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## Changes in the assessments of cancer service indicators in cervical cancer in Kazakhstan

About 800 thousand new cases of cervical cancer (CC) are predicted, and it is expected that about 460 thousand women will die from this pathology, according to the forecasts of the International Agency for Research on Cancer in 2040. To this aim, an analysis studying the indicators of the cancer service for CC also allows us to evaluate the effectiveness of anti-cancer measures in the Republic of Kazakhstan.

**Aim:** Evaluate some indicators of the cancer service at CC in Kazakhstan for 2009-2018.

**Materials and methods.** The research material was data from the Ministry of Health of the Republic of Kazakhstan – annual form No.7 and 35 regarding CC (ICD10–C53) for 2009-2018 – incidence, mortality, early diagnosis, neglect, morphological verification. A retrospective study using descriptive and analytical methods of biomedical statistics was used as the main method.

**Results and discussion.** For 2009-2018, 16,441 new cases of CC were registered in the Republic for the first time, and 6,461 women died from this disease. The crude CC incidence rate increased from  $16.3 \pm 0.4\text{‰}$  (2009) to  $19.5 \pm 0.5\text{‰}$  in 2018 ( $p=0.000$ ). In dynamics, mortality rates from CC tended to decrease from  $8.4 \pm 0.3\text{‰}$  (2009) to  $6.4 \pm 0.3\text{‰}$  in 2018 ( $p=0.000$ ). The research of the study period reveals a trend: early diagnosis indicators (specific weight of patients with I-II stage) improved from 79.8% (2009) to 88.1% in 2018, and accordingly the specific weight of neglected patients significantly decreased with stage III (from 15.4% to 8.9%) and with stage IV (from 3.4% to 2.7%). The morphological verification indicators for CC remained virtually unchanged, remaining fairly high 99.2% and 99.3%, respectively, in 2009 and 2018.

**Conclusion.** An analysis of the indicators of the cancer service in CC revealed an improvement in morphological verification and early diagnosis, a decrease in neglect and mortality rates, which is undoubtedly associated with regular anti-cancer activities in Kazakhstan, in particular CC screening.

**Keywords:** cervical cancer (CC), incidence, mortality, early diagnosis, neglect, morphological verification.

### Introduction

In 2040, the International Agency for Research on Cancer (IARC) forecasts about 800 thousand new cases of cervical cancer (CC) and about 460 thousand deaths from this pathology. Theoretically, this disease could be prevented entirely. However, despite the development and implementation of preventive measures, it still dominates in female cancers' incidence and mortality worldwide [1-3]. Unfortunately, the early detection rate for CC remains quite low. Organized cytological screening has reduced the CC incidence and mortality in many developed countries [4, 5]. In the US, screening allows detecting two-thirds of cervical neoplasms in the preinvasive stage, and 70-80% – in stages I-II [5-7]. The disease detection in the preclinical phase allows using less "aggressive" treatment methods, reduces the treatment period, the rates of disability and mortality, and provides a significant economic effect. CC prevention and elimination are possible but cannot be implemented on the desired scale in many lower-middle-income countries due to the lack of effective and efficient public health programs. CC could be eliminated worldwide by implementing successful large-scale anti-cancer programs in public healthcare.

**The purpose of the study** was to evaluate some indicators of the cancer service of Kazakhstan on CC in 2009-2018.

### Material and methods

The research material included the data obtained from the annual forms No. 7 & 35 of the Ministry of Healthcare of the Republic of Kazakhstan on CC (ICD 10 – C53) for 2009-2018 on incidence, mortality, early detection, neglect, and morphological verification. A retrospective study based on descriptive and analytical methods of biomedical statistics was used as the main method. Extensive and intensive indicators were calculated using the generally accepted methods of biomedical statistics [8, 9]. The annual averages (M), mean error (m), 95% confidence interval (95% CI), and average annual upward/downward rates (T%) were calculated.

### Results

In 2009-2018, 16,441 new CC cases and 6,461 deaths from this pathology were registered in the Republic of Kazakhstan. The average annual crude incidence rate over the study years was  $18.6 \pm 0.5\text{‰}$  (95% CI=17.6-19.6). The crude CC incidence rate increased from  $16.3 \pm 0.4\text{‰}$  in 2009 to  $19.5 \pm 0.5\text{‰}$  in 2018, with a statistically signifi-

cant difference ( $t=5.00, p=0.000$ ). The CC mortality rate decreased statistically significantly ( $t=12.02, p=0.000$ ), from  $8.4 \pm 0.3\text{‰}$  in 2009 to  $6.4 \pm 0.3\text{‰}$  in 2018. The average

annual crude mortality was  $7.3 \pm 0.2\text{‰}$  (95% CI=6.9-7.8). Figure 1 shows trends in equalized crude incidence and mortality rates from CC in Kazakhstan.

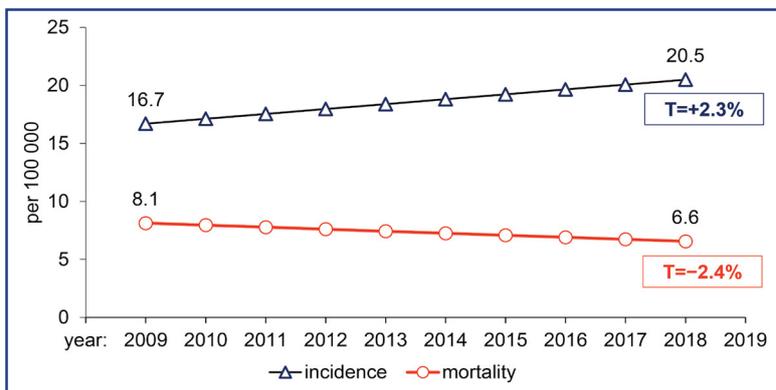


Figure 1 – Trends of equalized incidence and mortality rates from CC in Kazakhstan, 2009-2018

The average annual equalized CC incidence increase was equal to  $T=+2.3\%$ , at the average annual mortality decrease of  $T=-2.4\%$  (figure 1).

