

Reporting 'Denominator' data is essential for benchmarking and quality standards in ovarian cancer

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1 Reporting 'Denominator' data is essential for benchmarking and quality standards in ovarian
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26

27 **ABSTRACT**

28

29 **Objective**

30

31 Combined surgery and platinum-based chemotherapy is the internationally agreed standard
32 therapy for advanced ovarian cancer (AOC). However international cancer registry datasets
33 demonstrate a significant proportion of patients do not receive both or either therapies. Our
34 objective was to evaluate the effect of total patient cohort data ('Denominator') on median
35 overall survival (OS) and determine how frequently this was reported in literature.

36

37 **Methods**

38

39 We retrospectively reviewed OS outcomes for 593 patients diagnosed with AOC for 77
40 months at a regional cancer centre. Patients were stratified into five progressively
41 overlapping categories based on treatment received - Primary debulking surgery (PDS), PDS
42 or Interval debulking (IDS), all surgery and those considered for IDS, patients receiving any
43 treatment and total patient cohort. A systematic search of literature was performed.

44

45 **Results**

46

47 Median OS progressively decreased from 54.5 months in patients receiving PDS, 38.7
48 months in the PDS +IDS group, 35.4 months in the PDS/IDS + patients considered for IDS,
49 33.3 months in patients receiving any treatment and 30.2 months in the total patient cohort.
50 OS in the surgically treated group was statistically significantly different from the OS in the
51 total patient cohort (Denominator)($p=0.000353$). Denominator descriptors were identified in
52 11% of studies.

53

54 **Conclusions**

55

56 Denominator data is critical to understanding selection and OS in AOC. Published outcomes
57 of selected cohorts should routinely incorporate outcomes for all women managed within the
58 reporting Centre. This is essential for benchmarking and quality assurance in gynaecological
59 cancer and should be an integral part of any publication on outcomes from AOC.

60

61 KEYWORDS

62 Ovarian cancer; Denominator; Survival; Surgery; Chemotherapy; Patient selection

63 **INTRODUCTION**

64

65 Disease burden with cytoreductive outcomes following debulking surgery and platinum
66 sensitivity are two of the strongest predictors of survival in advanced ovarian cancer
67 (AOC)(1-3). As such, the importance of surgery is reflected in published international
68 guidelines(4, 5). However, both the United States SEER data and the United Kingdom
69 Cancer registry datasets demonstrate that up to 44% of patients with AOC do not receive
70 optimum therapy(6, 7). Explanations for such deviations in care include: elderly patients;
71 emergency presentations; unclear histology; significant co-morbidities; as well as patient
72 choice(7-9). Investigating the underlying factors for this under-treated group has been
73 difficult with limited data recorded in national databases in these patients compared to their
74 counterparts who receive treatment(9).

75

76 In contrast, there are numerous publications, mainly single centre based, on the success
77 associated with primary cytoreductive surgery where attempted(10-16). In this latter group,
78 survival data is often presented without reference to the population from which they are
79 derived. This makes it impossible to ascertain the selection processes which resulted in the
80 reported patient cohort. Patient selection in AOC between centres can vary by: i) by the
81 proportion of patients selected at each centre to receive any treatment; ii) those managed by
82 primary surgery vs neoadjuvant chemotherapy and; iii) finally by the proportion who
83 following neoadjuvant chemotherapy have debulking surgery. All of these variables may
84 render the population reported showing an excellent outcome (e.g. by selecting only those
85 with a high chance of complete cytoreduction) or a poorer outcome (by a policy that all
86 patients are exposed to primary surgery). Failure to report the proportion of patients
87 receiving each treatment modality therefore risks bias, with centres that routinely operate on
88 patients with more disseminated disease potentially reporting inferior survival data in their
89 surgical arm compared to centres that would routinely manage similar patients with the same
90 tumour load with chemotherapy or palliation. The more aggressive centres may however
91 have superior overall survival (OS) data because they are operating on a greater proportion of
92 patients. We define the denominator as the total number of advanced ovarian cancer cases
93 presenting referred to a specific cancer centre or within the catchment area of a cancer centre
94 and describe the survival shift as the ‘denominator effect’.

95

96 In this study, we evaluate the effect of the denominator on the survival of the total AOC cases
97 in a systematic literature search of published literature and data from our cancer centre.

98

99

100 Methods

101

102 We undertook a retrospective review of all patients diagnosed with stage 3 or 4 AOC
103 between 16th August 2007 and 3rd February 2014. All patients were managed by subspecialty
104 trained gynaecological oncologists at the Pan-Birmingham Gynaecological Cancer Centre
105 (PBGCC), Birmingham, United Kingdom, which serves a population of 2.2 million people.
106 All patients were discussed at the Centre Multi-disciplinary team meeting (MDT) and
107 prospectively recorded in an electronic database. The UK system of healthcare necessitates
108 the management of every ovarian cancer patient within this population to be discussed at the
109 PBGCC MDT. Approval for this study was obtained from the hospital clinical effectiveness
110 department.

111

112 All consecutive patients diagnosed with stage 3 or 4 epithelial ovarian, tubal or peritoneal
113 cancer were identified from the database, along with those lacking a histological confirmation
114 but diagnosed based on imaging and biochemical findings and agreed as AOC by the MDT.
115 All women with suspected AOC underwent a clinical examination, transvaginal ultrasound
116 scan, serum CA125 assay and CT scan of the thorax, abdomen and pelvis, with imaging
117 reviewed by specialist gynaecological cancer radiologists. Following discussion at the MDT
118 meeting, women either underwent: primary debulking surgery (PDS), 3-4 cycles carboplatin
119 AUC 6 +/- paclitaxel 175mg/m² based neoadjuvant chemotherapy (NACT) with an intention
120 to consider interval debulking surgery (IDS), or palliation of symptoms alone (no
121 cytoreductive surgery or chemotherapy). Our standard approach to advanced ovarian cancer
122 is PDS followed by 6 cycles of platinum based adjuvant chemotherapy. However, patients
123 with stage 4 disease, poor performance status (ECOG/WHO 3-4), obvious porta hepatis
124 involvement on scan, small bowel mesenteric or extensive serosal involvement on diagnostic
125 laparoscopy, or with large amount of ascites/pleural effusions with low albumin level are
126 offered 3 cycles of platinum based NACT to enhance their feasibility to radical surgery with
127 3 - 5 further cycles of adjuvant chemotherapy. This is in-keeping with international
128 guidelines of practice(17, 18). Contraindications for IDS consist of progressive disease on

129 NACT, worsening performance status, severe cardiovascular disease and patient choice. All
130 patients with a response on CT/CA125 or clinical indicators are considered for IDS. The
131 PBGCC was an early adopter of advanced upper abdominal surgical procedures in the UK
132 with complete (R0) and optimal (<1cm) (R1) cytoreduction rates of 62.2% and 14.3%
133 respectively in AOC. Detailed surgical outcomes-have been previously published(19).

