insertion in ICU

SWAN＝1，the patients with Swan-Guans insertion in ICU

b. The insertion of tracheotomy: TRA

Patients received tracheotomy because they need long duration of ventilator assistance. The insertion of tracheotomy in intensive care unit represents the complexity of the treatment during the intensive and is suspected to affect the outcome of patients in intensive care.

c. Emergent operation: EMERG

Some patients admitted to intensive care unit for post-emergent operation. Because little preparation time is allowed for emergent operation, quality outcome of the patients will be affected.

EMERG = 0, The patients do not receive emergent operation in pre-ICU stage,

EMERG = 1, The patients receive emergent operation in pre-ICU stage

d. The ICU stays period (DUR)

The longer periods the patients stay in intensive care unit, the more various treatment processes the patients receive. Consequently, the quality outcome of the patients will be negative affected.

DUR = the ICU stays (days)

(3) The patient factors

a. The age of patients: AGE

The age of patients staying in intensive care unit was collected as the one of patient factors of quality performance driver.

b. The acute physical status: APS

The physical status of the patients negatively affected the quality outcome of the patients. APACH II system is used to evaluate the physical status of the patient in research hospital. There are ten items to measure for the patient physical status, such as blood pressure, respiratory rate, etc. The high acute physical score in APACH II system means the severe physical function insufficiency. Therefore, we collected the acute physical scores of the patient when admitting into ICU by APACH II system and regarded one of the patient factors.

APS = the acute physical scores by APACH II system at ICU admission

c. Pre-ICU CPR: CPR

Patients receive cardiopulmonary resuscitations to save their lives from the edge

of death. Such patients need more intensive care after successful cardiopulmonary resuscitations. However, these patients are suspected to get poor quality outcome. Whether the patients receive the pre-admission CPR is consider one of the patient factors.

CPR＝0, the patients suffer cardiopulmonary resuscitation in pre-admission stage.

CPR＝1, the patients do not suffer cardiopulmonary resuscitation in pre-admission stage.

2. Dependent variables—quality performance indicators of intensive care

According to our national hospital accreditation of intensive care, the nosocomial infection rate, the mortality rate and the readmission rate were included into the quality performance indicators. The duration after discharge from intensive care unit was chose as one of the quality performance indicators in this paper.

(1) Infection occurrence: INF

The infection control committee of the research hospital monitored nosocomial infection occurrence in patients. The infection occurrence was collected by the infection control committee of the research hospital.

INF＝0, the patients without nosocomial infection,

INF＝1, the patients with nosocomial infection.

(2) Mortality occurrence: MORTAL

MORTAL＝0，the patients do not have mortality in ICU，

MORTAL＝1，the patients have mortality in ICU。

(3) Readmission occurrence: READM

Readmission means that the patients readmitted into the intensive care unit in 14 days after discharging from intensive care unit.

READM＝0, the patients did not readmit into ICU in 14 days.

READM＝1, the patients readmitted into ICU in 14 days.

(4) The period between discharge from ICU and death: DISCHA

This indicator is not included in the criteria for our national hospital accreditation. However, cost to cure patients in intensive care unit is very expensive, so the longer period to death after discharge from intensive care unit means that the cost spent for ICU is more worthwhile. The period to death after discharge from intensive care unit was classified into three groups as following:

DISCHA＝0，the period to death after discharge from ICU > 10 days.

DISCHA＝1，the period to death after discharge from ICU =11-30 days.

DISCHA＝2，the period to death after discharge from ICU < 10 days.

3. Control variables

(1) Patient stay in medical ICU or surgical ICU（OP）

The reasons why patients admitted in medical ICU or surgical ICU are different. Patients usually admitted in medical ICU due to their physical function insufficiency. However, patients admitted to surgical ICU for postoperative care. The physical function of these patients is not quite severely insufficiency. The variable should be controlled.

OP=0, Patient stay in medical ICU.

OP=1, Patient stay in surgical ICU.

(2) Years when data collected: YR

Data was collected from two different years. The year is considered one of the controlled variables to prevent the year factor affects our model.

YR=0, data from 1999.

YR=1, data from 2000.

VII. Empirical Models

1. Empirical models on the cataract surgery

(1) Empirical model of the postoperative visual acuity

$$VA = \beta_0 + \beta_1 CASENO + \beta_2 EXTRAC + \beta_3 AGE + \beta_4 PREDX$$

(2) Empirical model of the complication occurrence

$$COMP = \beta_0 + \beta_1 CASENO + \beta_2 EXTRAC + \beta_3 AGE + \beta_4 PREDX$$

(3) Empirical model of the operation time

$$OPTIME = \beta_0 + \beta_1 CASENO + \beta_2 EXTRAC + \beta_3 AGE + \beta_4 PREDX$$

(4) Empirical model of the recovery time

$$RETIME = \beta_0 + \beta_1 CASENO + \beta_2 EXTRAC + \beta_3 AGE + \beta_4 PREDX$$

