Health and Socio-Economic Status
Factors Impacting Care and Treatment in Ovarian Cancer Patients

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Aim: To provide knowledge about health status, socio-economic status and use of public health care in women undergoing ovarian cancer surgery, in order to improve their care during the perioperative period. Method: An epidemiological methodology was applied. The material consisted of data from the Registry of Health and Social Conditions and the Danish Gynaecological Cancer Database on women diagnosed in 2007; this material underwent descriptive statistical analysis. Results: Data from 666 women were suitable for analysis. The majority were older, with moderate to severe systemic illness and a tendency to be overweight. Many had a low educational level, were retired, and lived alone with few financial resources. The quality of the surgical treatment had improved in terms of centralisation and staging procedures. Conclusions: As a group the women proved to be in a vulnerable position in terms of living conditions and general health. Some of these factors might be compensated via health promotion and supportive preoperative care, others by appropriate organisation of treatment. Substantial advantages might therefore be within reach by introducing nurse-led, supportive preoperative care during the wait for surgery.

Key words: female, gynaecological, nursing, postoperative, preoperative
Introduction

Ovarian cancer is the leading cause of death among women suffering from gynaecological malignancies in the Western World (Ferlay, Bray, Pisani, & Parkin, 2004). Danish women have a record-high mortality rate for the disease (Berrino, De Angelis, Sant, Rosso, Bielska-Lasota, Coebergh, & Santaquilan, 2007). In order to improve the survival and the quality of life as well, there is need for early detection and high quality care throughout the full treatment trajectory, which usually consist of one or two sessions of fast-track extensive surgery and six to nine sessions of chemotherapy.

The early stages I–II of ovarian cancer have a good prognosis, with a five-year survival of 80–90%, but the five-year survival rate declines substantially to about 25% in the advanced stages III–IV. It is therefore of crucial importance to treat the disease when it is still in its early stages (Robinson, Ottesen, Christensen, & Krasnik, 2009; Tingulstad, Skjeldestad, Halvorsen, & Hagen, 2003). Due to poor survival rates in cancer in general, the Danish government has issued a guarantee to all citizens of fast and free treatment for cancer (The Danish Ministry of Welfare, 2006). This guarantee includes women with suspected ovarian cancer. Since then, Danish women, like women in many other European countries, have had a maximum waiting time of two weeks from referral to ovarian cancer surgery (Figure 1) (Hannibal, Cortes, Engholm, & Kjaer, 2008; Jensen et al., 2008; Parkin, Bray, Ferlay, & Pisani, 2005). Simultaneously, a growing awareness of the importance of preoperative optimisation emerged within the field of elective surgery, and the surgical care was centralised, specialised and standardised into fast-track multi modal programmes (Marx et al., 2006). As the aim of these preoperative interventions predominantly was to prevent complications in relation to the surgical procedure (Jensen & Hessov, 2000; Kehlet & Wilmore, 2002; Lindström et al., 2008), the efforts did not target the personal needs of the individuals undergoing treatment. Furthermore, the women’s general health status (Charlson, Pompei, Ales, & MacKenzie, 1987; Tetsche, Dethlefsen, Pedersen, Sorensen, & Norgaard, 2008a; Tetsche, Norgaard, Jacobsen, Wogelius & Sorensen, 2008b) and socio-economic and psychosocial conditions were given very little attention (Mitchell, 2003; Shourie, Conigrave, Proude,
Ward, Wutzke, & Haber, 2007; Wang, Caldwell-Andrews, & Kain, 2003). On this background it was found important to further study the general health and living conditions of women, undergoing ovarian cancer surgery.

**Aim**
The aim of the study was to provide knowledge about the general health status, the socio-economic status, and the use of public health care in women undergoing ovarian cancer surgery, in order to improve care and facilitate treatment during the perioperative period.

