



ORIGINAL ARTICLE

# Estimation of HIV Seroprevalence in Colorectal Hospitals by Questionnaire Survey in Korea, 2002–2007

Mee-Kyung Kee<sup>a</sup>, Do Yeon Hwang<sup>b</sup>, Jong Kyun Lee<sup>b</sup>, Seung Hyun Kim<sup>a</sup>,  
Chaeshin Chu<sup>c</sup>, Jin-Hee Lee<sup>a</sup>, Sung Soon Kim<sup>a,\*</sup>

<sup>a</sup>Division of AIDS, Korea National Institute of Health, Osong, Korea.

<sup>b</sup>Department of Benign Proctology, Song Do Medical Center, Seoul, Korea.

<sup>c</sup>Division of Epidemic Intelligence Service, Korea Centers for Disease Control and Prevention, Osong, Korea.

Received: May 19, 2011  
Revised: July 11, 2011  
Accepted: July 18, 2011

**KEYWORDS:**

colorectal hospital,  
HIV seroprevalence,  
questionnaire,  
South Korea

**Abstract**

**Objectives:** The incidence of anal disease is higher among persons with human immunodeficiency virus (HIV) infection than among the general population. We surveyed the status of seroprevalence in colorectal hospitals in Korea.

**Methods:** The survey was conducted in colorectal hospitals in Korea from November to December 2008. The questionnaire was comprised of six topics about the status of HIV testing in colorectal hospitals. We gathered the data by website (<http://hivqa.nih.go.kr/risk>) or fax.

**Results:** Among 774 colorectal hospitals contacted, 109 (14%) hospitals participated in the survey. Among these, 48 hospitals (44%) performed HIV tests in their own hospitals and 11 (23%) took HIV testing by rapid method. The main reason for recommending an HIV test was surgical operation (54%) followed by endoscope (11%) and health checkup (9%). The annual number of HIV tests increased from 58,647 (at 21 hospitals) in 2002 to 246,709 (at 58 hospitals) in 2007. HIV seroprevalence was >3.0 per 10,000 individuals during 2002–2005, decreased to 2.2 per 10,000 individuals in 2006 and rose to 2.8 per 10,000 individuals in 2007.

**Conclusions:** HIV seroprevalence of colorectal hospitals was more than twice that of general hospitals in Korea. HIV surveillance systems based on colorectal hospitals for HIV/AIDS transmission prevention by early HIV diagnosis are needed.

\*Corresponding author.

E-mail: [sungskim@korea.kr](mailto:sungskim@korea.kr)

This is an Open Access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (<http://creativecommons.org/licenses/by-nc/3.0>) which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

## 1. Introduction

In Korea, the major route of HIV transmission is sexual contact (99%) and the ratio of men to women for HIV positivity is 11:1. The proportion of men who have sex with men (MSM) was approximately 40% of those infected [1]. MSM are known to have more anorectal diseases compared with the general population [2], and anal sex enhances HIV infection risk [3].

Patients with HIV are chronically immunosuppressed, which may increase their risk for development of malignancies [4,5]. In many studies, HIV infection led to significantly increased rates of several cancers, including Hodgkin's disease, multiple myeloma, brain cancer, and seminoma [6]. Anal cancer and its precursor anal intraepithelial neoplasia have a high prevalence in the HIV-positive population [7]. The relative risk for developing anal cancer among HIV-positive MSM is 37 times higher than for the general population [8].

Neoplastic lesions of colorectum detected by endoscopy (colonoscopy or sigmoidoscopy) were significantly more common in HIV-infected patients than in control subjects without HIV [9]. Colorectal cancer is the third most common cancer (13%) in Korea, with >7100 deaths resulting from the disease in 2009 [10].

With recent increases in the number of specialized colorectal clinics and hospitals, persons who develop anorectal diseases due to anal intercourse or HIV infections tend to be treated in these centers. HIV-infected persons have more anorectal diseases, and the most frequent reason to undergo surgical operation is anorectal diseases [11–13]. Therefore, this study aimed to identify HIV seroprevalence among patients in anorectal clinics/hospitals in Korea.

## 2. Methods

### 2.1. Data collection

The survey was conducted in colorectal hospitals in Korea from November to December 2008 and was co-sponsored by the Korea Centers for Disease Control (KCDC) and the Korean Society of Coloproctology (KSC). The Division of AIDS of KCDC designed a questionnaire to identify the status of HIV testing in colorectal hospitals. KSC distributed the questionnaire to 774 colorectal hospitals in Korea. KCDC gathered the data by the website (<http://hivqa.nih.go.kr/risk>) or by fax. The questionnaire comprised six topics about HIV testing, such as whether the colorectal hospital tested for HIV in their own hospital, the methods of HIV test, the reason for recommendation of HIV test to patients, the necessity for HIV test under endoscopy, and the annual number of HIV tests (2002–07).

