

# GARDASIL9: ACCELERATED REDUCTION IN THE INCIDENCE AND COSTS OF HPV-RELATED PRECANCEROUS LESIONS AND CANCERS

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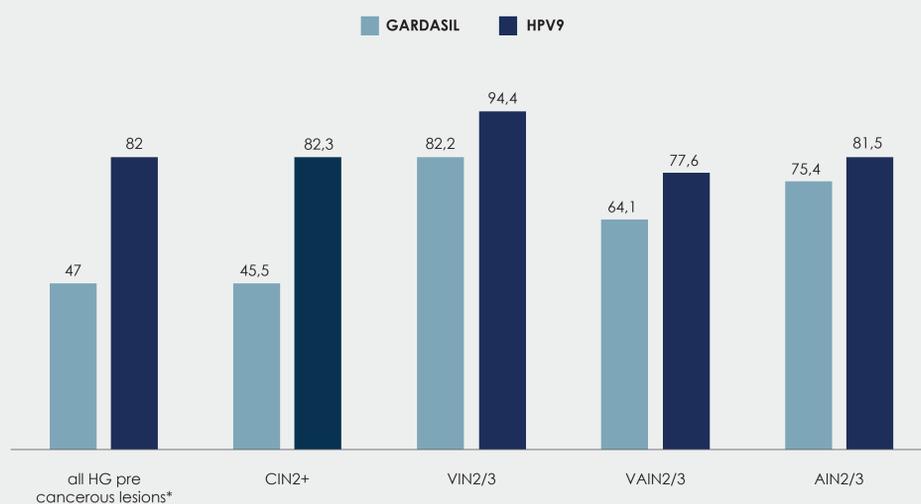
## BACKGROUND

Gardasil9 – protecting against HPV 6, 11, 16, 18, 31, 33, 45, 52 & 58 - is available and indicated in males and females to protect against

- Premalignant lesions and cancers affecting the cervix, vulva, vagina and anus caused by vaccine;
- Genital warts (Condyloma acuminata) caused by specific HPV types (1).

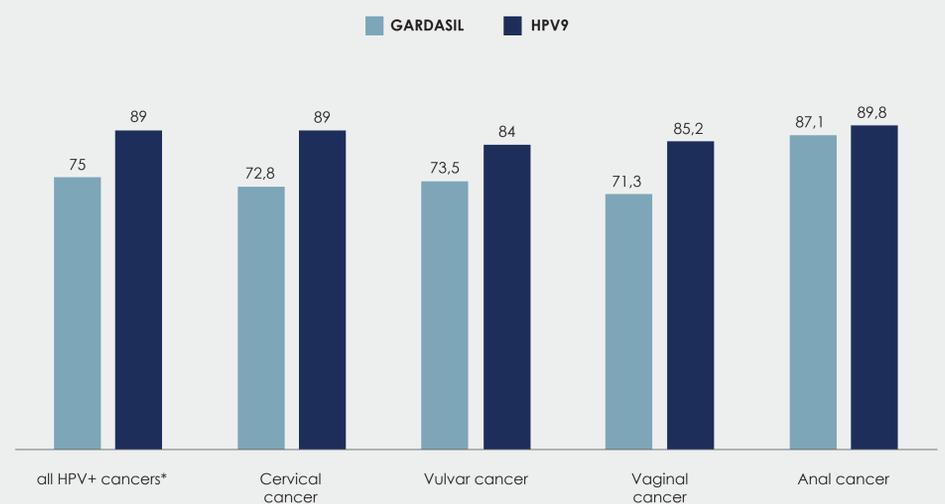
Compared to Gardasil and Cervarix, Gardasil9 improves the protection against precancerous lesions and cervical, vulva, vaginal and anal cancers (2) implying that Gardasil9 lead to an accelerated reduction in the incidence of precancerous lesions in the cervix, vulva and vagina and anus and in the incidence of cervical, vulva, vaginal and anal cancers. Consequently, the future saved costs of treatment of precancerous lesions and costs of treatment of cancer will be reduced even more.

**FIGURE 1.** RELATIVE CONTRIBUTION OF THE 9 AND 4 HPV TYPES TO HIGH GRADE PRE-CANCEROUS LESIONS IN EU (2).



\* cervical, vulvar, vaginal and anal.

**FIGURE 2.** RELATIVE CONTRIBUTION OF THE 7 AND 2 HIGH RISK HPV TYPES TO HPV POSITIVE CANCER BY ANATOMICAL SITE IN EU (2).



\* cervical, vulvar, vaginal and anal.

In this study, the extra costs saved in Denmark using Gardasil9, compared to Cervarix and Gardasil, in the Danish HPV-vaccination programme targeted girls will be estimated.

## METHODS

The analyses are based on previous published model simulations and updated unit cost estimates (3). In addition, the following limitations and assumptions are made:

- It is assumed that Gardasil and Cervarix has the same relative protection against CIN2+ (cervical intra-epithelial neoplasia), cervical, vulva and vaginal cancers;
- Since Gardasil9's extra protective effect against anal cancer is little, and since unvaccinated men (and ignoring the herd immunity protection) also are diagnosed with anal cancer, this extra effect is ignored in the calculations; and
- Since no Danish unit cost estimates for the precancerous lesions in the vulva or vagina and anus (VIN 2/3, VaIN 2/3 and AIN 2/3) are published/available, Gardasil9's extra protective effect against VIN 2/3, VaIN 2/3 and AIN 2/3 is also ignored

## CONCLUSIONS

In a Danish setting, a Gardasil9 vaccination programme will lead to an increased reduction in the incidence and costs of HPV-related precancerous lesions and cancers.

## RESULTS

Compared to Cervarix and Gardasil, the extra costs saved given Gardasil9 vaccination is estimated to 3.2 mill. € (PV: present value) per vaccinated cohort. Especially the additional reduced incidence of CIN2+ and cervical cancer lead to sizeable extra costs saved – 2.5 mill. € (PV) and 0.65 mill. € (PV), respectively.

In addition, Gardasil and Gardasil9's protection genital warts lead to extra saved treatment costs compared to Cervarix.

**Table 1.** Gardasil and Gardasil 9 vaccination: extra cost saved per vaccinated cohort (2016 price level).\*

Gardasil 9 vs. Gardasil: extra cost saved per year (€), PV	
Cervix	650,000
Vulvar	10,000
Vaginal	20,000
CIN2+	2,520,000
Total	3,200,000

\* Unit costs are sourced by (3) and (4) and inflated to 2016 price level.

## REFERENCES

- (1) **Summary of Product Characteristics.** European Medicines Agency. 23.02.2017.
- (2) **S Hartwig, JJ Baldauf, G Dominiak-Felden et al.** "Estimation of the epidemiological burden of HPV-related anogenital cancers, precancerous lesions, and genital warts in women and men in Europe: Potential additional benefit of a nine-valent second generation HPV vaccine compared to first generation HPV vaccines". Papillomavirus Research; 1 (2015); 90–100.
- (3) **J Olsen & TR Jørgensen.** "Revisiting the cost-effectiveness of universal HPV-vaccination in Denmark accounting for all potentially vaccine preventable HPV-related diseases in males and females". Cost Effectiveness and Resource Allocation; 2015, DOI 10.1186/s12962-015-0029-9.
- (4) **Olsen J, Jepsen MR.** "Human papillomavirus transmission and cost-effectiveness of introducing quadrivalent HPV vaccination in Denmark." Int J Technol Assess Health Care. 2010 Summer;183–91.