



Abnormal cervical cytology and health care use: A population-based register study



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HIGHLIGHTS

- We did a nationwide population-based study.
- We assess the use of health care services in women with abnormal cytology.
- These women constitute a selected group with a higher health care use, before.
- We did not observe any additional burden of the abnormal result.

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ABSTRACT

Objective. This study aimed to assess the long-term use of health care services in women with abnormal cytology results compared to women with normal cytology results.

Methods. We did a nationwide population-based study, using women aged 23 to 59 years participating in the national organized cervical cancer screening program. We included a study population of 40,153 women with abnormal cytology (exposed) and 752,627 women with normal cytology (non-exposed). We retrieved data from the Danish Civil Registration System, the Danish Pathology Data Bank, the National Health Service, the National Patient and the National Prescription Register. We calculated the frequencies of contacts to general practitioner (GP), to private psychiatrist and/or psychologist, admissions to hospitals and use of prescription drugs. These frequencies were calculated separately in the 5-year period “before” the cytology result and for the 5-year period “after” the result.

Results. During the “before” period exposed women had more contacts to GPs, more contacts to psychologists/psychiatrist, and more hospital admissions than non-exposed women. In both exposed and non-exposed women, health care use increased from the “before” to the “after” period. This increase was significantly higher for exposed than non-exposed women regarding contacts to GP, admissions to hospitals, and drug use.

Conclusion. Women with abnormal cytology results constitute a selected group with a higher health care use than other women even before they have the abnormal cytology. This difference is further enhanced after the abnormal cytology result.

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1. Introduction

In many countries around the world cytology-based cervical screening is provided either as an organized screening program or as opportunistic screening. In Denmark, around 5% of women screened in a given year get an abnormal result, though only 1.3% will have a high-grade

cervical intraepithelial neoplasia (CIN) requiring treatment [1]. The possible psychological burden caused by the many abnormal results in cervical screening has therefore raised concern [2].

Many papers have investigated the psychosocial impact of getting an abnormal result [3,4]. Drolet et al. found a significant increase in anxiety after receiving an abnormal cytology result [5]. Waller et al. noted that although most women did not suffer from on-going anxiety, it reappeared in some women when they were due for repeated testing [6]. All previous studies have used psychometric measurements to assess the psychosocial burden. These measurements can, however, be

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prone to recall bias. Furthermore, the studied populations may to some extent be selected as only invited women willing to answer the study questionnaires were included. Finally, most of the studies looked only at short-term changes occurring after women had been informed about the cytology result.

To overcome these limitations, we undertook a population-based register study of use of health care services among women with abnormal cytology results compared with that of women with normal cytology results. To take account of possible selection into these two groups of women, our analysis also compared their use of health care services before the receipt of cytology.

2. Material and methods

2.1. Setting

Pap smears introduced in Denmark in the late 1950s, and the incidence and mortality of cervical cancer decreased dramatically during the 1970s and 1980s. Organized screening started in Denmark in 1962 with a pilot program in one county, and organized screening was later expanded to cover all counties in 1996. National screening recommendations were issued in 1986 recommending screening of women aged 23–59 years every third year [7]. In 2007, new guidelines remained unchanged for women aged 23–49 years, but recommending screening every fifth year for women aged 50–65 years. Women are not screened during pregnancy. In 2012, human papillomavirus (HPV) testing was recommended as a check-out test for women aged 60–64 years [1]. The shift from conventional Pap smears to liquid-based cytology took place between 2006 and 2014 [8].

We aimed to identify the possible impact of an abnormal cytology outcome on the general health status. We included the health care indicators expected to reflect most comprehensively the overall health status of the women. In Denmark, all inhabitants are registered with a general practitioner (GP), and the GP is the gatekeeper to all other health care services. The use of psychiatrist/psychologist and use of analgesics and nervous system drugs were expected to reflect possible psychological side effects of abnormal cytology outcomes. The use of hospital care would reflect any serious disease burden.