### 2.2. HIV testing system

In Korea, HIV reactive samples from primary screening tests in hospital laboratories or clinical laboratories are

referred to 17 local sites of the Institutions of Health and the Environment (IHE) for confirmatory tests. Unconfirmed reactive samples are referred to the Division of AIDS at KCDC, where final decision on HIV infection status for each sample is made. The results of positivity from IHE or from Division of AIDS are reported to the Division of HIV and TB control at KCDC, which manages the national HIV/AIDS database [14].

### 2.3. Statistical methods

HIV seroprevalence is defined as the number of HIV-infected individuals divided by the total number of HIV-tested individuals in a single year during the study period. The number of HIV-tested individuals was calculated by the repeated value per person-year from previous study on hospital-based HIV seroprevalence in Korea. The repeated value of HIV test per person-year during 2002–07 was follows: 1.021, 1.024, 1.030, 1.030, 1.041 and 1.044, respectively [15]. Statistical analysis was performed using the  $\chi^2$  test. A  $p$ -value <0.05 was considered statistically significant.

## 3. Results

The survey included 109 (14%) of 774 colorectal hospitals in Korea. Table 1 shows the status of HIV test in colorectal hospitals. HIV test was taken in 102 hospitals (94%) and 48 hospitals (44%) performed HIV test in-house. The main reason for recommending an HIV test to patients was for operation (54%) followed by for endoscope (11%) and on health checkup (9%). HIV test before endoscopy was deemed necessity in 44

**Table 1.** Status of HIV test in colorectal hospitals in Korea

	No. cases <sup>a</sup> (%)
Responding hospitals	109 (100)
Where to perform HIV test	
Independent HIV test in-hospital	48 (44.0)
Refer to clinical laboratory	54 (49.5)
No HIV test	7 (6.5)
Case of recommendation for HIV test <sup>a</sup>	
Operation	59 (54.1)
Endoscope	12 (11.0)
Health checkup	10 (9.2)
Suspected HIV infection	60 (55.0)
Necessity of HIV test before endoscopy	
Yes	44 (40.4)
No	62 (56.9)
No response	3 (2.8)
Reason for not performing HIV test before endoscopy	
Refusal by a patient	12 (11.0)
Not covered by insurance	51 (46.8)
Not necessary	37 (33.9)
No response	9 (8.3)

<sup>a</sup>Multiple responses allowed.

**Table 2.** Initiation and method of HIV tests in 48 colorectal hospitals in Korea

	No. cases (%)
Starting year of HIV test	
Before 1990	7 (14.6)
1990–1999	10 (20.8)
2000–2009	31 (64.6)
Testing method	
ELISA (Ab)	14 (29.2)
ELISA (Ag +Ab)	22 (45.8)
Rapid test	11 (22.9)
No response	1 (2.1)

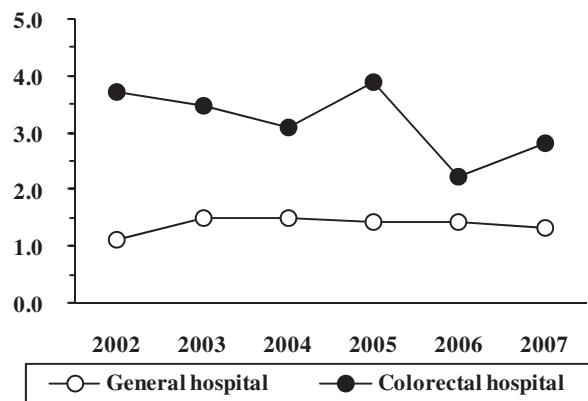
(40%) of responding hospitals. The major reason for not doing an HIV test before endoscopy was that it was not covered by insurance (47%), followed by it was deemed unnecessary (34%).

The status of HIV tests in 48 colorectal hospitals performing HIV tests in-house are shown in Table 2. Thirty-one (65%) hospitals began to take HIV tests from 2000. Antigen/antibody enzyme-linked immunosorbent assay (ELISA) was performed in 22 hospitals (46%).

Table 3 shows the annual number of HIV tests and HIV seroprevalence in colorectal hospitals from 2002 through 2007. The annual number of HIV test increased from 58,647 (at 21 hospitals) in 2002 to 246,709 (at 58 hospitals) in 2007. HIV seroprevalence was >3.0 per 10,000 individuals until 2005, decreased to 2.2 per 10,000 individuals in 2006, and increased to 2.8 per 10,000 individuals in 2007.