134 Gynaecological cancer care in the UK National Health Service (NHS) is delivered at
135 designated regional cancer centres that are responsible for the care of all women with
136 gynaecological malignancies within a specific catchment population. For illustration, the
137 PBGCC manages all patients with gynaecological cancer within a 2.2 million catchment
138 population. Although patient-initiated referrals to other providers are achievable, the NHS
139 system focuses referrals to named providers within a gynaecological cancer centre. Referrals
140 for private care are relatively uncommon and still necessitate discussion at, and notification
141 to, the MDT of the regional cancer centre. Referrals to other cancer centres are uncommon
142 and usually occur when a specific second opinion is required often after initial treatment has
143 been implemented. As such, within the UK NHS all women with ovarian cancer within a
144 designated region are likely to be registered with a specified cancer centre.

145 The following data were analysed: age; performance status (PS); age-adjusted Charlson co-
146 morbidity index (ACCI); Deprivation score (LSOA)(20); stage; organ of origin; histology;
147 treatment received; cytoreduction rate; surgical complexity score (SCS)(12); and survival
148 data. We classified our total patient cohort by mode of treatment received into five
149 progressively overlapping groups: group A comprised patients who underwent PDS; group B
150 comprised patients in group A and also included all patients who underwent IDS; group C
151 comprised patients in group B and also included patients who underwent assessment for IDS
152 but who did not eventually undergo surgery; group D included patients in group C and also
153 included all patients treated with chemotherapy alone; and group E included all patients in
154 group D and also included all patients who did not receive any treatment. Group E therefore
155 represents the total patient cohort ‘denominator’ and consists of all patients managed by our
156 cancer centre. These groups are illustrated in Figure 1. We investigated whether survival and
157 other variables differed between these five groups.

158 We performed a systematic search of EMBASE databases between 1996 to Week 03 2017
159 using a combination of text words “ovarian ca*” and Medical Subject Headings “surgery” or
160 “ovary cancer” to generate a subset of citations relevant to the research question. Search was

161 limited to studies involving human subjects, published in the English language, between
162 1.1.16 and 31.12.16. Duplicate papers were removed, as were commentaries, narrative
163 reviews and letters. Additional papers were identified from reference lists and previously
164 identified studies. Inclusion criteria consisted of: prospective or retrospective, single centre,
165 cohort studies of surgically treated stage 3-4 AOC that presented OS data. Exclusion criteria
166 consisted of: multicentre studies, randomised controlled trials of chemotherapy or papers
167 where OS data could not be extracted. Papers were selected from their abstracts by one
168 author (AP) with a second review by another (SS) where inclusion or exclusion was unclear.
169 The EMBASE database was last interrogated on 18/1/17.

170

171 Statistical Analysis

172

173 Categorical variables were compared with the chi-squared test and parametric and non-
174 parametric continuous variables were compared with the ANOVA or Kruskal-Wallis test
175 respectively. All tests were two-sided and a p-value of less than 0.05 was regarded as being
176 statistically significant. All tests were two-sided and a p-value of less than 0.05 was regarded
177 as statistically significant. The Kaplan-Meier method was used to estimate survival with
178 survival compared using the Log rank method with IBM SPSS version 20.

179

180 Results

181

182

183 Between 16th August 2007 and 3rd February 2014, 593 women diagnosed with advanced
184 ovarian cancer (AOC) were identified from the database. Of these, 441 (74.4%) patients
185 received either PDS (n=146) or IDS after NACT (n=295), and 152 (25.6%) patients received
186 no cytoreductive surgery. The clinico-pathological data comparing those that did and did not
187 undergo surgery is summarised in Table 1. Patients who did not undergo surgery were
188 significantly older (p<0.00001), had a worse performance status (p<0.00001), a higher ACCI
189 (p<0.00001), lived in more deprived regions (p<0.00001), presented with more advanced
190 disease (p=0.0001) and were more likely not to have a histological diagnosis of their
191 malignancy (p<0.00001).

192

193 Figure 1 summarises study population by treatment received. Of the 152 patients that did not
194 receive any cytoreductive surgery, 25 were considered for palliation of symptoms only due to
195 poor performance status that precluded any cancer treatment either with chemotherapy or
196 cytoreductive surgery. NACT was recommended for 123 patients but only commenced in
197 104 patients due to 14 patients dying prior to NACT and five patients declining NACT.
198 Thirteen patients did not complete all their NACT cycles due to either death or intolerance.
199 The remaining 91 patients completed all their planned NACT cycles and were subsequently
200 considered for IDS (but did not receive it). Failure to receive IDS was most commonly due
201 to: poor performance status or co-morbidities (n= 30); progressive disease following NACT
202 (n=24); no response to NACT (n=21); patient refusal of IDS (n=7); issues pertaining to
203 disease distribution (n=7); dying prior to IDS (n=1); or, unknown (n=1).

204

205 Patients who did not receive cytoreductive surgery were considered in three groups: (1) all
206 those who did not receive cytoreductive surgery (n=152); (2) those who were fit enough to
207 undergo NACT (but did not necessarily receive it) (n=123); and (3) those who completed
208 NACT and were considered for IDS (but did not undergo it) (n=91). The median OS of
209 patients in group 1 was 11.3 months (95% CI 7.8-15.0). The corresponding value for patients
210 in group 2 and 3 were 14.0 (95% CI 10.2-17.7) and 19.1 (95% CI 15.8-22.5) months
211 respectively.

212

213 Five of the 123 patients that were fit enough to undergo NACT declined chemotherapy.
214 Seven of the 91 patients that completed NACT and were considered for IDS declined
215 surgery. The median OS for the former group of patients was 6.1 months (95% CI 0.9-11.4)
216 whilst those patients in the latter group had not reached median OS by 33 months of follow
217 up.

218

219 To illustrate the ‘denominator effect’, we analysed the median OS for the five groups of
220 patients as described in Methods. OS progressively decreased from Group A patients (n=140)
221 with the median OS 54.5 (35.7 – 73.3) months, Group B (n=441) with median OS 38.7 (34.9
222 – 42.4) months, Group C (n= 532) with median OS 35.4 (31.9 – 38.8) months, Group D
223 (n=564) with median OS 33.3 (29.8 – 36.8) months and Group E, the total patient cohort
224 ‘Denominator’ with AOC (n=593 with median OS of 30.2 (26.7 – 32.6) months (Table 2)

225

226 Comparison of median OS between Group A (patients receiving PDS) and Group E (the total
227 patient cohort) demonstrated a highly statistically significant difference, $p= 0.000586$. There
228 was a statistically significant difference between OS in Groups B and Group E, $p = 0.000353$
229 and between Groups C and E, $p = 0.039180$. (Table 2 and Figure 2).

230

231 Eighteen studies met the specified inclusion criteria(21-38) for the systematic search. Only
232 two (11%) papers explicitly defined their total patient cohort(21, 27). Two additional papers
233 (11%) used terms which were ambiguous in relation to the total patient population(34, 35).
234 No papers presented OS for the total patient cohort although one(21) did include non-
235 operated patients with their surgical study cohort. Two papers (11%) documented the number
236 of patients who received any therapeutic treatment(21, 27) with two papers (11%) ambiguous
237 in their descriptions(34, 35). Although twelve papers (67%) explicitly described all patients
238 receiving surgery(21, 23-25, 27-30, 32, 34-36) only four papers (22.2%) published their OS
239 of all surgically managed patients(24, 28-30). Table 3 presents this and any comment on
240 survival data.

