

Online only supplementary material**Supplementary methods*****Details of the NDB sampling dataset***

The NDB sampling dataset used in the current study includes three categories: outpatient data, inpatient data in diagnosis procedure combination (DPC) hospital, and inpatient data in non-DPC hospital [1]. The DPC is the Japanese original bundled payment system for medical expenses managed by the MHLW since 2003 [2]. Today, the proportion of hospitals recruiting DPC payment system has increased to cover approximately 90% of the total acute care inpatient hospitalizations [3]. Because inpatient data in DPC and non-DPC are very unlikely to overlap especially in CRAO hospitalization, we treated both as “inpatient data” in the current study.

Several cases are not included in the NDB database because of the Japanese health insurance system. Specifically, the number of consultations that give priority to public expenditures rather than health insurance might have been underestimated in the patients who have been supported as welfare recipients with low-income or by the Relief in Accordance with the Law for Special Aid to the Wounded and Sick Retired Soldiers or by Atomic Bomb Victims' Relief Law. However, more than 95% of the health insurance coverage has been

reported to be included in the NDB dataset [4].

Primary inpatient and secondary inpatient

To ensure the quality of investigation, we used the CRAO diagnostic code only in the following 6 out of 7 categories of conditions filled out with ICD-10 codes in the DPC inpatients claim data, other than “comorbidities at the time of admission”: “greatest-resource condition,” “trigger-for-hospitalization condition,” “main condition,” “other condition,” “second greatest-resource condition,” and “conditions occurring during the hospitalization.”[5] Among these 6 categories, “other condition”, “second greatest-resource condition,” and “conditions occurring during the hospitalization” are used for patients who developed CRAO while hospitalized for other diseases as previously reported [6] [7]. We defined these cases as “secondary inpatient”, while we defined the rest of whole inpatient as “primary inpatient”.

Calculation of the incidence of CRAO

In principle, since the NDB sampling dataset is fully anonymized based on the legally restriction, making it difficult to link with other data. For the outpatient data, however, the

number of patients who have visited two or more clinics were counted using the hashed personal identification number provided only in outpatient claim data of the NDB sampling dataset[8]. On the other hand, this also makes it impossible to count without duplication among the different claim categories including inpatient data with no hashed personal identification number. Because almost all patients in the Japanese medical system visit outpatient departments even before admission, outpatient data alone should be enough to identify the incidence of CRAO. If a patient is, however, directly hospitalized without referral from another institution on the first consultation day, the outpatient claims are combined into the inpatient claims. Such cases cannot be included in the identification of CRAO when we use outpatient data alone. Referring to the results of the Patient's Behavior Survey conducted by MHLW (available at <https://www.mhlw.go.jp/english/database/db-hss/pbs.html>, accessed February 28, 2020), we found that about 20% of all inpatients were hospitalized on the day of first consultations without referral. This was why we added 20% of primary inpatient and 100% of secondary inpatient to the outpatient data.

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