**Method**
An epidemiological methodology was applied in terms of a cross sectional registry study. The material consisted of registry data on all Danish women with borderline ovarian tumours, ovarian cancer and cancer of the fallopian tubes in 2007 (Petri, Hogdall, & Lidegaard, 2009a). The Danish population is one of the world’s most well-registered, as all citizens have a unique Civil Registration Number (CRN) (The Central Civil registration System, 2011). The CRN has made it possible to link data at both national and individual levels. The social- and health-related data originated from Statistics Denmark (StDK) and the Danish Gynaecological Cancer Database (DGCD). StDK is a national autonomous institution collecting, processing and producing statistical data. The DGCD is a nationwide multi-disciplinary database for research and quality improvement within the field of gynaecological cancer.

**Data management**
Through a link to the Registry of Health and Social Conditions, StDK has produced the social data for the study population. The variables used for analyses were demographic indicators as marital status, cohabitation status, and number of children below 18 years of age, followed by socio-economic indicators as housing, highest level of education, and affiliation to the labour market, socio-economic group, and annual income before tax. The variables selected for analyses from the DGCD were health status indicators as age, diagnosis, and FIGO stage of disease (FIGO: the International Federation of Gynaecology and Obstetrics). The FIGO stages go from I to IV, where I is the smallest stage with localised disease, and IV is the most advanced stage, where the disease has spread to the abdominal organs. The stages from I to III are furthermore divided into the sub-stages A-C, each representing increasing degrees of spreading of the disease. Additional variables selected from the DGCD were body mass index (BMI = weight (kg)/ (height (m)²)) and ASA (American Society of Anaesthesiologists) score. The ASA score describes the overall health status of the patient before surgery: 1 = healthy, 2 = mild systemic disease, 3 = severe systemic disease, 4 = severe systemic and life threatening disease. The original intention was to include life-style variables concerning consumption of alcohol and tobacco, too, but these were not included, as > 20% of these were missing in the database that year.
Treatment indicators as type of hospital, type of surgery and complications were also included.

Statistics
The statistical software package Stata 10 was used in the analyses. The nominal data were summarised, displayed and reported in frequencies (n) and percentages (%), and data at interval level, as age, was presented with mean values and standard deviation (SD). In order to measure the effect between the variable «complications» and the categorical explanatory variables $\chi^2$-tests have been performed first describing BMI and ASA in 2x4 tables, then type of hospital and stage in a 2x2 table, followed by Fisher’s exact test and a stepwise backwards logistic regression analysis of «complications». This analysis contained the following six explanatory variables: diagnosis, FIGO stage, type of hospital, ASA, BMI and age; the latter squared, as this had distribution closer to normal.

Ethics and consent
The study was approved by the Danish Data Protection Agency (file no. 2007-41-1640), which granted access to an encrypted version of data held by StDK (Project no. 702948). The Central Denmark Region Committees on Biomedical Research Ethics advised that the study did not need further approval.

Results
The data material consisted of 667 patients. One was excluded because of an invalid CRN, leaving 666 patients suitable for analysis.

Demographic factors
As indicated in Table 1, 52% of the women were married when diagnosed. Furthermore 4% were cohabiting; this left 44% of the women living alone. A number of 83 patients (12.5%) had a total of 131 children aged 0–17 years; of these, 19 (2.85%) were providing for children on their own when they were diagnosed with ovarian cancer.

Socio-economic factors
Housing concerned type of housing, as no size or price was stated. One person was homeless during the study period, another ten changed their housing conditions during 2007; they were registered twice. «Basic or high school» was equivalent to 7–12 years of primary, secondary or grammar school education (Table 1). This category comprised 42% of the women, of whom 62% had seven years of education. «Vocational education» was equal to 10–12 years of labour market-related education, and «higher education» was categorised as >13 years of education. Affiliation to the labour market and socio-economic group showed an unemployment frequency of 62%, however 61% of these were unemployed due to being retired (Table 1). Income per year was reported in Danish kroner (DKK) but converted to Euros (€1 = DKK 7.5) for international comparability (Table 1).
Health status factors

The mean age of the women was 62.5 years (SD 14.1); the youngest patient was 16 and the oldest was 93. The most frequent stages of disease were IA (25%) and IIIC (28%) (Table 2). The high
number of stage I patients was mainly due to the high number of borderline tumours; almost half (49%) of the women had developed advanced disease (Stages III and IV) when detected. A number of 53% of the women had a normal BMI when detected (18.5–24.9 kg/m²), while 26% were moderately overweight (≤ 25–29.9 kg/m²). Severe overweight (≥ 30 kg/m²) was seen in 17%, and 4% were underweight (≥ 18.5 kg/m²). ASA scores showed that 39% percent of the women were healthy, 46% had moderate systemic illness, and 15% had severe or life-threatening disease.