241

242 **Discussion**

243

244 In this study, we highlight the effect of the denominator on survival using our centre survival
245 data and the sparse description of denominators in published literature in AOC. To our
246 knowledge, this is the first study to explicitly define the denominator in AOC and describe its
247 relevance. Our study, demonstrates a significant difference in OS based on the total patient
248 cohort 'denominator'. Presenting denominator data would improve the understanding of the
249 process of patient selection within any given Centre, standardise selection between centres
250 and facilitate reducing selection bias which is inevitable in retrospective studies. Importantly
251 it would also help in understanding the underlying factors that preclude patients from
252 receiving therapy, thus potentially improving outcomes. OS for AOC internationally
253 continues to be poor with a five year survival of 30%(39). Unless we focus our efforts on
254 understanding the whole patient cohort of ovarian cancer, including those that do not receive
255 any treatment, obtaining improvements in OS will remain challenging.

256

257 In our series, 25.6% of patients with AOC did not receive cytoreductive surgery, 4.9% of
258 whom were too ill to receive any treatment beyond that of palliation (Figure 1). Such findings
259 are consistent with the UKs National Cancer Data Repository which has on record that 44%

260 of patients diagnosed with AOC in the UK do not receive cytoreductive surgery and 25% do
261 not receive any treatment beyond palliation(7). Such a high prevalence of undertreated
262 patients is not unique to the UK with comparable corresponding figures from the American
263 National Cancer Database (no surgery in 21% and no chemotherapy in 8.7%) and
264 Surveillance, Epidemiology and End Results (SEER) Database (no surgery in 34.2% and no
265 chemotherapy in 16.5%)(8, 9).

266

267 Whilst this manuscript demonstrated the impact on survival based on the category of patient
268 investigated, it is reasonable to expect that this denominator effect would impact as well on
269 morbidity of treatment and quality of life post treatment(40). An explicitly defined
270 denominator is crucial to efforts to benchmark survival between centres worldwide. The
271 European Society of Gynaecological Oncology should be applauded for incorporating total
272 denominator data into their recent quality standards for ovarian cancer(41). Such data can be
273 used for self-assessment, for institutional quality assurance programs, for governmental
274 quality assessment and eventually to build a network of certified centres for ovarian cancer
275 surgery that are transparent about the quality of care they deliver and the survival data that
276 their approach achieves.

277

278 Unfortunately, such robust reporting is scant in the literature and potentially artificially
279 inflates survival outcomes. Our data represents every single patient with AOC based on
280 histology, cytology and/or radiology and tumour markers in a centre serving a population of
281 2.2 million. Patients in other health care systems may be triaged in different ways. It is likely
282 that there will be variation in overall operating rates in nationalised healthcare systems
283 compared to systems with significant patient and provider selection. The total patient
284 denominator, may aid identification of those centres with an unselected patient cohort
285 compared to those treating a predominantly triaged population with good fitness for surgery.
286 The lack of total denominator data makes a fallacy of a centre's "cytoreduction rate" or
287 "primary surgery rate".

288

289 The importance of the total patient denominator has been established in numerous nationwide
290 cancer audits in the United Kingdom, such as the "National Bowel Cancer Audit Report"(42)
291 and the "National Oesophago-Gastric Cancer Audit"(43). Such basic data has allowed trends
292 in patients receiving treatment to be followed at a local, regional and national level. Both
293 these registers collect data in not only those who receive surgery but also those that, either

294 due to patient or disease factors, do not. The importance of denominator data for ovarian
295 cancer should be considered no different to these other high risk and aggressive cancers.

296

297 Even with the use of a denominator as simplistic as the total patient cohort there are still areas
298 of contention. Firstly, is the issue of AOC being defined as stage 3 or 4 disease. It is possible
299 that the true overall patient denominator may be underestimated in cases with inadequate
300 retroperitoneal or extra-pelvic exploration performed. Equally, diagnosis based on radiology
301 and tumour markers alone may increase the denominator with non-ovarian tumours
302 mimicking that of epithelial ovarian tubal and primary peritoneal cancers. The result of this
303 being that centres with suboptimal staging practice or who are less aggressive in obtaining
304 histological diagnosis are potentially going to present a cohort with inferior OS relative to
305 their peers. A potential solution would be to expand the denominator to include all stage
306 distributions of patients with ovarian cancer and to declare the proportion who did not receive
307 a histological diagnosis. The development of an outcomes “dataset” is beyond the remit of
308 this paper but standardised reporting of denominator, stage, histological diagnosis as well as
309 patient and disease descriptors would, we believe, be a tool to accurately categorise centres
310 and allow greater interpretation of centres outcomes. The development of a “core outcome”
311 set for ovarian cancer, as recommended by the COMET initiative would be a welcome
312 development in this space(44, 45). Comparisons could then be made with centres with similar
313 data distributions and thus allow their research findings to be appropriately implemented
314 either more cautiously in centres with wider but more heterogenous patient group or more
315 rapidly in similar centres.

316

317 As an important initial step, we suggest that to enable accurate interpretation of prospective
318 or retrospective cohort surgical studies in AOC, the minimum denominator descriptors that
319 should be provided should include the total number of patients as well as the total number of
320 patients operated on. Indeed, the absence of such denominator data risks a disservice to
321 studies that are innovative in their conclusions.

322

323 In conclusion, the denominator of advanced cancer cases in each centre is critical to
324 understanding selection and survival. This is essential for benchmarking and quality
325 assurance in gynaecological cancer and should be an integral part of any publication on
326 outcomes from AOC.

327

328

329 Tables/Figures

330

331 Table 1: Clinicopathological data of the total patient cohort presented comparing patients
332 who did not undergo surgery with those who underwent surgical management of AOC

