Aim The primary aim of this study was to identify and describe different delay types in women with gynecologic cancer, and to analyze the relationship between diagnostic delay and a number of characteristics for patients, cancers and the health care system. Setting A cohort study of women newly diagnosed with gynecologic cancer at the Department of Gynecology and Obstetrics at Odense University Hospital (OUH) Denmark, during a 15-month period from October 1st 2006 to December 31st 2007. Method Data were obtained from four different questionnaires, the Electronic Patient Journal (EPJ) and The Danish Gynecological Cancer Database (DGCD). 161 women were included; ovarian cancer: 63, endometrial cancer: 50, cervical cancer: 34 and vulvar cancer: 14. Outcome measures were different delay types counted in days and the influence of four clinical important variables: Presence of alarm symptoms, age (≤ or > 60 years), performance of gynecological examination by the GP and notification of cancer suspicion on first referral from GP’s on the diagnostic delay (short delay ≤90 days and long delay >90 days). Results Across cancer type a median total delay of 101 days was observed. The 10% of women with the longest delay experienced a total delay of 436 days or more. Vulva cancer had the longest delays while women with ovarian cancer had shortest delay. Over one third (39%) of the women consulted their GP for reasons other than the alarm symptoms predefined by us. Gynecologic examination by the GP was less likely to be performed if the woman did not present with vaginal bleeding as an alarm symptom. The length of the delay was shortened by performance of a gynecological examination by the GP and a primary referral from the GP raising a cancer suspicion with the receiver. Conclusion Reducing diagnostic delays should be achievable, particularly for those most delayed, named as “the heavy tail”. Interventions aimed at reducing delays especially among the heavy tail need to be developed and creation of new valid instruments for measuring delay are essential to do so.