3. Empirical models on the intensive care unit

(1) Empirical model of the infection occurrence

$$INF = \beta_0 + \beta_1 EXP + \beta_2 SWAN + \beta_3 TRA + \beta_4 DUR + \beta_5 EMERG + \beta_6 AGE + \beta_7 APS + \beta_8 CPR$$

(2) Empirical model of the mortality occurrence

$$MORTAL = \beta_0 + \beta_1 EXP + \beta_2 SWAN + \beta_3 TRA + \beta_4 DUR + \beta_5 EMERG + \beta_6 AGE + \beta_7 APS + \beta_8 CPR$$

(3) Empirical model of the readmission occurrence

$$READM = \beta_0 + \beta_1 EXP + \beta_2 SWAN + \beta_3 TRA + \beta_4 DUR + \beta_5 EMERG + \beta_6 AGE + \beta_7 APS + \beta_8 CPR$$

(4) Empirical model of the period between discharge from ICU and death

$$DISCHA = \beta_0 + \beta_1 EXP + \beta_2 SWAN + \beta_3 TRA + \beta_4 DUR + \beta_5 CPR + \beta_6 EMERG + \beta_7 APS + \beta_8 AGE$$

VIII. Empirical Results

1. The statistic data for Two diseases

The statistic data of the quality performance indicators, the quality performance

drivers and controlled variables in the cataract surgery and intensive care unit were shown in the Table 1, Table 2, Table 3 and Table 4.

Table 1 descriptive statistics on quality performance indicators in the cataract surgery (n=754)

Outcome indicators	Minimum	Maximum	Mean	Std dev.
VA	0	2	1.1	0.71
COMP	0	1	0.10	0.31
OPTIME	10	158	42.3	18.1
RETIME	2	90	50.84	33.95

Table 2 descriptive statistics on quality performance drivers and control variables in the cataract surgery (n=754)

Variables	Minimum	Maximum	Mean	Std dev.
CASENO	76	669	375.6	156.8
EXTRAC	0	1	0.55	.50
AGE	54	90	72.7	9.4
PREDX	0	1	0.25	0.43
GENDER	0	1	0.29	0.45
PREVA	1	2	1.984	0.127

Table 3 descriptive statistics on quality performance indicators in the intensive care unit (n=180)

Quality performance indicators	Minimum	Maximum	Mean	Std dev.
INF	0	1	.18	.38
MORTAL	0	1	.41	.49
READM	0	1	.089	.29
DISCHA	0	2	.13	.43

Table 4 descriptive statistics on quality performance drivers and control variables in the intensive care unit (n=180)

Variables	Minimum	Maximum	Mean	Std dev.
EXP	0.2	25.5	11.6	6.72
SWAN	0	1	0.42	0.0369
TRA	0	1	0.14	0.0258
DUR	0	86	12.95	12.43
EMERG	0	1	0.19	0.39
AGE	15	94	65.65	17.39
APS	0	35	15.53	8.07
CPR	0	1	0.0389	0.19
YR	0	1	0.69	0.46
OP	0	1	0.44	.50

2. The empirical results on simple disease -- cataract surgery

Table 5 showed that the more case number of the physician practicing in the past two years gets better postoperative visual acuity. The result is correspondent with the past research. The operation method had significant effect on the visual acuity, which means that the patients receiving phacoemulsification have better postoperative visual acuity. Furthermore, the older patients and the patients with co-existing other ophthalmologic disease have worse postoperative visual acuity.

Table 5 Empirical results on visual acuity (n=752)

Variables	Estimated Influence	β value	T value	P value
INTERCEPT			.691	.490
CASENO	−	-.171	-4.060	.000**
EXTRAC	+	-.196	-5.451	.000**

AGE	+	.099	2.874	.004**
PREDX	+	.300	8.900	.000**
GENDER	?	.056	1.649	.100
PREVA	?	.034	1.005	.315
LEN0	?	.080	2.179	.049*
LEN2	?	.035	1.002	.317
LEN3	?	.058	1.570	.117
LEN4	?	.014	.375	.708
LEN5	?	-.027	-.747	.455
LEN6	?	.012	.358	.720
LEN7	?	.061	1.719	.086

F-Value＝12.194，Prob＞F＝.000**,

R-sqaure＝.202， Adj R-sq. ＝.186

*：5% significance； **：1% significance

Table 6 showed that only the operative method had significant influence on the postoperative complication occurrence. The patients receiving phacoemulsification have more chance to get postoperative visual acuity.

Table 6 Empirical results on postoperative complication （n＝752）

Variables	Estimated Influence	β value	Wald value	P value
INTERCEPT		-3.342	2.672	.102
CASENO	-	.001	.4249	.515

EXTRAC	+	.705	5.956	.015*
AGE	+	.017	1.317	.251
PREDX	+	.164	.343	.558
GENDER	?	-.278	.896	.344
PREVA	?	-.353	.189	.664
LEN0	?	1.837	9.270	.002**
LEN1	?	.379	1.297	.255
LEN2	?	1.196	4.113	.043*
LEN4	?	1.800	8.497	.004**
LEN5	?	1.123	5.363	.021*
LEN6	?	-3.453	.024	.877
LEN7	?	.996	3.730	.053

Goodness-of-Fit test Chi-Square＝9.517，

Goodness-of-Fit test P value＝.301

Nagelkerke R-sqaure＝.074， P value＝.024*

* ：5% significance； ** ：1% significance

Table 7 showed that the physician factors, the treatment factors and the patient factors have no significant influence on the operation time.