333 Figure 1: Flowchart demonstrating patient outcomes for the total patient cohort
334 'denominator'.

335 Table 2: Impact on median OS by group of patients analysed demonstrating the
336 'Denominator effect'.

337 Figure 2: Kaplan-Meier curve comparing OS by patient groups A-E.

338 Table 3: Reporting of denominator data, surgical cohort data and survival data in included
339 studies

340

341

342 **Conflict of interest statement**

343

344 The authors declare no conflicts of interest

345

346 **References**

347

- 348 1. Horowitz NS, Miller A, Rungruang B, Richard SD, Rodriguez N, Bookman MA, et al. Does
349 aggressive surgery improve outcomes? Interaction between preoperative disease burden and complex
350 surgery in patients with advanced-stage ovarian cancer: an analysis of GOG 182. *Journal of clinical
351 oncology : official journal of the American Society of Clinical Oncology*. 2015;33(8):937-43.
- 352 2. du Bois A, Reuss A, Pujade-Lauraine E, Harter P, Ray-Coquard I, Pfisterer J. Role of surgical
353 outcome as prognostic factor in advanced epithelial ovarian cancer: a combined exploratory analysis
354 of 3 prospectively randomized phase 3 multicenter trials: by the Arbeitsgemeinschaft
355 Gynaekologische Onkologie Studiengruppe Ovarialkarzinom (AGO-OVAR) and the Groupe
356 d'Investigateurs Nationaux Pour les Etudes des Cancers de l'Ovaire (GINECO). *Cancer*.
357 2009;115(6):1234-44.
- 358 3. Markman M, Rothman R, Hakes T, Reichman B, Hoskins W, Rubin S, et al. Second-line
359 platinum therapy in patients with ovarian cancer previously treated with cisplatin. *Journal of clinical
360 oncology : official journal of the American Society of Clinical Oncology*. 1991;9(3):389-93.
- 361 4. Ledermann JA, Raja FA, Fotopoulou C, Gonzalez-Martin A, Colombo N, Sessa C, et al.
362 Newly diagnosed and relapsed epithelial ovarian carcinoma: ESMO Clinical Practice Guidelines for
363 diagnosis, treatment and follow-up. *Annals of oncology : official journal of the European Society for
364 Medical Oncology / ESMO*. 2013;24 Suppl 6:vi24-32.
- 365 5. Wright AA, Bohlke K, Armstrong DK, Bookman MA, Cliby WA, Coleman RL, et al.
366 Neoadjuvant Chemotherapy for Newly Diagnosed, Advanced Ovarian Cancer: Society of
367 Gynecologic Oncology and American Society of Clinical Oncology Clinical Practice Guideline.
368 *Journal of clinical oncology : official journal of the American Society of Clinical Oncology*.
369 2016;34(28):3460-73.

- 370 6. Urban RR, He H, Alfonso R, Hardesty MM, Gray HJ, Goff BA. Ovarian cancer outcomes:
371 Predictors of early death. *Gynecologic oncology*. 2016;140(3):474-80.
- 372 7. Barclay M, Gildea C, Poole J, Hirschowitz L, Menon U, Nordin A. Factors Affecting Short-
373 term Mortality in Women With Ovarian, Tubal, or Primary Peritoneal Cancer: Population-Based
374 Cohort Analysis of English National Cancer Registration Data. *International journal of gynecological*
375 *cancer : official journal of the International Gynecological Cancer Society*. 2016;26(1):56-65.
- 376 8. Thrall MM, Gray HJ, Symons RG, Weiss NS, Flum DR, Goff BA. Trends in treatment of
377 advanced epithelial ovarian cancer in the Medicare population. *Gynecologic oncology*.
378 2011;122(1):100-6.
- 379 9. Shalowitz DI, Epstein AJ, Ko EM, Giuntoli RL, 2nd. Non-surgical management of ovarian
380 cancer: Prevalence and implications. *Gynecologic oncology*. 2016;142(1):30-7.
- 381 10. Colombo PE, Mourregot A, Fabbro M, Gutowski M, Saint-Aubert B, Quenet F, et al.
382 Aggressive surgical strategies in advanced ovarian cancer: a monocentric study of 203 stage IIIC and
383 IV patients. *European journal of surgical oncology : the journal of the European Society of Surgical*
384 *Oncology and the British Association of Surgical Oncology*. 2009;35(2):135-43.
- 385 11. Eisenkop SM, Friedman RL, Wang HJ. Complete cytoreductive surgery is feasible and
386 maximizes survival in patients with advanced epithelial ovarian cancer: a prospective study.
387 *Gynecologic oncology*. 1998;69(2):103-8.
- 388 12. Aletti GD, Podratz KC, Moriarty JP, Cliby WA, Long KH. Aggressive and complex surgery
389 for advanced ovarian cancer: an economic analysis. *Gynecologic oncology*. 2009;112(1):16-21.
- 390 13. Chi DS, Eisenhauer EL, Zivanovic O, Sonoda Y, Abu-Rustum NR, Levine DA, et al.
391 Improved progression-free and overall survival in advanced ovarian cancer as a result of a change in
392 surgical paradigm. *Gynecologic oncology*. 2009;114(1):26-31.
- 393 14. Kommos S, Rochon J, Harter P, Heitz F, Grabowski JP, Ewald-Riegler N, et al. Prognostic
394 impact of additional extended surgical procedures in advanced-stage primary ovarian cancer. *Annals*
395 *of surgical oncology*. 2010;17(1):279-86.
- 396 15. Peiretti M, Zanagnolo V, Aletti GD, Bocciolone L, Colombo N, Landoni F, et al. Role of
397 maximal primary cytoreductive surgery in patients with advanced epithelial ovarian and tubal cancer:
398 Surgical and oncological outcomes. Single institution experience. *Gynecologic oncology*.
399 2010;119(2):259-64.
- 400 16. Dowdy SC, Loewen RT, Aletti G, Feitoza SS, Cliby W. Assessment of outcomes and
401 morbidity following diaphragmatic peritonectomy for women with ovarian carcinoma. *Gynecologic*
402 *oncology*. 2008;109(2):303-7.
- 403 17. Wright AA, Bohlke K, Armstrong DK, Bookman MA, Cliby WA, Coleman RL, et al.
404 Neoadjuvant Chemotherapy for Newly Diagnosed, Advanced Ovarian Cancer: Society of
405 Gynecologic Oncology and American Society of Clinical Oncology Clinical Practice Guideline.
406 *Journal of clinical oncology : official journal of the American Society of Clinical Oncology*. 2016.
- 407 18. British Gynaecological Cancer Society. British Gynaecological Cancer Society (BGCS)
408 Epithelial Ovarian / Fallopian Tube / Primary Peritoneal Cancer Guidelines: Recommendations for
409 Practice. 2017.
- 410 19. Phillips A, Pounds R, Balega J, Singh K. Histopathological correlation of splenic disease with
411 radiological and surgical findings: should we incorporate into standard procedures for disseminated
412 Mullerian adenocarcinoma? *European journal of gynaecological oncology*. 2016;37(5):678-84.
- 413 20. Abdel-Rahman ME, Butler J, Sydes MR, Parmar MK, Gordon E, Harper P, et al. No
414 socioeconomic inequalities in ovarian cancer survival within two randomised clinical trials. *British*
415 *journal of cancer*. 2014;111(3):589-97.
- 416 21. Ataseven B, Grimm C, Harter P, Heitz F, Traut A, Prader S, et al. Prognostic impact of
417 debulking surgery and residual tumor in patients with epithelial ovarian cancer FIGO stage IV.
418 *Gynecologic oncology*. 2016;140(2):215-20.
- 419 22. Bachmann C, Bachmann R, Fend F, Wallwiener D. Incidence and Impact of Lymph Node
420 Metastases in Advanced Ovarian Cancer: Implications for Surgical Treatment. *Journal of Cancer*.
421 2016;7(15):2241-6.
- 422 23. Bian C, Yao K, Li L, Yi T, Zhao X. Primary debulking surgery vs. neoadjuvant chemotherapy
423 followed by interval debulking surgery for patients with advanced ovarian cancer. *Archives of*
424 *gynecology and obstetrics*. 2016;293(1):163-8.