### Treatment factors

The majority (59%) of the women was treated in a university hospital, which was a national centre for surgical treatment of gynaecological cancer, and 41% were treated at regional hospitals. A total of 24 different hospitals were involved in the surgical treatment, performing five different types of surgery of which the exploratory laparotomy was preferred in 88%. For unknown reasons, 40 patients were not operated. Of those patients with a borderline ovarian tumour, 48.5% were operated at university hospitals and 51.5% were operated at a regional hospital. The

### Table 2. Type of diagnosis and distribution of stages in Danish ovarian cancer patients in 2007

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Borderline</td>
<td>171</td>
<td>26</td>
</tr>
<tr>
<td>Neoplasma malignum ovarii</td>
<td>472</td>
<td>71</td>
</tr>
<tr>
<td>Neoplasma malignum tuba uterina</td>
<td>23</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>666</td>
<td>100</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stage</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>IA</td>
<td>166</td>
<td>25</td>
</tr>
<tr>
<td>IB</td>
<td>18</td>
<td>3</td>
</tr>
<tr>
<td>IC</td>
<td>73</td>
<td>11</td>
</tr>
<tr>
<td>IIA</td>
<td>9</td>
<td>1</td>
</tr>
<tr>
<td>IIB</td>
<td>11</td>
<td>2</td>
</tr>
<tr>
<td>IIC</td>
<td>23</td>
<td>3</td>
</tr>
<tr>
<td>IIIA</td>
<td>18</td>
<td>3</td>
</tr>
<tr>
<td>IIIB</td>
<td>33</td>
<td>5</td>
</tr>
<tr>
<td>IIIC</td>
<td>187</td>
<td>28</td>
</tr>
<tr>
<td>IV</td>
<td>88</td>
<td>13</td>
</tr>
<tr>
<td>No stage stated</td>
<td>40</td>
<td>6</td>
</tr>
<tr>
<td>Total</td>
<td>666</td>
<td>100</td>
</tr>
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stage of disease was associated with being operated at a university hospital in up to 73% of cases in stage III C. This was followed by a decrease in numbers to 54.5% for stage IV.

The frequency of post-surgical complications was 13% (n = 77). Analysing the frequency of complications with ASA scores showed that the general health status before surgery had an impact on the frequency of complications, as 70% of the patients with complications had an ASA score exceeding one. A similar pattern was seen regarding BMI. In those patients with registered complications, 53% were overweight and 5% were underweight. Comparisons of complications and stage of disease showed a significant association between complications and a high stage of disease (p = 0.013 with Fisher’s exact test). Logistic regression analysis with a stepwise backwards exclusion showed that type of surgery, the diagnosis, and the age of the women did not as such have any significant impact on the odds ratio for complications. A small determination coefficient for this analysis on $R^2 = 0.03$ furthermore demonstrated that type of surgery, diagnosis and age explained only little of the variation. However, there was an odds ratio (OR) of 1.80 (95% CI 1.01–3.20) for having complications with a systemic disease (ASA>1); an OR of 1.76 (95% CI 0.87–3.52) for having complications following an advanced stage of disease, and an OR of 1.59 (95% CI 0.98–2.61) for having complications related to overweight.

Discussion

The results showed that almost half the patients lived alone. Jensen et al. (2008) found a higher relative survival among cohabiting women with ovarian cancer than among women living alone. One explanation could be the greater extent of psychosocial support available for cohabiting women; another, the healthier life-style (Poortinga, 2007). The high number of women living alone might therefore be considered in relation to psychosocial support during the perioperative period and perhaps in particular in relation to timing of discharge. As the mean age of the women at the time of diagnosis was approximately 62 years, not many were mothers of minors. However, other kinds of strain within the family context of the middle-aged women might be present but not captured by registry data, e.g. taking care of an old or ill husband. The subject deserves attention, and further investigation during the preoperative period.