2.2. Study design

The study population was defined as women with a valid cytology sample between 1st January 2003 and 31st December 2005, and aged 23 to 59 years when the sample was taken. Women were defined as “exposed” when having an abnormal cytology result (atypical squamous cells of undetermined significance [ASCUS], low grade squamous intraepithelial lesion [LSIL], high grade squamous intraepithelial lesion [HSIL], atypical glandular cells [AGC], atypical squamous cell cannot exclude high grade intraepithelial lesion [ASC-h], and invasive carcinoma), and “non-exposed” when having a normal cytology result. If more than one cytology result occurred, we included only the first one occurring during the period 2003–2005 with age between 23 and 59 years.

We defined 4 measures of health care use: number of contacts to the general practitioner (GP), number of contacts to a private psychiatrist and psychologist (PSY), number of admissions to hospitals (HOSP), and use of prescription drugs (DRUGS) measured as number of “defined daily dose (DDD)” of drugs using anatomical therapeutical chemical classification (ATC) codes. DDD is the assumed daily maintenance dose administered for the main indication as mono-therapy. We included selected analgesic (e.g. opioids ATC: N02A), antiepileptic (N03), psycholeptic (N05), psychoanaleptic (N06), and other nervous system drugs (N07).

We measured the number of events over a 10 year period, during the 5 year period before the sample was taken (“before-diagnosis-period”), and during the 5 years after (“after-diagnosis-period”). Women in the study had to be alive and present in Denmark during the entire 10-year period (except up to 1-month absences likely due to registration

errors). To avoid that past cervical neoplasia could influence behavior in the study period; we excluded women with CIN treatment during the “before-diagnosis-period”, and women with previous cervical cancer.

In order to take into account a possible interaction between the outcome level in the “before-diagnosis-period” and cytology result we undertook an analysis of the outcome in the “after-diagnosis-period” stratified by level of the outcome in the “before-diagnosis-period”.

2.3. Data sources

We used data from the nationwide Danish Pathology Data Bank (Patobank) containing data on cytology and histology from 1990 onwards. The Patobank includes almost 100% of specimens from both public and private sectors, except for Copenhagen county, where cytology registration has been complete only since 2006 [9]. We consequently excluded the 11% of Danish women living in Copenhagen county from the study.

Date of birth, death, immigrations, emigrations, movements within Denmark, and age at date of diagnosis were retrieved from the Danish Civil Registration System established in 1968 [10]. These data allowed exclusion of women not present in Denmark during the entire 10-year study period.

Data on use of GP and psychiatrist/psychologist were retrieved from the National Health Service Register which was established in 1990 [11]. The National Patient Register established in 1977, holds the information on admissions to hospitals. All in- and out-patients contacts with all Danish hospitals were covered during our study period [12]. Last, we collected data on use of prescription drugs from the Danish National Prescription Registry that contains all drugs purchases in community pharmacies from 1995 onwards [13].

All data were retrieved from the beginning of registration until 31 December 2010, and linked via the Danish unique personal identification number.

2.4. Statistical analysis

Exposure was divided into “exposed” including women with an abnormal cytology, and “non-exposed” including women with normal cytology. Period was divided into “before” the cytology test and “after” the cytology test, both periods of 5 years. The data in this study thus provide four observation points for each of the four health care outcomes: number of events in the before period for non-exposed women, in the before period for exposed women, in the after period for non-exposed women, and in the after period for exposed women. The aim of our analysis was exclusively to assess how the exposure affected the mean number of events in the two different periods, and it was not to model or predict means for other possible observation points.

In the analysis, the data were stratified (divided) by period (before/after), and generalized linear mixed models plus least square means were applied to these stratified data to find two points in the outcome variable (mean number of events for exposed women and mean number of events for non-exposed women), their corresponding confidence intervals, and their statistical significance. Following the same procedures we assessed the values, confidence intervals and statistical significance of the difference between the before and after period outcomes for exposed and non-exposed women.

In a secondary analysis, applying the same statistical methods, we stratified by age and region to address the effect of these variables. Age was divided into 23–32 years; 33–42 years; and 43–59 years. Denmark was divided into three regions: “Capital” (Copenhagen and Frederiksberg municipalities), “Islands” (old Frederiksborg, Roskilde, Vestsjælland, Storstrøm, Bornholm and Fyn counties) and “Jutland” (old Sønderjylland, Ribe, Vejle, Ringkøbing, Aarhus, Viborg and Nordjylland counties). These analyses were repeated using generalized linear mixed models with different distributions and link functions

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