Completeness of Case Ascertainment among the Elderly in Swiss Cancer Registration

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Objective

- The aim of the present study is to estimate the overall coverage of malignant cancer cases in combined Swiss Cancer Registries with dedicated methods, stratified by cancer type and age at diagnosis.

Background

- Cancer diagnoses may not come to the attention of the cancer registry by a number of reasons, such as treatment by the general practitioner only, or without pathological assessment, or only palliative treatment. To be missed by cancer registration may differ with age at diagnosis.
- The age-dependence of completeness is rarely reported and observations made are not in agreement, ranging from no dependence [1], to negative [2], or to positive correlation [3,5] with age.
- No gold-standard approach is available to assess completeness. We apply simple as well as more dedicated methods and focus on replicated outcomes.

%DCN/DCO: simple measures from routine statistics

Age at diagnosis	C00-14	C15	C16	C18-21	C22	C25	C33-34	C43	C50	C53-55	C56	C61	C64	C67	C69-72	C81	C82-86,C96	C90	(C91-95)	C91	C92-94
0 - 59	0.1	1.0	0.0	0.4	4.7	3.5	1.6	0.0	0.1	0.3	0.0	0.1	0.4	0.0	1.5	0.0	0.1	0.0	0.9	0.7	1.0
60 - 74	0.9	0.8	1.1	0.8	5.5	5.0	2.6	0.1	0.2	0.5	1.5	0.1	1.1	0.6	3.3	0.0	0.5	1.5	1.3	0.5	2.3
75 +	2.7	5.5	5.8	4.0	10.6	16.9	8.4	0.5	2.3	4.2	8.2	5.1	7.3	3.7	16.2	0.0	3.6	7.8	10.6	9.9	7.9

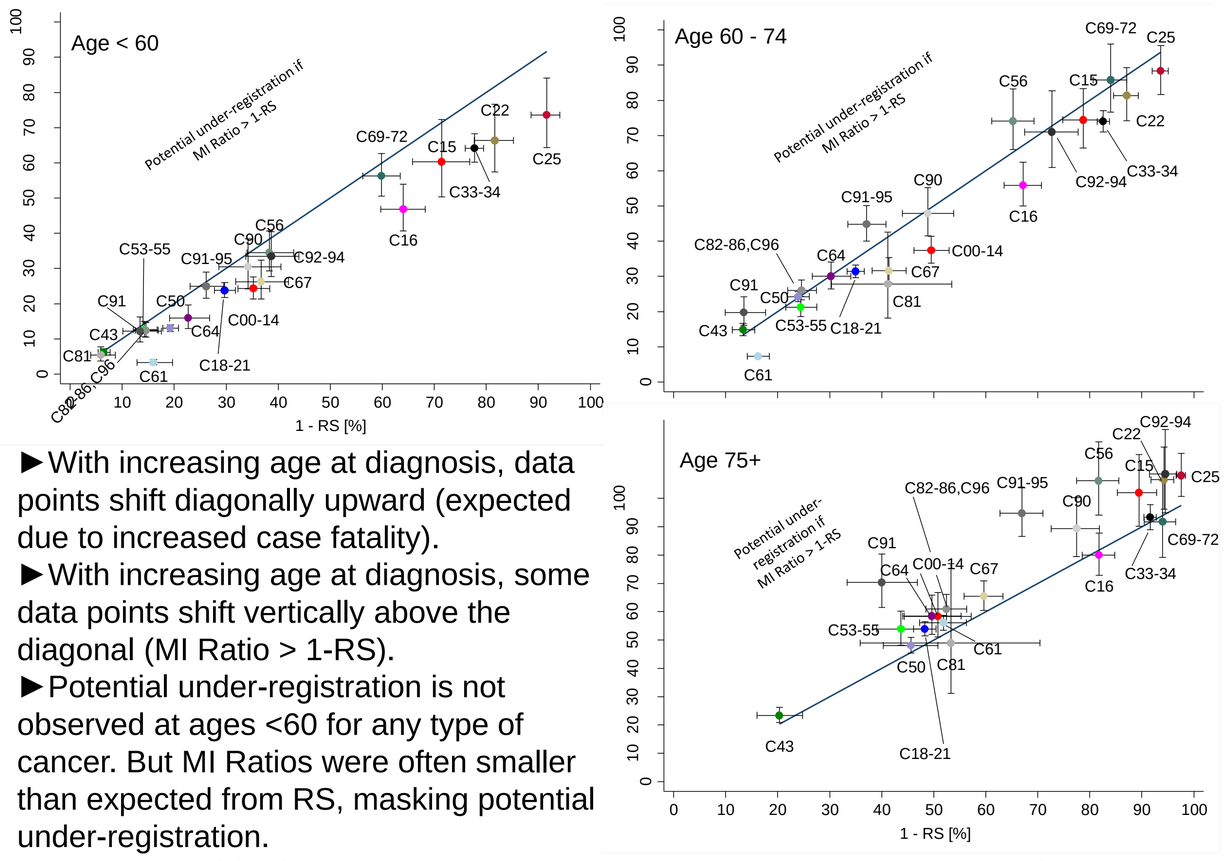
DCN: Death certificate as first notification (% of all diagnoses)