#### 4. Discussion

We looked at the status of HIV tests and HIV seroprevalence in colorectal hospitals, which treat more patients with benign anal diseases than general hospitals. HIV tests in colorectal hospitals were performed before surgical operations and when HIV infection was suspected. During the analyzed period, HIV seroprevalence of patients in colorectal hospitals was 2.2–3.9 per 10,000 individuals, whereas that in hospitals/clinics was 1.1–1.5 in Korea [15]. HIV seroprevalence in colorectal hospitals was thus 2–3 times higher than that of general hospitals/

**Figure.** Comparison of HIV seroprevalence between general hospitals and colorectal hospitals (2002–07). The HIV seroprevalence is the number of the HIV infected per 10,000 individuals.

clinics (Figure). The number of individuals taking HIV test has increased in colorectal hospitals and general hospitals/clinics. The effect of increased numbers of HIV test takers was contrasting; HIV seroprevalence in general hospitals/clinics has not increased because of a rough balance between the number of HIV-infected individuals and test takers, whereas that in colorectal hospitals has decreased because of higher proportional increases in the latter than the former parameter.

Koreans aged in their 50s are advised to take periodical colonoscopies for early detection of colorectal cancer, which has one of the highest prevalences among malignancies in Korea [16]. As the number of colonoscopy increases, so does the risk of infection by colonoscopy. However, our results showed that the decision to undertake HIV tests prior to colonoscopy was not governed by necessity, but rather by health insurance coverage. Korean health insurance policy deems that only the following cases are covered by health insurance for HIV tests: organ transplant; patients scheduled for surgical operation or transfusion, severely infected patients, patients with pyrexia of unknown origin, dialysis, untypical skin ailment or lymphatic swelling of unknown origin, homosexuals, prostitutes, injection drug users with histories of sexually transmitted disease and possible HIV infection, others suspected for HIV infection, and pregnant women [17]. Most of the cases in colorectal

**Table 3.** Number of HIV tests and HIV seroprevalence in colorectal hospitals, 2002–2007

	2002	2003	2004	2005	2006	2007
No. hospitals	21	31	35	45	52	58
No. HIV test	58,647	147,395	164,022	200,013	223,311	246,709
No. detection of HIV	21	51	50	75	47	65
HIV seroprevalence	3.7	3.5	3.1	3.9	2.2	2.8

HIV seroprevalence is the number of the HIV-infected per 10,000 individuals.

**Table 4.** Annual insurance claim proportion for HIV testing in colorectal hospitals in Korea

	2002	2003	2004	2005	2006	2007
Insurance claim proportion (%) <sup>a</sup>	69.7	34.6	34.0	35.4	33.9	25.7

<sup>a</sup>Insurance claim proportion, (no. insurance claims for HIV test/no. of HIV tests) × 100.

hospitals/clinics were patients scheduled for surgical operation or transfusion and suspected for HIV infection.

In this study, the proportion of HIV test fees not covered by national health insurance decreased since 2002. In 2002, the insurance claim for HIV tests at colorectal hospitals was much higher than that of general hospitals, but each year the claim decreased, finally to the level of general hospitals (Table 4). This can be interpreted as being that HIV tests were performed for patients eligible for insurance claim in 2002, whereas thereafter the population enlarged to include those who were not eligible for insurance, and so that the HIV seroprevalence in 2006 and 2007 decreased although the number of HIV tests and confirmed HIV-infected patients increased in colorectal hospitals.

HIV tests are necessary to prevent infection during diagnosis and treatment such as transfusion and to prevent transmission by persons who do not know that they are HIV infected. A recent study on the survival rate of HIV-infected persons suggests that if they are identified and receive adequate treatment they can extend their lives by 16–30 years [18]. To prevent HIV infection and to extend the survival time of HIV infected individuals by early detection, US Centers for Disease Control recommends that all Americans aged 13–64 years take HIV tests. Furthermore, high-risk groups should take the tests every year [19]. Korea has also run more active program for early detection since 2008; anonymous tests extended to hospitals.

Moreover, most newly identified infected persons start undergoing immediate treatment due to detection in late disease progression [20]; 700–800 newly identified HIV infected persons are added each year. However, we need to improve the current national surveillance system in Korea. More than 70% of HIV-infected persons are identified by tests in hospitals/clinics. We developed methods to estimate HIV tests and HIV seroprevalence in previous study [15]. Our next study will investigate departmental differences of HIV seroprevalence in hospitals/clinics because we noticed that a high seroprevalence in a branch of colorectal hospitals in this study.