Half of the patients lived in single family houses. As the data provided no information about the size or price of the housing, we were unable to compare the findings with a study by Jensen et al. (2008), who found a poorer long term survival among ovarian cancer patients living in small dwellings. This was probably because the size of the dwelling could be synonymous with the woman’s general living standard.

Compared to the female population in a similar average age, the study population had a relatively low educa-
tional level (Statistics Denmark, 2011a). In Danish female cancer patients, Dalton et al. (2008a) demonstrated that a decline in their educational level was associated with a 12% decrease in their survival from 62% to 50%. The fact that up to 42% of the women had no higher education after primary or high school might therefore influence their options of seeking and comprehending detailed information about their disease and its treatment. The educational level should therefore be considered, when informing the patients about the diagnosis and treatment. Furthermore the educational level could be addressed when enrolling patients into highly specialised programmes, in terms of adherence to and perception of treatment. The average female income is generally lower than the male income in Denmark (Statistics Denmark, 2011b). However, 58% of the women in the study population had incomes below the female average, presumably due to their retired status. Previous studies have shown significant association between social position, general health and cancer survival (Dalton et al., 2008a; Dalton et al., 2008b; Wray, Markovic, & Manderson, 2007). These non-disease-specific factors proved influential on the health-seeking process as well as on the outcome of treatment. This impact was most likely due to a reduced capability of seeking health care and of completing efficient treatment in the group of socially less privileged (Hansen, Olsen, Sorensen, Sokolowski, & Sondergaard, 2008; Menvielle & Kunst, 2008).

Approximately 28% of the Danish female population are daily smokers, and 29% consume more than one daily unit of alcohol (Dalton et al., 2008a; Ekholm et al., 2007; Juel 2004). However, a reverse social distribution concerning consumption of alcohol in comparison with consumption of tobacco should be considered, as unlike smoking, it is predominantly the privileged female population who has the highest daily alcohol consumption, (Bjørk, Vinther-Larsen, Thygesen, Johansen, & Grønbæk, 2006). Secession of smoking and alcohol drinking should in all cases be encouraged, before surgery and during the follow-up.

The BMI represented an influential life-style variable: The surgical treatment was negatively impacted by presence of moderate to severe overweight, as this was followed by a higher frequency of complications. Likewise the small number of patients with a BMI < 18.5 kg/m² would benefit from nutritional supplement during the perioperative period. Action against the overweight would, however, not be feasible during the maximum two weeks wait from initial diagnosis to surgery, and should be postponed until after surgery. The tumour itself and the abdominal ascites have furthermore made the preoperative BMI a rather uncertain estimate in relation to nutritional status (Gupta, Lis, Vashi, & Lammersfeld, 2010). Other methods of measuring, such as triceps skin fold, might be preferable in the future.

According to national guidelines, the surgical treatment of women with
ovarian cancer in Denmark should take place in one of five surgical cancer centres in university hospitals. The fact that 24 different hospitals were involved in the surgical treatment indicated deficient implementation of the aforementioned guidelines. The preoperative evaluation via the risk of malignancy index (RMI) was applied according to international guidelines, and patients in whom RMI > 200 were referred to the centres (Charlson, Pompei, Ales, & MacKenzie, 1987). The high number of patients operated outside the centres could be explained by the FIGO stage distribution of 2.5% in stage IA, and by the fact that patients with borderline conditions and stage IA disease proved difficult to detect by RMI alone (Tingulstad et al., 1996). Consequently a genuine staging procedure was not applied in all of these patients. The majority of women with advanced disease and with substantial co-morbidity were treated at the centres. An unexpected and unexplained decrease in the centralisation of patients with stage IV disease was found. This finding requires follow-up.

A 13% complication rate related to surgery was reported to the DGCD database. Analyses showed that the patients’ co-morbidity in terms of ASA scores had the highest impact on the rate of complications. This was followed by high stages of disease and a BMI exceeding normal levels. The type of hospital and the diagnosis had no significant impact on the complication frequency; neither had age. It was expected that the co-morbidity would increase with the increase in age. However the extent of the surgical procedure might have decreased as for the very old patients; this might explain the results. As a whole, the results suggest that co-morbidity should be further targeted in future, for perioperative quality improvements.

