

Standardization

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[AP2-E2-3-01] Meal Completion as a Substitutional Event for Clinical Pathway Completion: Extension of Comparison from Single Hospital Database to That of Multiple Hospitals

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Keywords: Clinical Pathway, Meal, Propensity Score Matching

We demonstrated that clinical pathway completion can improve quality indicators such as length of hospital stay or mortality rate. Moreover, we extended the completion rate of clinical pathway from binary to percentage using electronic medical records that can identify whether each treatment is registered in clinical pathway or not. Since few databases can record the level of detail of treatment as our case, this study explored events that can substitute for clinical pathway completion. The prospective event was named “meal completion” decided by whether additional fee of meal was claimed every day or not. Approximately 8259 patients were selected for data analysis. With application of a propensity score matching, two groups (1997 patients each) were created for comparison of clinical pathway completion rate between patients with meal completion and those without. Before applying propensity score matching, the difference of rate of meal completion was about 9% ($p < 0.001$, chi-square test) between patient with clinical pathway completion (25.2%) and those who without clinical pathway completion (34.3%). After applying propensity score matching, the difference of rate of clinical pathway completion was about 5% ($p = 0.007$, chi-square test) between patients with meal completion (32.5%) and those who without meal completion (27.6%). Although the difference of the rate was small, meal completion is important due to its direct relationship to the patient's condition. Therefore, meal completion should be validated use this event as a study hypothesis.

Meal Completion as a Substitutional Event for Clinical Pathway Completion: Extension of Comparison from Single Hospital Database to That of Multiple Hospitals

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Abstract

We demonstrated that clinical pathway completion can improve quality indicators such as length of hospital stay or mortality rate. Moreover, we extended the completion rate of clinical pathway from binary to percentage using electronic medical records that can identify whether each treatment is registered in clinical pathway or not. Since few databases can record the level of detail of treatment as our case, this study explored events that can substitute for clinical pathway completion. The prospective event was named “meal completion” decided by whether additional fee of meal was claimed every day or not. Approximately 8259 patients were selected for data analysis. With application of a propensity score matching, two groups (1997 patients each) were created for comparison of clinical pathway completion rate between patients with meal completion and those without. Before applying propensity score matching, the difference of rate of meal completion was about 9% ($p < 0.001$, chi-square test) between patient with clinical pathway completion (25.2%) and those who without clinical pathway completion (34.3%). After applying propensity score matching, the difference of rate of clinical pathway completion was about 5% ($p = 0.007$, chi-square test) between patients with meal completion (32.5%) and those who without meal completion (27.6%). Although the difference of the rate was small, meal completion is important due to its direct relationship to the patient’s condition. Therefore, meal completion should be validated use this event as a study hypothesis.

Keywords:

Clinical Pathway, Meal, Propensity Score Matching

Introduction

Clinical pathways (CPs) are implemented and revised in various diseases for standardization of medical service. To evaluate the effect of CPs, we recently demonstrated that CP completion can reduce the length of hospital stay (LHS) and decrease mortality rate [1-3] and demonstrated how CP completion rate was calculated based on each treatment, converted from binary (completed or not) to a percentage (0%–100%).

However, the limitation of our recent study was the difficulty in applying this calculation method to other hospital’s electronic medical records (EMRs). Therefore, we aimed to explore a viable substitution which relates to CP completion. In other words, this study wants to explore events that are easily extracted from standard EMRs all over the world. It would be

possible for almost medical organizations that cannot integrate to evaluate the effect CP completion using these events

Materials and methods

We retrospectively reviewed 8256 hospitalized patients from EMRs in the University of Miyazaki Hospital from April 1, 2013, to March 31, 2018.

CP completion was determined by whether patients have taken all treatments registered on the CP. A prospective event was termed a meal completion (MC), which means that medical fees for enrichment of the meal were implemented every day. As meals are always registered on CP, this metric can help determine the variance in CP completion. We expect the positive relationship between CP and MC as study hypothesis, because MC indicates that patients would be well based on the availability of meal.