This study has two main limitations. First, we applied the numbers of repeat tests from the previous study on HIV seroprevalence in general hospitals/clinics to estimate the HIV seroprevalence in colorectal hospitals. Second, the low response rate (14%) may have led to selection bias; most responding hospitals were large-sized hospitals.

HIV/AIDS in Korea is mainly infected by sexual contact and is dominated by infected men. This

characteristic supports our study results on colorectal hospitals and suggests that the national HIV surveillance system should be fortified for colorectal patients.

## Acknowledgement

This study was supported by an intramural grant (No. 4800-4842-302) of Korea National Institute of Health.

## References

1. Korea Centers for Disease Control and Prevention. The surveillance reports for HIV/AIDS in Korea 2010. Osong: KCDC; 2011.
2. Goldstone SE, Winkler B, Ufford LJ, et al. High prevalence of anal squamous intraepithelial lesions and squamous-cell carcinoma in men who have sex with men as seen in a surgical practice. *Dis Colon Rectum* 2001 May;44(5):690–8.
3. Vittinghoff E, Douglas J, Judson F, et al. Per-contact risk of human immunodeficiency virus transmission between male sex partners. *Am J Epidemiol* 1999 Aug;150(3):306–11.
4. Rabkin CS, Yellin F. Cancer incidence in a population with a high prevalence of infection with human immunodeficiency virus type 1. *J Natl Cancer Inst* 1994 Nov;86(22):1711–6.
5. Melbye M, Cote TR, Kessler L, et al. High incidence of anal cancer among AIDS patients. The AIDS/cancer working group. *Lancet* 1994 Mar;343(8898):636–9.
6. Goedert JJ, Cote TR, Virgo P, et al. Spectrum of AIDS-associated malignant disorders. *Lancet* 1998 Jun;351(9119):1833–9.
7. Palefsky J. Biology of HPV in HIV infection. *Adv Dent Res* 2006 Apr;19(1):99–105.
8. Mudrikova T, Jaspers C, Ellerbroek P, Hoepelman A. HPV-related anogenital disease and HIV infection: not always 'ordinary' *Condylomata acuminata*. *Neth J Med* 2008 Mar;66(3):98–102.
9. Abbas A, Yang G, Fakhri M. Management of anal cancer in 2010. Part 1: overview, screening, and diagnosis. *Oncology* 2010 April;24(4):364–9.
10. Ministry of Health Welfare. National Cancer Information Center, statistics of cancer: anal cancer. Available from: <http://www.cancer.go.kr/cms/statistics/incidence>; 2011.
11. Miles AJ, Mellor CH, Gazzard B, et al. Surgical management of anorectal disease in HIV-positive homosexuals. *Br J Surg* 1990 Aug;77(8):869–71.
12. Wexner SD, Smithy WB, Milsom JW, Dailey TH. The surgical management of anorectal disease in AIDS and pre-AIDS patients. *Dis Colon Rectum* 1986 Nov;29(11):719–23.
13. Burke EC, Orloff SL, Freise CE, et al. Wound healing after anorectal surgery in human immunodeficiency virus-infected patients. *Arch Surg* 1991 Oct;126(10):1267–70.
14. Korea Centers for Disease Control and Prevention. Guideline for HIV/AIDS control. Seoul: KCDC; 2010.
15. Lee JH, Hong KJ, Wang JS, et al. Estimation of hospital-based HIV seroprevalence as a nationwide scale by novel method: 2002–2008 in Korea. *BMC Public Health* 2010 Nov;10:739.

16. Ministry of Health Welfare. National Cancer Information Center, type of cancer: anal cancer. Available from: <http://www.cancer.go.kr/cms/cancer>; 2011.
17. Ministry of Health Welfare. Information field: the data of laws, number of issue a notification. Available from, <http://www.mohw.go.kr>; 2008.
18. Antiretroviral Therapy Cohort Collaboration. Life expectancy of individuals on combination antiretroviral therapy in high-income countries: a collaborative analysis of 14 cohort studies. *Lancet* 2008 Jul;372(9635):293–9.
19. CDC. Revised recommendation for HIV testing of adolescents, and pregnant women in health-care setting. *MMWR* 2006 Sep; 55(RR14):1–17.
20. Lee JH, Kim GJ, Choi BS, et al. Increasing late diagnosis in HIV infection in South Korea: 2000–2007. *BMC Public Health* 2010 Jul;10:411–7.