- 425 24. Feng Z, Wen H, Bi R, Yang W, Wu X. Prognostic impact of the time interval from primary
426 surgery to intravenous chemotherapy in high grade serous ovarian cancer. *Gynecologic oncology*.
427 2016;141(3):466-70.
- 428 25. Gadducci A, Cosio S, Zizioli V, Notaro S, Tana R, Panattoni A, et al. Patterns of Recurrence
429 and Clinical Outcome of Patients With Stage IIIC to Stage IV Epithelial Ovarian Cancer in Complete
430 Response After Primary Debulking Surgery Plus Chemotherapy or Neoadjuvant Chemotherapy
431 Followed by Interval Debulking Surgery: An Italian Multicenter Retrospective Study. *International
432 journal of gynecological cancer : official journal of the International Gynecological Cancer Society*.
433 2017;27(1):28-36.
- 434 26. Gill SE, McGree ME, Weaver AL, Cliby WA, Langstraat CL. Optimizing the treatment of
435 ovarian cancer: Neoadjuvant chemotherapy and interval debulking versus primary debulking surgery
436 for epithelial ovarian cancers likely to have suboptimal resection. *Gynecologic oncology*.
437 2017;144(2):266-73.
- 438 27. Heitz F, Harter P, Alesina PF, Walz MK, Lorenz D, Groeben H, et al. Pattern of and reason
439 for postoperative residual disease in patients with advanced ovarian cancer following upfront radical
440 debulking surgery. *Gynecologic oncology*. 2016;141(2):264-70.
- 441 28. Luo Y, Lee M, Kim HS, Chung HH, Song YS. Effect of neoadjuvant chemotherapy on
442 platinum resistance in stage IIIC and IV epithelial ovarian cancer. *Medicine*. 2016;95(36):e4797.
- 443 29. Medina-Franco H, Cortes-Gonzalez R, Lambreton-Hinojosa F, Fimbres-Morales A, Vargas-
444 Siordia JC. Neoadjuvant Chemotherapy Increases R0 Cytoreduction Rate But Does Not Improve
445 Final Outcome in Advanced Epithelial Ovarian Cancer. *Annals of surgical oncology*. 2016.
- 446 30. Mueller JJ, Zhou QC, Iasonos A, O'Cearbhaill RE, Alvi FA, El Haraki A, et al. Neoadjuvant
447 chemotherapy and primary debulking surgery utilization for advanced-stage ovarian cancer at a
448 comprehensive cancer center. *Gynecologic oncology*. 2016;140(3):436-42.
- 449 31. Munoz-Casares FC, Medina-Fernandez FJ, Arjona-Sanchez A, Casado-Adam A, Sanchez-
450 Hidalgo JM, Rubio MJ, et al. Peritonectomy procedures and HIPEC in the treatment of peritoneal
451 carcinomatosis from ovarian cancer: Long-term outcomes and perspectives from a high-volume
452 center. *European journal of surgical oncology : the journal of the European Society of Surgical
453 Oncology and the British Association of Surgical Oncology*. 2016;42(2):224-33.
- 454 32. Oseledchik A, Hunold LE, Mallmann MR, Domrose CM, Abramian A, Debal M, et al.
455 Impact of Extended Primary Surgery on Suboptimally Operable Patients With Advanced Ovarian
456 Cancer. *International journal of gynecological cancer : official journal of the International
457 Gynecological Cancer Society*. 2016;26(5):873-83.
- 458 33. Pereira A, Perez-Medina T, Magrina JF, Magtibay PM, Rodriguez-Tapia A, Cuesta-Guardiola
459 T, et al. "The impact of debulking surgery in patients with node-positive epithelial ovarian cancer:
460 Analysis of prognostic factors related to overall survival and progression-free survival after an
461 extended long-term follow-up period". *Surgical oncology*. 2016;25(1):49-59.
- 462 34. Plotti F, Montera R, Aloisi A, Scaletta G, Capriglione S, Luvero D, et al. Total
463 rectosigmoidectomy versus partial rectal resection in primary debulking surgery for advanced ovarian
464 cancer. *European journal of surgical oncology : the journal of the European Society of Surgical
465 Oncology and the British Association of Surgical Oncology*. 2016;42(3):383-90.
- 466 35. Skof E, Merlo S, Pilko G, Kobal B. The role of neoadjuvant chemotherapy in patients with
467 advanced (stage IIIC) epithelial ovarian cancer. *Radiology and oncology*. 2016;50(3):341-6.
- 468 36. Stewart JM, Tone AA, Jiang H, Bernardini MQ, Ferguson S, Laframboise S, et al. The
469 optimal time for surgery in women with serous ovarian cancer. *Canadian journal of surgery Journal
470 canadien de chirurgie*. 2016;59(4):223-32.
- 471 37. Sun JH, Ji ZH, Yu Y, Wu HT, Huang CQ, Zhang Q, et al. Cytoreductive Surgery plus
472 Hyperthermic Intraperitoneal Chemotherapy to Treat Advanced/Recurrent Epithelial Ovarian Cancer:
473 Results from a Retrospective Study on Prospectively Established Database. *Translational oncology*.
474 2016;9(2):130-8.
- 475 38. Xu X, DF, Lv M., Ren B., Guo W., Chen X. Ascites regression following neoadjuvant
476 chemotherapy in prediction of treatment outcome among stage IIIC to IV high-grade serous ovarian
477 cancer. *Journal of ovarian research*. 2016;9(1):85.

- 478 39. Matz M, Coleman MP, Carreira H, Salmeron D, Chirlaque MD, Allemani C, et al. Worldwide
479 comparison of ovarian cancer survival: Histological group and stage at diagnosis (CONCORD-2).
480 Gynecologic oncology. 2017;144(2):396-404.
- 481 40. SOCQER-2. SOCQER-2 2016 [cited 2016 7th June]. Available from:
482 <https://clinicaltrials.gov/ct2/show/NCT02569983>.
- 483 41. ESGO. Advanced (StageIII-IV) Ovarian Cancer Surgery Quality Indicators. 2016.
- 484 42. Royal College of Surgeons of England (RCS). National Bowel Cancer Audit. 2015.
- 485 43. Royal College of Surgeons of England (RCS). National Oesophago-Gastric Cancer Audit.
486 2016.
- 487 44. COMET (Core Outcome Measures in Effectiveness Trials) Initiative.
- 488 45. CROWN (Core outcomes in women's and newborn health).
- 489

4. Table

[Click here to download 4. Table: Table 1.docx](#)