Table 7 Empirical results on operation time（n＝752）

Variables	Estimated Influence	β value	T value	P value
INTERCEPT			3.115	.002**

CASENO	-	-.046	-1.028	.305
EXTRAC	+	.070	1.821	.069
AGE	+	.035	.942	.346
PREDX	+	-.012	-.327	.744
GENDER	?	-.092	-2.516	.012*
PREVA	?	.042	1.184	.237
LEN0	?	-.080	-2.055	.040
LEN2	?	.015	.405	.686
LEN3	?	.141	3.548	.000**
LEN4	?	-.076	-1.968	.049*
LEN5	?	-.042	-1.094	.275
LEN6	?	.075	2.102	.036*
LEN7	?	-.010	-.309	.757

F-Value＝4.852 ，Prob＞F＝.000*

R-sqaure＝.092 ，Adj R-sq＝.073

*：5% significance；**：1% significance

Table 8 showed that patients operated by the ophthalmologist with the more practicing case number in the past two years gets shorter recovery time. The result is correspondent with the past research. The patients receiving phacoemulsification have shorter recovery time. Furthermore, the patients with co-existing other ophthalmologic disease have longer recovery time.

Table 8 Empirical results on recovery time（n＝752）

Variables	Estimated Influence	β value	T value	P value
INTERCEPT			3.816	.000**
CASENO	-	-.119	-2.754	.006**
EXTRAC	-	-.213	-5.779	.000**
AGE	+	.044	1.240	.216
PREDX	+	.249	7.168	.000**
GENDER	?	.000	-.003	.998
PREVA	?	.054	1.572	.116
LEN0	?	.068	1.808	.071
LEN2	?	.015	.423	.673
LEN3	?	-.014	-.374	.709
LEN4	?	-.002	-.048	.962
LEN5	?	.011	.300	.764
LEN6	?	.043	1.252	.211
LEN7	?	.079	2.187	.029*

F-Value=9.319，Prob>F=.000**

R-sqaure=.162，Adj R-sq=.145

*：5% significance；**：1% significance

3. The Empirical results on complicated diseases -- intensive care

Table 9 showed that only the admission stay in the treatment factors category has significant influence on the infection occurrence. Patients with longer admission

stay have more chance to get nosocomial infection in the intensive care.

Table 9: Empirical results on the infection occurrence （N＝180）

Variable	Estimated Influence	β value	Wald value	P value
INTERCEPT		-3.6768	8.6376	.0033
EXP	–	.0041	.0130	.9094
SWAN	+	.4454	. 8815	.3478
TRA	+	1.0028	2.6156	.1058
DUR	+	.0730	12.5832	.0004*
CPR	+	-.1868	.0251	.8741
EMERG	+	-.1068	.0186	.8915
APS	+	.0170	.3073	.5794
AGE	+	.0168	1.2590	.2618
YR	?	-.9255	3.4746	.0623
OP	?	-.6386	1.1209	.2897

Goodness-of-Fit test Chi-Square＝5.0662，

Goodness-of-Fit test P value＝.7505

Percentage of correct: 97.3%

Nagelkerke R-sqaure＝.332， P value＝.0000**

* ：5% significance； ** ：1% significance

Table 10 showed that the treatment factors and the patient factors have significant influence on the mortality occurrence. The patients with the insertion of Swan-Gauz have more mortality rate. Moreover, the patients with the tracheotomy have mortality rate. These two treatment procedures usually were performed in these

patients with more severe physical function insufficiency. Consequently, patients with these two treatment procedures have higher mortality rate. The patients with higher acute physical scores have more mortality rate.

Table 10: Empirical results on the mortality occurrence （N＝180）

Variable	Estimated Influence	β value	Wald value	P value
INTERCEPT		-1.3305	2.3424	.1259
EXP	−	.0091	.1104	.7397
SWAN	+	1.3419	12.7745	.0004**
TRA	+	-1.9995	8.1979	.0042**
DUR	+	-.0041	.0622	.8031
CPR	+	1.0485	1.2593	.2618
EMERG	+	.5321	.8532	.3556
APS	+	.0721	9.0624	.0026**
AGE	+	-.0062	.3315	.5648
YR	?	.0479	.0153	.9016
OP	?	-.8218	3.2014	.0736

Goodness-of-Fit test Chi-Square＝7.9836，

Goodness-of-Fit test P value＝.4351

Percentage of correct: 81.13%

Nagelkerke R-sqaure＝.313， P value＝.0000**

* ：5% significance； ** ：1% significance

Table 11 showed that the patients with tracheotomy have high readmission rate. The tracheotomy is usually performed on these patients with respiratory function insufficiency, who need long term ventilator assistance. So these patients have more