The trends in equalized incidence rates by stage showed an increase in stage I-II CC incidence and a decrease in stage III and IV incidence (figure 2).

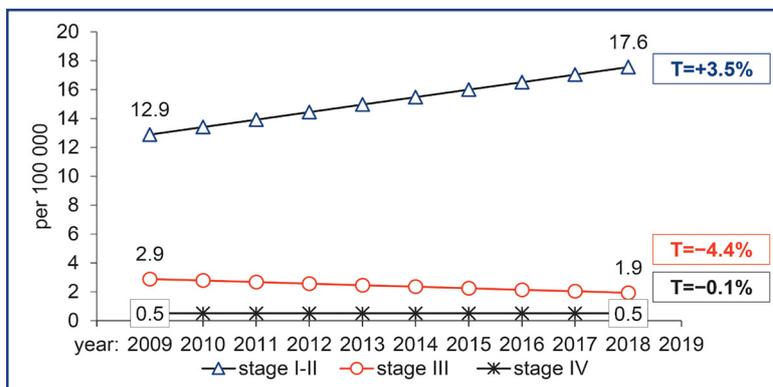


Figure 2 – Trends in equalized CC incidence rates by disease stage in Kazakhstan, 2009-2018

Over time, the share of patients with stages I-II CC increased from 79.8% in 2009 to 88.1% in 2018 (figure 3), with an average annual increase in the equalized rate of  $T=+1.2\%$ .

The share of patients with stage III CC decreased from 15.4% in 2009 to 8.9% in 2018 (figure 3), with an average annual decrease in the equalized rate of  $T=-2.3\%$ . Over time, the share of patients with stage IV CC decreased from 3.4% in 2009 to 2.7% in 2018 (figure 3), with an average annual decrease in the equalized rate of  $T=-6.7\%$ .

The share of patients with stage IV CC decreased from 3.4% in 2009 to 2.7% in 2018 (figure 3), with an average annual decrease in the equalized rate of  $T=-6.7\%$ . Over time, the share of patients with stage IV CC decreased from 3.4% in 2009 to 2.7% in 2018 (figure 3), with an average annual decrease in the equalized rate of  $T=-2.3\%$ .



Figure 3 – The dynamics of CC early detection (stage I-II) and neglect (stage III and IV) in Kazakhstan, 2009-2018

During the study period, morphological verification in CC remained almost at the same level exceed-

ing 99.1-99.6%, except for 93.3% in 2013 and 96.3% in 2014 (figure 4).

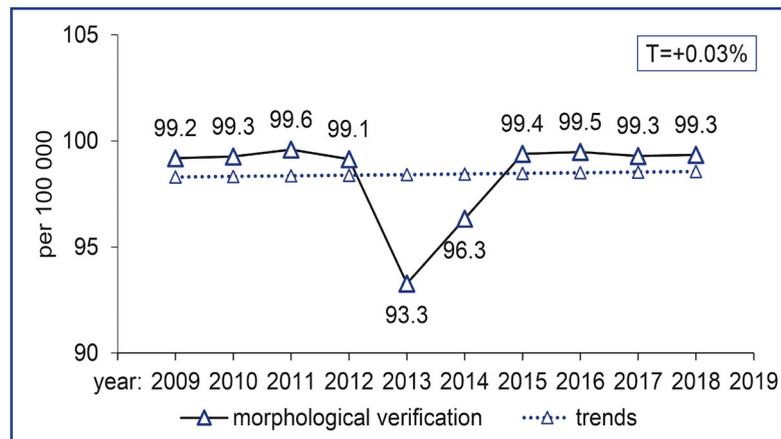


Figure 4 – The dynamics of CC morphological verification in Kazakhstan, 2009-2018

At that, the equalized morphological verification rates have remained at the same level of  $T=+0.03\%$  (figure 4).

### Conclusions:

1. In the Republic of Kazakhstan, over the study years, the absolute number of people with newly diagnosed CC has increased by 35.3%. CC incidence per 100,000 women has increased by 10.2% over the decade. At that, the incidence of stage I CC was growing, and the incidence of stage III-IV was decreasing.

2. In 2009-2018, the absolute number of deaths from CC in Kazakhstan decreased by 13.3%. The mortality from CC per 100,000 women has decreased by 23.4% over the decade.

3. In the study period, the number of patients with stages I-II at diagnosis has added 48.7%, with stage III – lost 22.2%, with stage IV – added 6.5%. In general, there was a positive trend in the early detection and reduction of neglect.

### Conclusion

The obtained data shows that Kazakhstan follows the global trend of growth in CC incidence. At the same time, we can observe positive changes in the cancer service indicators: a growing share of morphological verification and early detection, reducing share patients with stage III-IV at diagnosis, and reduction in the CC mortality rate. All this evidences the positive effect of anti-cancer measures taken in the Republic, such as CC screening.

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