Strengths and weaknesses of the study

The use of registry data made it possible to obtain information on the entire Danish population of newly detected ovarian cancer patients in 2007. Data were however not collected directly for the purpose, neither were they complete in terms of presence of all the requested variables. On the other hand, the data were not biased by the aim of the study, and validation showed that data in the DGCD were adequate for research (Petri et al., 2009b).

The study did not deal with an individual perspective on the perioperative period, as this was not possible within the applied epidemiological methodology. It is therefore strongly suggested that this subject is being further investigated within a humanistic health research paradigm, too. Further knowledge concerning coping strategies and lived experiences during the peri-operative period could with advantage be included into the body of knowledge concerning fast-track surgery and pre-operative care (Kehlet & Wilmore, 2002; Marx et al., 2006; Mitchell, 2003; Norlyk & Harder, 2009).
Conclusions
No cause and effect conclusions can be drawn between developing the ovarian cancer disease and the populations’ general health and living conditions. However, the majority of the ovarian cancer patients were older people, with moderate systemic illness and a tendency to be overweight. Relatively many had a low level of education, were retired, and lived alone with few financial resources. Some of these factors could be compensated via providing the women health promoting and supportive perioperative care, others by appropriate organisation of treatment.

Even though fast and centralised treatment was not yet fully implemented and a genuine staging procedure was not performed in all cases, the quality of the surgical treatment had improved substantially in accordance with international guidelines. However, the co-morbidity of the population deserves further investigation, as it has been identified as a subject for substantial quality improvements.

Implications for nursing
In a nursing perspective, every person possesses important personal resources which care should aim to support regardless of the current state of health (Antonovsky, 1987, 1996). Seen as a group the ovarian cancer patients proved to be physically and socially most vulnerable before starting their treatment. On this background there is a pressing need for initiating further care and rehabilitation from the very beginning of the treatment trajectory and during the perioperative period. It is suggested that nurse-led, supportive perioperative programmes, carried out in a close and interdisciplinary collaboration between the patient and her family, the general practitioner and the staff at the surgical centre should be developed and tested within various contexts and settings. Further nursing research is most warranted within this rather unknown field.

Elective surgery facilitates supportive care during the preoperative period. By supporting the patients in preparing themselves for treatment during the average wait of two weeks (Figure 1), some of the factors which are negatively affecting the treatment outcome could be compensated. One suggestion of such a preoperative clinical intervention is illustrated in Table 3, consisting of lean in clinical pathways, basic care and physical optimisation combined with psychosocial support during the perioperative period. In many ways the wait for surgical cancer treatment is a challenging and rather meaningless period of time – for the patients as well as for their families. A supportive preoperative intervention might therefore have the potential of preventing complications and furthermore improving the women’s general health and quality of life during treatment.
Acknowledgements
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References


Table 3. Suggestion of a preoperative care programme

<table>
<thead>
<tr>
<th>Lean in clinical pathways</th>
<th>Preoperative care and optimisation</th>
<th>Psychosocial care and support</th>
</tr>
</thead>
<tbody>
<tr>
<td>First visit within two days</td>
<td>Screening in relation to psycho-social needs</td>
<td>Nurse-led telephone follow-up during the perioperative period</td>
</tr>
<tr>
<td>Immediate scheduling of further diagnostics and surgery</td>
<td>Screening in relation to general health status</td>
<td>Written information on treatment and care (booklet)</td>
</tr>
<tr>
<td>One multidisciplinary team takes care of the individual woman and her family</td>
<td>Management of symptoms (e.g. nausea, pain, constipation)</td>
<td>Audio-visual information on disease and treatment (DVD)</td>
</tr>
<tr>
<td>A coordinator takes care of the papers</td>
<td>Nutritional supplement</td>
<td>Personal information adjusted to the individual and her family</td>
</tr>
<tr>
<td></td>
<td>Physiotherapy supporting respiration and circulation</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Specialist management of co-morbidity</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Offering smoking cessation</td>
<td></td>
</tr>
</tbody>
</table>

Nurse-led supportive care programme in ovarian cancer surgery