Age at diagnosis	C00-14	C15	C16	C18-21	C22	C25	C33-34	C43	C50	C53-55	C56	C61	C64	C67	C69-72	C81	C82-86,C96	C90	(C91-95)	C91	C92-94
0 - 59	0.0	0.0	0.0	0.0	0.8	1.2	0.5	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
60 - 74	0.3	0.4	0.2	0.2	1.1	1.8	0.7	0.1	0.1	0.0	0.6	0.0	0.3	0.2	0.9	0.0	0.1	0.3	0.1	0.2	0.0
75 +	1.2	1.5	2.1	1.3	2.2	5.9	2.3	0.3	1.0	0.8	2.0	2.4	3.0	1.2	3.0	0.0	1.2	2.3	3.8	4.1	1.9

DCO: Death certificate only (% of all diagnoses)

►Death certificates (DCs) are judged negligible (DCN <5%) for case finding in patients <75 years of age, except for hepatic (C22) and pancreatic cancer (C25).
►DCs are an important information source for patients aged 75+ (DCN >10%) in C22, C25, brain cancer (C69-72) and leukemia (C91-95). Because DCs may not always mention a cancer diagnosis, these sites are potentially under-registered.
►Intensive trace-back of DCN diagnoses lead to low %DCO for all cancer types and age groups.