Table 1: Clinicopathological data of the total patient cohort presented comparing patients who did not undergo surgery with those who underwent surgical management of AOC

| | Non-surgical cases | | Surgical cases | | <i>p</i> |
|-----------------------------|------------------------------|-------|---------------------------------|-------|----------|
| | n = 152 | | n = 441 | | |
| Age | 72.3 (95% CI 61.3 - 83.3) | | 63.27 (95% CI 51.46 - 75.08) | | <0.00001 |
| PS (Median IQR) | 2 (1-2) (54 cases) | | 1 (0-1) (307 cases) | | <0.00001 |
| ACCI | 4 (3-5) (70cases) | | 2 (0-3) (441 cases) | | <0.00001 |
| LSOA Deprivation Score | 3 (2-5) | | 5 (2-7) | | <0.00001 |
| Stage | | | | | |
| 3 | 92 | 60.5% | 347 | 78.7% | 0.000011 |
| 4 | 56 | 36.8% | 94 | 21.3% | 0.000146 |
| Unstaged advanced | 4 | 2.6% | 0 | 0.0% | 0.00063 |
| Site of origin | | | | | |
| Ovary | 124 | 81.6% | 322 | 73.0% | 0.034988 |
| Peritoneal | 28 | 18.4% | 78 | 17.7% | >0.05 |
| Tubal | 0 | 0.0% | 41 | 9.3% | 0.000098 |
| Histology | | | | | |
| Serous | 107 | 70.4% | 348 | 78.9% | 0.032121 |
| Serous low grade | 3 | 2.0% | 23 | 5.2% | >0.05 |
| Mucinous | 2 | 1.3% | 3 | 0.7% | >0.05 |
| MMMT | 3 | 2.0% | 22 | 5.0% | >0.05 |
| Mixed Epithelial | 1 | 0.7% | 15 | 3.4% | >0.05 |
| Psammomatous | 1 | 0.7% | 0 | 0.0% | >0.05 |
| Clear Cell | 2 | 1.3% | 16 | 3.6% | >0.05 |
| unknown | 31 | 20.4% | 3 | 0.7% | <0.00001 |
| Mullerian | 2 | 1.3% | 2 | 0.5% | >0.05 |
| Undifferentiated/Anaplastic | 0 | 0.0% | 4 | 0.9% | >0.05 |
| Endometroid | 0 | 0.0% | 5 | 1.1% | >0.05 |

4. Table[Click here to download 4. Table: Table2.docx](#)

Table 2. Impact on median OS by group of patients analysed demonstrating the 'Denominator effect'.

| Treatment group | Median OS (months) (95% CI) | <i>p</i> |
|---|--|-----------------|
| A: Patients undergoing PDS | 54.5 (35.7 – 73.3) | 0.000586 |
| B: Group A and patients undergoing IDS | 38.7 (34.9 – 42.4) | 0.000353 |
| C: Group B and patients assessed for IDS | 35.4 (31.9 – 38.8) | 0.039180 |
| D: All AOC patients receiving any treatment | 33.3 (29.8 – 36.8) | 0.393738 |
| E: All advanced ovarian cancer patients | 30.2 (26.7 – 32.6) | Reference |

4. Table

[Click here to download 4. Table: Table3.docx](#)

Table 3: Reporting of denominator data, surgical cohort data and survival data in included studies

| Study | Journal | Stage | Total operated patients | Study group and number of patients on whom survival data is presented | OS in study group (Median OS +/-95% CI) months or 5-year survival | Denominator Data (Total patient number) | Total Cohort OS (Median +/- 95% CI) months or 5-year survival |
|--------------------|-----------------------------|-------|-------------------------|---|---|---|---|
| Ataseven et al (1) | <i>Gynecol Oncol</i> | 4 | 315 | PDS:286 | 16 (12–20) - 50 (3–57) | 355 | PDS + No surgery: 30 (NACT patients excluded) |
| Bachmann et al (2) | <i>J Cancer</i> | 3c -4 | Not stated | R0/R1: 108 | 18.8 (9.7 – 27.9) - 30.5 (24.7 – 57.3) | Not stated | Not stated |
| Bian et al (3) | <i>Arch Gynecol Obstet</i> | 3c -4 | 339 | IDS: 114 PDS:225 | IDS: 25 (21.7–28.3) PDS: 25 (22.1–27.9) | Not stated | Not stated |
| Feng et al (4) | <i>Gynecologic Oncology</i> | 1 - 4 | 625 | 625 | 51.40% | Not stated | Not stated |
| Gadducci et al (5) | <i>Int J Gynecol Cancer</i> | 3c-4 | 384 | IDS: 64 PDS: 322 | IDS: 41.8% PDS: 69.3% | Not stated | Not stated |
| Gill et al (6) | <i>Gynecol Oncol</i> | 3c -4 | Not stated | IDS (?R2): 45 PDS (R2): 45 | IDS 28.2 PDS: 16.8 | Not stated | Not stated |
| Heitz et al (7) | <i>Gynecol Oncol</i> | 3b-4 | 663 | PDS: 578 | 49 (42–55) | 739 | Not stated |
| Luo et al (8) | <i>Medicine</i> | 3c-4 | 370 | Overall: 341 PDS: 283 IDS: 58 | Overall 50.0 (44.5–55.5) PDS: 51.0 IDS: 41.0 | Not stated | Not stated |

| | | | | | | | |
|-------------------------|-----------------------------|--------|------------|------------------------------------|---|------------|------------------|
| Medina-Franco et al (9) | <i>Ann Surg Oncol</i> | 3c-4 | 105 | Overall: 105 PDS: 42 IDS: 63 | Overall: 38 PDS: 33.59 IDS: 56.4 | Not stated | Not stated |
| Mueller et al (10) | <i>Gynecol Oncol</i> | 3-4 | 581 | 581 IDS: 149 PDS: 432 | Overall 63.2 (55.3–73.2) PDS 71.7(59.8-not reached) IDS (42.9 (37.1–56.3) | Not stated | Not stated |
| Munoz-Casares et al(11) | <i>Eur J Surg Oncol</i> | 3c-4 | Not stated | IDS + HIPEC: 124 | 49% | Not stated | Not stated |
| Oseledchyk et al(12) | <i>Int J Gynecol Cancer</i> | 3-4 | 278 | R1/R2: 96 | 19.5 - 32.9 | Not stated | Not stated |
| Pereira et al(13) | <i>Surgical Oncology</i> | 3-4 | Not stated | 116 | If alive: 169.8 If dead: 34.9 months | Not stated | Not stated |
| Phillips et al | | 3-4 | 441 | All surgery: 441 PDS: 140 | All surgery: 38.7 (34.9-42.4). PDS: 54.5 (35.7-73.3) | 593 | 30.2 (26.7-32.6) |
| Plotti et al(14) | <i>Eur J Surg Oncol</i> | 3-4 | 337 | PDS: 154 | 48-52% | Unclear | Not stated |
| Skof et al(15) | <i>Radiol Oncol.</i> | 3c-4 | 160 | PDS: 80 IDS 80 | PDS: 31.6 IDS 24.8 | Unclear | Not stated |
| Stewart et al(16) | <i>Can J Surg</i> | 3-4 | 334 | IDS: 156 PDS: 178 | IDS: 33.4 PDS 69.5 | Not stated | Not stated |
| Sun et al(17) | <i>Transl Oncol</i> | 3c-4 | Not stated | PDS + HIPEC: 46 | 74.0 (8.5-139.5) | Not stated | Not stated |
| Xu et al(18) | <i>J Ovarian Res</i> | 3c - 4 | Not stated | IDS: 160 | 32.1 (27.1–37.1) | Not stated | Not stated |

