The Role of New Information and Communication Technologies in Gynecological Diagnosis of Cervical Cancer

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Cervical cancer still presents a major problem in Germany and in other countries, in and outside Europe, in spite of the establishment of an effective screening program involving screening cytology and the Pap smear test (conventional, thinprep). Although incidence and mortality have already been reduced in some countries by up to 50%, there has been no further improvement in the situation for many years. Secondary prevention is still suboptimal in most of the member states of the EU (Table 1). Either there is no national cervical screening program or existing programs are ineffective due to reluctance of women to take part in them. In Germany there are 6,000 to 7,000 new cases of cervical cancer every year with a mortality rate of 2,000-3,000/year (1,2). Only 48% of all the women in Germany participate in the cytological screening program.

It should also be stressed that a single Pap smear test which is not repeated regularly only has a sensitivity of 50%. Therefore new strategies have been proposed for screening, such as HPV testing, which is currently hotly disputed (3). However it shouldn't be forgotten that a combination of cytology with colposcopy would increase the sensitivity of a single examination for the detection of cervical intraepithelial neoplasias (CIN) by up to 95% (2,4,5).

Colposcopy is a simple, diagnostic method to detect precancerous lesions at an early stage of development. However, significant pathological changes such as cervical intraepithelial neoplasms may be open to misinterpretation during colposcopy because of the low specificity and a high level of inter- and intra-observer variability (6,7).

To overcome the low specificity, colposcopy requires a technical adjunct which will result in a more precise differentiation between cervical cancer, cancer precursors and normal tissue. Regarding the high level of inter- and intra-observer variability, an improvement can only be achieved by training and quality control. Even though the cytological method i.e. Pap smear test is widely used by established cytological laboratories, there is a drastic shortage of gynaecologists trained in colposcopy both in Germany and in other countries.

The combination of traditional binocular colposcopy with digital image processing systems and modern communication technologies provides the means to deal with these problems. The digitalization of patient data and visual information (e.g. colposcopic images) not only improves the quality and reliability of patient documentation but also opens up new fields in telemedicine which have been already established in several other medical divisions, i.e. telepathology (8-11) and teleradiology (12-14), with telecardiology (15,16) and teledermatology (17,18) coming up close behind. First investigations in digital telecolposcopy are intended to make available for gynecology the advantages of teleconsulting, such as cost reduction, quality assurance of colposcopic patient sessions, optimal use of expertise, and reduction of observer variability (19-24).

The specific advantages of digital and telecolposcopy can be seen in the optimization of the documentation of medical findings, an improved follow-up particularly for pregnant women, and a marked improvement in patient information for both patients and doctors. Moreover, the digital technique can be used for assessing the competence of trainees with respect to accreditation in colposcopy as well as continuous education of practising colposcopists. Especially in rural areas and for small hospitals, telecolposcopy could be noticeably beneficial by giving added support to an inexperienced colposcopist from an outside specialist.

In spite of these indisputable advantages, the establishment of modern information and communication technologies in medical practice have to be realistically assessed. There are a number of difficulties and it is not a specificically German problem but a general European one. Given the need for technical standards and networks to link doctors' practices with hospitals on the one hand, and for solutions to the remaining questions on the subjects of liability and data safety, without which extensive and interoperable application of health telematics is still hampered, this is ultimately a financial and investment problem (25).

Furthermore additional research in the field of digital and telecolposcopy is required in order to assess the significance of these new techniques in the quality assurance of diagnostics.

Table 1. Incidence and mortality of cervix uteri cancer in the EU member states (1)

Country	Incidence rate per 100,000 persons	Cases numbers per year	Mortality rate per 100,000 persons	Deaths numbers per year
Slovakia	18.5	654	6.1	242
Poland	18.4	4,901	7.8	2,278
Lithuania	17.5	446	9.0	256
Czech Republic	16.2	1,160	5.5	476
Slovenia	16.1	207	4.7	79
Hungary	15.7	1,042	6.7	551
Estonia	15.5	156	6.6	74
Portugal	13.5	956	4.5	378
Latvia	12.9	291	7.4	165
Denmark	12.6	439	5.0	230
Austria	10.9	610	4.1	295
Germany	10.8	6,133	3.8	2,967
France	9.8	4,149	3.1	1,647
Belgium	9.3	667	3.4	326
Luxembourg	8.7	24	3.9	13
United Kingdom	8.3	3,181	3.1	1,529
Sweden	8.2	485	3.1	249
Italy	8.1	3,418	2.2	1,186
Greece	7.7	578	2.5	239
Spain	7.6	2,103	2.2	739
The Netherlands	7.3	753	2.3	307
Ireland	7.2	164	3.5	88
Malta	4.8	14	1.6	6
Finland	4.3	164	1.8	81
Cyprus	No data available			

Only a successful clinical evaluation will help to establish the pre-conditions for the implementation of digital colposcopy in medical networks and thereby contribute to the future development of gynecological services, particularly in countries with a weak infrastructure.

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