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Geographic variation in cancer care quality at the end-of-life – a retrospective cohort study based on linked data from national registries in Norway

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Background

Optimization of cancer care in the late stages of life is essential for the provision of comfort and improvement of quality of life. Health care systems worldwide are facing growing demand for appropriate end-of-life (EOL) cancer care as the number of cancer deaths increases due to ageing populations.

Objectives

Aim of the study was to describe EOL cancer care across health referral regions (HRR) in Norway using international evidence-based quality measures.

Methods

This study included all adult persons in Norway who died from cancer in the period 2012-2017 (n= 62 495). Individual data were obtained from registries with national coverage:

- The Cancer Registry of Norway
- The Norwegian Patient Registry
- The Norway Control and Payment of Health Reimbursement Database,
- The Cause of Death Registry
- Statistics Norway

Multilevel logistic regression models were applied for comparisons across HRRs. Clinical, demographic (model 1) and socioeconomic patient characteristics (model 2) and contextual factors (model 3) were added to the model to assess compositional and contextual effects.

Measures of supportive EOL care were:

- physician house call last two weeks of life
- dying at home

Measures of inappropriate EOL care were:

- hospitalization last month of life
- emergency department (ED) visit last two weeks of life
- hemotherapy last two week of life
- life-sustaining treatment last month of life
- any inappropriate care (composite measure)

Results

National proportions and HRR-range for each of the quality measures are shown in the table. HRR-differences (odd ratios (OR)) in provision of supportive care and provision of any inappropriate care are depicted in the figure.

OR for physician house call ranged 0.84-2.80 (model 3). Ten HRRs varied significantly from the reference HRR .
OR for dying at home ranged 0.67-1.63 (model 3). Three HRRs varied significantly from the reference HRR .
A total of 23% of the patient received some supportive care. The measures of inappropriate care overlapped. Any such measure was found in 66% of the patients. OR for any inappropriate care ranged 0.80-1.16 (model 3). Six HRRs varied significantly from the reference HRR. One in four patients had neither supportive nor inappropriate care.

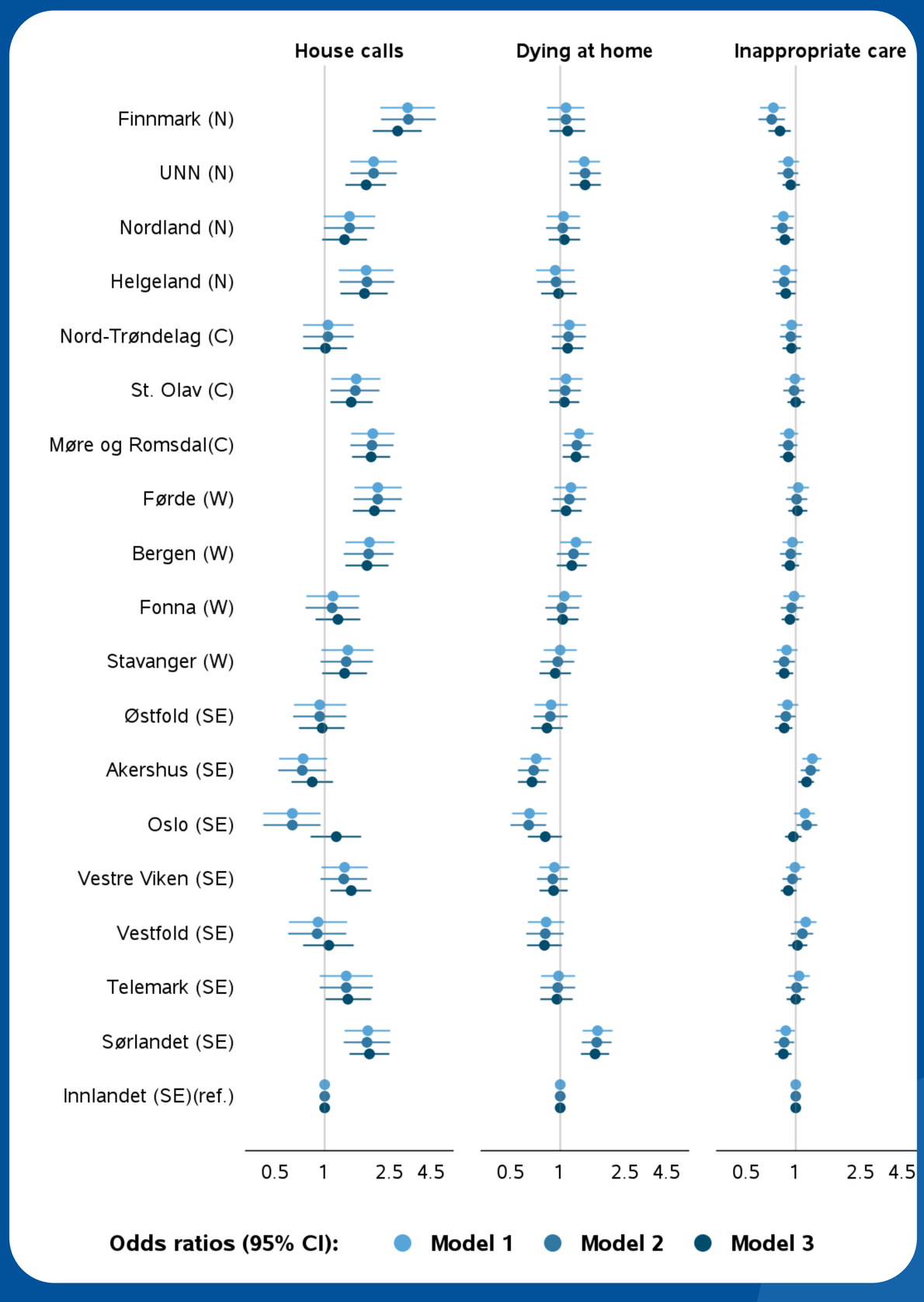
Proportions of the total individual variation attributable to the HRR- and municipal levels were small in all quality measures, except from physician house call (table).

Table. Proportions of EOL cancer care provision

Quality measures	Nationally % (HRR range)	ICC* HRR	ICC* mun.
Physician house call	15.5 (9.6-39.6)	4.7%	10.6%
Dying at home	12.9 (8.8-21.9)	1.6%	3.3%
Hospitalization	64.7 (56.9-71.2)	0.5%	1.0%
ED visit	39.8 (33.1-49.1)	0.6%	0.8%
Chemotherapy	2.4 (1.0-4.0)	1.6%	NS
Life-sustaining treatment	3.5 (2.3-5.2)	1.2%	NS

* ICC: Intraclass correlation coefficient detailing the proportion of the total individual variation attributable to the HRR and municipality levels in the null model.

Figure. HRR-differences in provision of EOL cancer care quality



Null model: Cluster-specific random effects only to model between-HRR and between-municipal variation

Model 1: Null model + sex, age, cancer type, stage, comorbidity
Model 2: Model 1 + education, household income, type of household
Model 3: Model 2 + travel time, hospital in municipality

Conclusion

Cancer care quality at EOL varied between the health referral regions. Geographic variation was larger for supportive EOL cancer care than for inappropriate EOL care. Compositional effects from patient characteristics on geographic variation were neglectable for all quality measures. For physician house call, travel time to hospital and hospital in municipality reduced the total unexplained contextual effect from 15.3% to 10.9%. Contextual effects were small for all measures of inappropriate care.