Legend: PDS = Primary debulking surgery; IDS = Interval debulking surgery; R0= Complete cytoreduction; R1 = Optimal <1cm residual disease; R2= Suboptimal >1cm residual disease; HIPEC = Hyperthermic intraperitoneal chemotherapy

1. Ataseven B, Grimm C, Harter P, Heitz F, Traut A, Prader S, et al. Prognostic impact of debulking surgery and residual tumor in patients with epithelial ovarian cancer FIGO stage IV. *Gynecologic oncology*. 2016;140(2):215-20.
2. Bachmann C, Bachmann R, Fend F, Wallwiener D. Incidence and Impact of Lymph Node Metastases in Advanced Ovarian Cancer: Implications for Surgical Treatment. *Journal of Cancer*. 2016;7(15):2241-6.
3. Bian C, Yao K, Li L, Yi T, Zhao X. Primary debulking surgery vs. neoadjuvant chemotherapy followed by interval debulking surgery for patients with advanced ovarian cancer. *Archives of gynecology and obstetrics*. 2016;293(1):163-8.
4. Feng Z, Wen H, Bi R, Yang W, Wu X. Prognostic impact of the time interval from primary surgery to intravenous chemotherapy in high grade serous ovarian cancer. *Gynecologic oncology*. 2016;141(3):466-70.
5. Gadducci A, Cosio S, Zizioli V, Notaro S, Tana R, Panattoni A, et al. Patterns of Recurrence and Clinical Outcome of Patients With Stage IIIC to Stage IV Epithelial Ovarian Cancer in Complete Response After Primary Debulking Surgery Plus Chemotherapy or Neoadjuvant Chemotherapy Followed by Interval Debulking Surgery: An Italian Multicenter Retrospective Study. *International journal of gynecological cancer : official journal of the International Gynecological Cancer Society*. 2017;27(1):28-36.
6. Gill SE, McGree ME, Weaver AL, Cliby WA, Langstraat CL. Optimizing the treatment of ovarian cancer: Neoadjuvant chemotherapy and interval debulking versus primary debulking surgery for epithelial ovarian cancers likely to have suboptimal resection. *Gynecologic oncology*. 2017;144(2):266-73.
7. Heitz F, Harter P, Alesina PF, Walz MK, Lorenz D, Groeben H, et al. Pattern of and reason for postoperative residual disease in patients with advanced ovarian cancer following upfront radical debulking surgery. *Gynecologic oncology*. 2016;141(2):264-70.
8. Luo Y, Lee M, Kim HS, Chung HH, Song YS. Effect of neoadjuvant chemotherapy on platinum resistance in stage IIIC and IV epithelial ovarian cancer. *Medicine*. 2016;95(36):e4797.
9. Medina-Franco H, Cortes-Gonzalez R, Lambreton-Hinojosa F, Fimbres-Morales A, Vargas-Siordia JC. Neoadjuvant Chemotherapy Increases R0 Cytoreduction Rate But Does Not Improve Final Outcome in Advanced Epithelial Ovarian Cancer. *Annals of surgical oncology*. 2016.
10. Mueller JJ, Zhou QC, Iasonos A, O'Cearbhaill RE, Alvi FA, El Haraki A, et al. Neoadjuvant chemotherapy and primary debulking surgery utilization for advanced-stage ovarian cancer at a comprehensive cancer center. *Gynecologic oncology*. 2016;140(3):436-42.
11. Munoz-Casares FC, Medina-Fernandez FJ, Arjona-Sanchez A, Casado-Adam A, Sanchez-Hidalgo JM, Rubio MJ, et al. Peritonectomy procedures and HIPEC in the treatment of peritoneal carcinomatosis from ovarian cancer: Long-term outcomes and perspectives from a high-volume center. *European journal of surgical oncology : the journal of the European Society of Surgical Oncology and the British Association of Surgical Oncology*. 2016;42(2):224-33.
12. Oseledchik A, Hunold LE, Mallmann MR, Domrose CM, Abramian A, Debald M, et al. Impact of Extended Primary Surgery on Suboptimally Operable Patients With Advanced Ovarian Cancer. *International journal of gynecological cancer : official journal of the International Gynecological Cancer Society*. 2016;26(5):873-83.
13. Pereira A, Perez-Medina T, Magrina JF, Magtibay PM, Rodriguez-Tapia A, Cuesta-Guardiola T, et al. "The impact of debulking surgery in patients with node-positive epithelial ovarian cancer: Analysis of prognostic factors related to overall survival and progression-free survival after an extended long-term follow-up period". *Surgical oncology*. 2016;25(1):49-59.

14. Plotti F, Montera R, Aloisi A, Scaletta G, Capriglione S, Luvero D, et al. Total rectosigmoidectomy versus partial rectal resection in primary debulking surgery for advanced ovarian cancer. *European journal of surgical oncology : the journal of the European Society of Surgical Oncology and the British Association of Surgical Oncology*. 2016;42(3):383-90.
15. Skof E, Merlo S, Pilko G, Kobal B. The role of neoadjuvant chemotherapy in patients with advanced (stage IIIC) epithelial ovarian cancer. *Radiology and oncology*. 2016;50(3):341-6.
16. Stewart JM, Tone AA, Jiang H, Bernardini MQ, Ferguson S, Laframboise S, et al. The optimal time for surgery in women with serous ovarian cancer. *Canadian journal of surgery Journal canadien de chirurgie*. 2016;59(4):223-32.
17. Sun JH, Ji ZH, Yu Y, Wu HT, Huang CQ, Zhang Q, et al. Cytoreductive Surgery plus Hyperthermic Intraperitoneal Chemotherapy to Treat Advanced/Recurrent Epithelial Ovarian Cancer: Results from a Retrospective Study on Prospectively Established Database. *Translational oncology*. 2016;9(2):130-8.
18. Xu X. DF, Lv M., Ren B., Guo W., Chen X. Ascites regression following neoadjuvant chemotherapy in prediction of treatment outcome among stage IIIC to IV high-grade serous ovarian cancer. *Journal of ovarian research*. 2016;9(1):85.

