



Improved patient survivals with colorectal cancer under multidisciplinary team care: A nationwide cohort study of 25,766 patients in Taiwan

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ABSTRACT

Objectives: The evidence of improved survival in patients of colorectal cancer (CRC) receiving multidisciplinary team (MDT) care remains inconclusive.

Methods: All patients with incident CRC but no prior cancer history in 2005–2008 were included and followed till 2010. A logistic regression model was used to predict the associated factors to participate in the MDT care model. The propensity score method was included under Cox proportional hazards model to reduce potential bias and to conduct survival analyses.

Results: In total, 25,766 patients were included; the mean follow-up period was 35.1 months. The factors associated with participating in MDT included receiving treatments at regional hospitals, at private hospitals, and stage III cancer (all p values <0.001). The favorable survival factors included participating in MDT (HR = 0.91, p = 0.001), age of 45–75, top-ranked income group, receiving treatments at district hospitals, or at hospitals or with doctors that had higher service volumes (all p values <0.05). Regarding individual stages, the risk of mortality was significantly lower at stage IV (HR = 0.88, p = 0.002).

Conclusion: Colorectal cancer patients with participation in MDT have a lower mortality risk; the improvements of survival exist in all colorectal cancer patients, especially in those with stage IV disease.

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1. Introduction

Colorectal cancer (CRC) was the third most common cancer worldwide, with nearly 1.4 million new cases [1], and about 694,000 people died of the disease in 2012 [2]. In Taiwan, CRC is the most common cancer since 2010 [3]. A large proportion of incident CRC patients are found at advanced stages (18.3–24.2% in Taiwan, 14.5–18.8% in France) [4–6]. Many of them chose conservative

attitudes toward treatment; treatment refusers in CRC were reported to have 2.66 times the risks of death of those who received treatments [7].

Multidisciplinary team (MDT) care started after the publication of the Calman and Kline report [8] in 1995, a report which recommended that the treatment of CRC should be coordinated by an MDT. Nowadays, MDT has become the model of CRC care across European countries [9], in the United States [10], Australia [11], and has been increasingly accepted in China [12]. In 2003, Taiwan Health Promotion Administration, Ministry of Health and Welfare launched a project called “Cancer Centers for a Great Improvement in the Quality of Cancer Care” to enhance the quality of prevention, diagnosis and treatment of cancers [13]. Under the project, similar to the characteristics in MDT of other countries, the fundamental work is to “organize a multidisciplinary cancer treatment team” with diverse subspecialties and under the patient-centered principle. However, the project started as an encouraging program with extra reimbursement, while in other countries, it was a requirement. Hospitals which were approved to participate in this project should follow the “Regulations for Cancer Care Quality Assurance Measures” [14], which required the MDT include at least (1) psychological counseling, social work, spiritual care; (2) oncology nursing and pain control; (3) nutrition, health education, and drug information; (4) rehabilitation; (5) transitional service upon discharge from hospital; (6) hospice and palliative care or home care services if necessary; and (7) information on patient support groups [14]. The team leader coordinated the subspecialties and provided customized care protocol for the patients. Thus, patients were treated by an integrated MDT, no longer by individual physicians.

The policy of the MDT project in Taiwan aimed to encourage all hospitals which treat cancer patients to join this program and provide MDT expertise treatments. However, even though the hospitals joined the project, not all doctors in these hospitals practiced MDT care.

Thus far, the MDT care model has demonstrated improved patient survivals in breast cancer [15], oral cancer [16,17] and prostate cancer [18]. In Taiwan, factors associated with better cancer survivals included Charlson comorbidity index, level of hospital, ownership of hospital, service volume of hospital and doctors [16,19]. In CRC, the improvements of MDT model on patient survival remain controversial. Our study aimed to provide evidence for the improvement of survival in CRC patients under MDT care. Our hypothesis was that CRC patients who participated in MDT care might have better survivals.

2. Materials and methods

The National Health Insurance (NHI) is a mandatory program which started since 1996. By the end of 2014, over 99.6% of the people in Taiwan were enrolled [20], and the contract rate was over 93% [20]. The NHI Research Database contains all medical claims with regards to comprehensive medical care services. The claims data are under periodic review by the Bureau of NHI to ensure accuracy. Personal identification information is encrypted before the release of the research database to protect patient privacy. This

study was approved by the institutional review boards of the hospitals and the school.

2.1. Study subjects

In Taiwan, MDT project started in 2004. We left a wash-out period of 1 year to start the study since 2005. The latest available data in Taiwan when starting the project was 2010. However, to maintain complete observation of at least 2 years, we chose to include new patients till 2008. All patients who had no previous cancer history, were newly diagnosed and registered in 2005–2008 as having CRC (International Classification of Diseases for Oncology, third edition, ICD-O-3 C180–C218) were identified as the target cohort. They were included if, within one year after diagnosis, they received any of the following treatments: surgical operation, radiotherapy, or chemotherapy. They were excluded if: (1) the histology showed lymphoma or sarcoma (ICD-O-3 morphology code 9590–9989, 8800–8806); (2) no pathological diagnosis obtained; (3) in situ cancer was identified; (4) the patients did not receive any of the aforementioned treatments within one year after cancer diagnosis; or (5) the state of the disease was so advanced that they died within one month of formal diagnosis. All of the included patients were followed up until they died, were lost to follow-up, or until the end of 2010, whichever came first.

2.2. Data sources

This is a retrospective nationwide cohort study using three secondary datasets: first, Taiwan Cancer Registry (2005–2008) published by Health Promotion Administration, to retrieve the data of all incident CRC patients. The data included the demographics, date and age of diagnosis, cancer staging, and treatment modality. Second, the NHI Research Database (2002–2010) published by the Ministry of Health and Welfare, Taiwan, which contained the health statuses before and after cancer diagnosis, comorbidity, presence of catastrophic illness including CRC if applicable, socio-economic status (residence localities, income), health service utilization, the treatment modalities and hospital characteristics (ownerships, levels of hospitals, service volume, and detailed health care claims). Third, the Cause of Death Database (2005–2010) published by the Ministry of the Interior, Taiwan, which provides confirmation for mortality. Since both the Taiwan Cancer Registry and the catastrophic illness file in the NHI Research Database recorded incident CRC diagnosis, the credibility of cancer diagnosis was further strengthened.

2.3. Variables definition

The urbanization of residence areas was categorized into seven levels, with level 1 as the highest degree of urbanization, and level 7 as the lowest degree of urbanization [21]. To simplify the comparisons, level 1 was chosen as the reference, and the remaining 6 levels were divided into 3 groups (level 2 and 3, level 4 and 5, and level 6 and 7). The severity of comorbidity was presented as Charlson comorbidity index (CCI) modified by Deyo et al. [22], with scores

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