Propensity score matching (PSM) was used to evaluate the relationship between CP completion and MC, with the objective variable being MC and the explorative variables being sex, age, body mass index (BMI), LHS, and the existence of the following events: smoking status, operation, plan change, comorbidity, and post-hospital disease. The 10th revision of the International Statistical Classification of Diseases and Related Health Problems (ICD-10) was used to evaluate plan change. If ICD-10 of the main disease differs from the disease for which medical resources were implemented, or if there is existence of disease with secondary implementation of medical resources, a plan change would be implemented. In total, 3994 patients were analyzed using PSM and thusly divided into two groups by MC (1997 patients each).

All statistical analyses were performed using SAS University Edition (developed by SAS Institute Inc., USA). We evaluated the difference of rate of MC by each explorative variable. For categorical variables including age, BMI, and LHS, chi-square test was implemented. For continuous variables (age, BMI, and LHS), Student’s *t*-test was implemented.

Results

Table 1 shows the number and rate of MC by CP completion and each explorative variable. All *p*-values were less than 0.05 except for plan change ($p = 0.134$), comorbidity ($p = 0.596$), and BMI as a continuous value ($p = 0.395$).

Table 1- Number and rate of MC

(a) Categorical

		Number of patients		Rate of MC
		All	With MC	
CP completion	Yes	2233	765	34.3
	No	6026	1517	25.2
Sex	Male	4031	1289	32.0
	Female	4228	993	23.5
Age (years)	0 to 19	999	264	26.4
	20 to 64	3823	871	22.8
	65 to 74	1790	541	30.2
	upper 74	1647	606	36.8
BMI	Under 18.5	1241	347	28.0
	18.5 to 25.0	4636	1318	28.4
	25.0 to 30.0	1832	492	26.9
	30.0 to 35.0	366	75	20.5
	35.0 to 40.0	73	16	21.9
	Above 40	27	5	18.5
Smoke	Yes	2423	744	30.7
	No	5836	1538	26.4
Operation	Yes	6393	1440	22.5
	No	1866	793	42.5
Plan change	Yes	751	225	30.0
	No	7508	2057	27.4
Comorbidity	Yes	4230	1158	27.4
	No	4029	1124	27.9
Post-hospital disease	Yes	2186	562	25.7
	No	6073	1720	28.3
LHS (days)	1 to 7	2375	1227	51.7
	8 to 17	3558	702	19.7
	Above 17	2326	353	15.2

(b) Summary statistics

		All patients	With MC	Without MC
Age (years)	Mean	53.3	58.0	51.5
	SD	24.1	23.8	23.9
BMI	Mean	22.8	22.7	22.8
	SD	5.8	4.2	6.3
LHS (days)	Mean	17.5	11.0	20.0
	SD	23.1	12.6	25.6

Table 2 shows the number and rate of patients with CP completion by MC for patients after PSM. There was about five percent in rate of CP completion by MC ($p = 0.007$).

Table 2- Number and rate of patients CP completion by MC

MC	Number of patients	CP completion	
		Frequency	Rate (%)
Yes	1997	650	32.5
No	1997	552	27.6

Discussion

Our data suggests that patients with MC can complete CP than those without MC. Although there were some differences between MC and CP, MC would be a useful event to compare other quality indicators. MC is an important event to evaluate the patient's condition, because availability of meal is directly connected to the condition. If there were young patients with enough motor function and old patient with daily nursing, the

difference of this availability is obvious. The younger can make MC easily. The older is more difficult than the younger.

However, there is room for improvement in these analyses. One PSM compared patients who had an operation with those who did not, and surgical patients might not eat for several days around a surgery. However, this action is not integrated into MC enough, because the existence of MC is simple decided by comparison between LHS and days of additional fee of meal.

In conclusion, this study has explained that MC can become an objective variable as same as CP. Future studies will use MC in empirical measurements.

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Compliance with ethical standards

The authors declare that they have no conflict of interest.

All procedures performed in studies involving human participants were in line with the ethical standards of the Committee of Medical Ethics, University of Miyazaki (Ethics approval number: O-0383) and with the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards.

Informed consent was obtained through an opt-out method. Authors posted details of this study on their website and gave participants an option to opt out until a specified date.

References

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