Figure 1: Flowchart demonstrating patient outcomes for the total patient cohort “denominator”

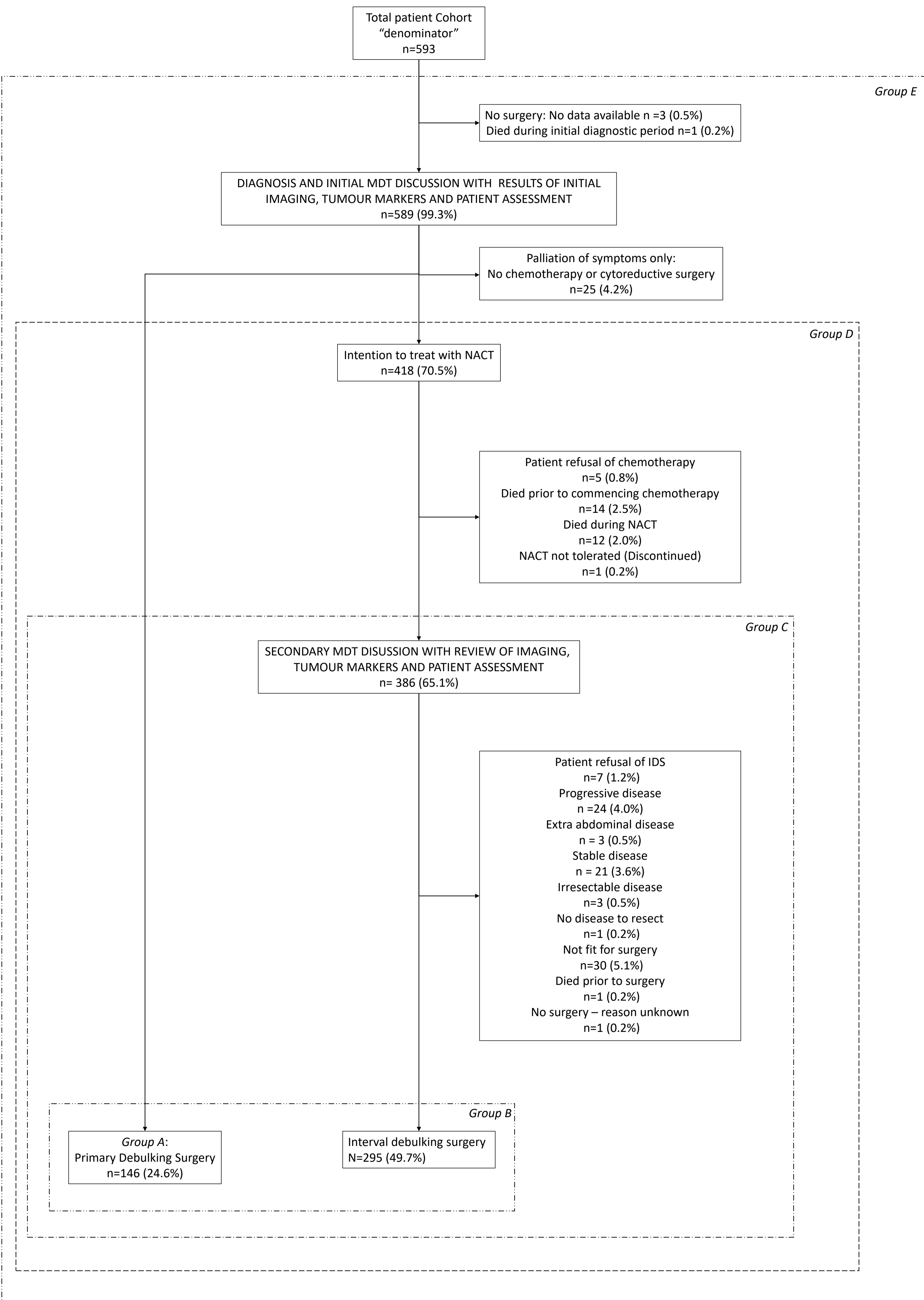
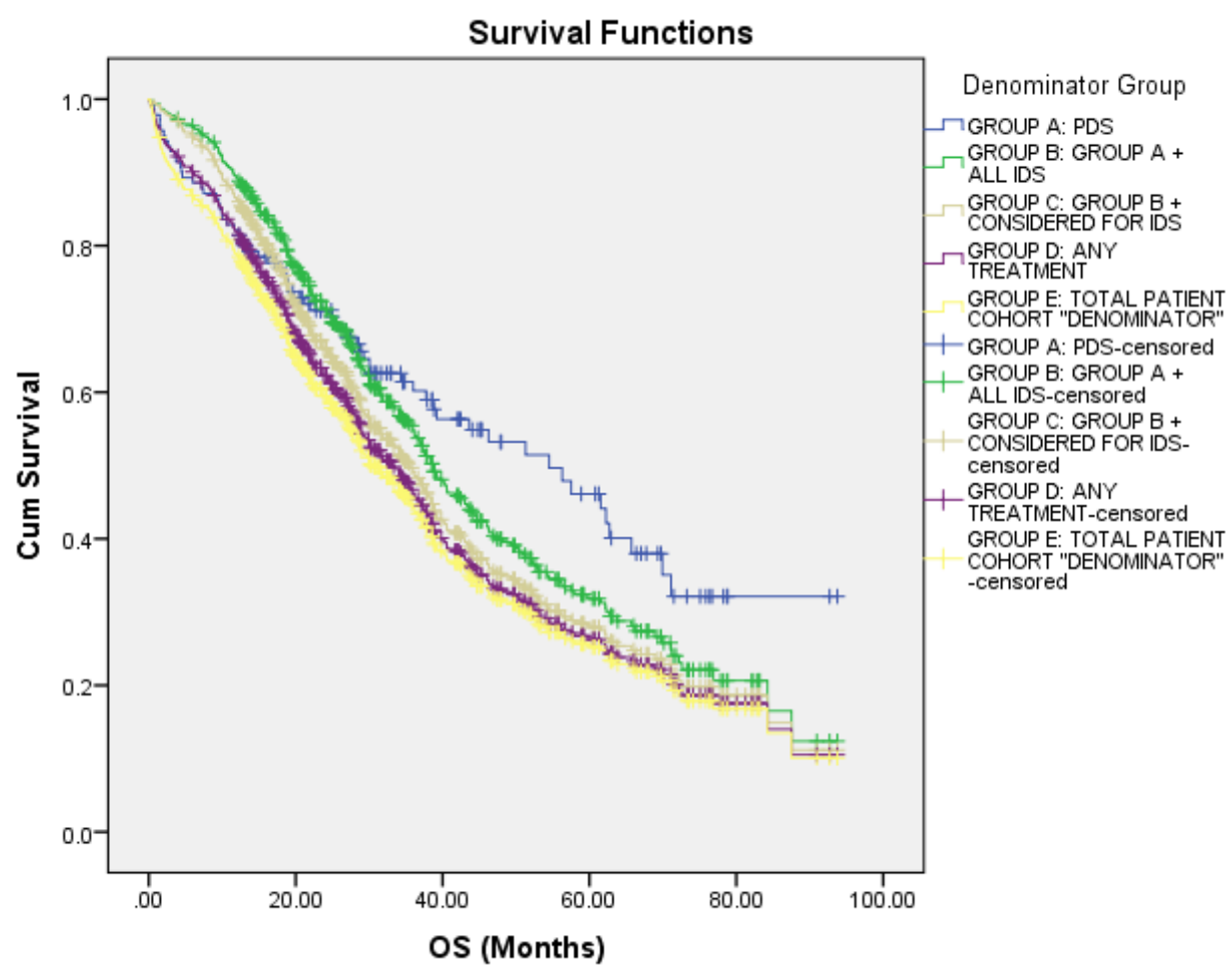


Figure 2: Kaplan-Meier curve comparing OS by patient groups A-E.



Highlights

- Survival from AOC is influenced by the total patient cohort 'denominator'
- Literature on outcomes after surgery contain denominator descriptors infrequently
- Denominator data is essential for benchmarking in gynaecology
- Denominator data should be described in surgical studies