MI/Surv-Method: M/I Ratio vs 1-Relative Survival

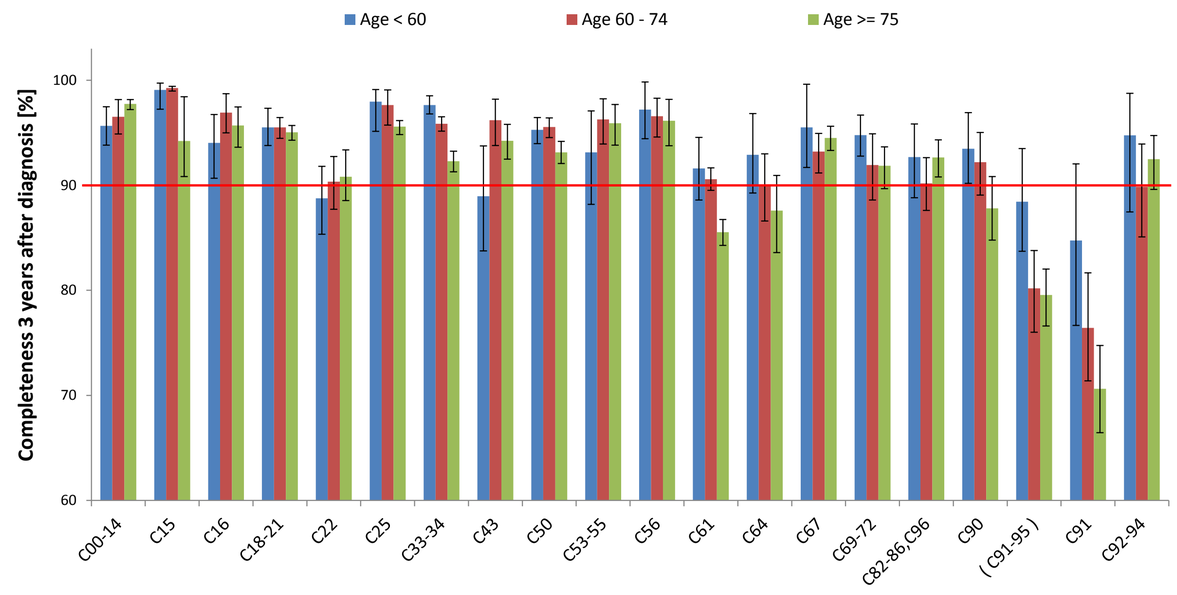


►With increasing age at diagnosis, data points shift diagonally upward (expected due to increased case fatality).
►With increasing age at diagnosis, some data points shift vertically above the diagonal (MI Ratio > 1-RS).
►Potential under-registration is not observed at ages <60 for any type of cancer. But MI Ratios were often smaller than expected from RS, masking potential under-registration.
►Leukemia (C91-95) is potentially under-registered in patients aged 60-74 due to lymphoid types (C91), while myeloid types (C92-94) are not affected. In addition, ovarian cancer (C56) is potentially under-registered at ages 60-74.
►At ages 75+, more types of cancer appear under-registered: uterine (C53-55) and kidney cancer (C64), non-Hodgkin lymphoma (C82-86,C96) and multiple myeloma (C90), esophageal (C15), hepatic (C22), pancreatic cancer (C25) and myeloid leukemia (C92-94) to some (unknown) degree.

Data and Methods

This study is based on the National Core Dataset (NCD) managed by the National Institute for Cancer Epidemiology and Registration (NICER) with the purpose of national cancer monitoring in Switzerland. Mortality statistics was derived from the Federal Statistical Office. All seven Cancer Registries (CR) eligible for the diagnosis period 2006-2011 (vital status follow-up 2012) and the methods used were included, representing 71% of the registered population, or 45% of the total population in Switzerland. Malignant primary diagnoses (coded ICD-10) were pooled.
In addition to simple approaches (%DCN, %DCO), we applied two dedicated methods: Completeness estimated by the MI/Surv-Method: The MI ratio and the complement of relative survival (1-RS) five years after diagnosis (ten for C50, C61) are expected to be similar under certain assumptions because both are estimators of the case fatality [4]. The MI ratios were calculated from crude mortality and incidence rates. The crude MI ratio is compared with crude 1-RS derived from the same regional population at risk. The MI/Surv-Method is a qualitative assessment of completeness. Completeness estimated by the Flow-Method as described in [5]: The Flow-method is based on the estimation of 3 processes depending on time t after diagnosis: (1) function s(t), the survival times, (2) function u(t), the times to registration during the patient lifetime, and (3) function m(t), the proportions of DCs which mention cancer. Cases only known from DCs (DCO) were excluded. If the same person had multiple primary diagnoses within a reporting group, only the first diagnosis was included. The Flow-Method provides an direct estimation of the proportion of missed cases.

Flow-Method: direct estimation of completeness



►Potential under-registration (<90% at 3 years after diagnosis) is not observed for ages <75, except for lymphoid leukemia (C91).
►At ages 75+, prostate cancer (C61), and lymphoid leukemia (C91) are potentially under-registered.
►For all other types of cancer, completeness was very close or above 90%, at all age-groups.
►In most types of cancer, completeness and age seemed unrelated. Possible exceptions are lung cancer (C33-34), prostate cancer (C61), and lymphoid leukemia (C91).

Summary

- Ascertainment of cancer in the elderly via death certificates (DCs) is specifically important (DCN≥10%) for hepatic, pancreatic, and brain cancer, and for leukemia. Intensive trace-back efforts reduce %DCO to low levels. %DCO thus contributes little information with respect to completeness.
- The MI/Surv- and Flow-Method specifically flag lymphoid leukemia (C91) as potentially under-registered, and both methods report a higher incompleteness with age at diagnosis.
- There was disagreement between methods about potential under-registration for other types of cancer and age-groups. This must be carefully qualified with respect to the method-specific assumptions made.

Conclusion

- The only type of cancer repeatedly flagged for potential under-registration by several methods was lymphoid leukaemia (C91) in ages ≥60 years.

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