

# Bridging the gap between knowledge and action for health: case studies

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**Abstract** Biomedical discoveries could improve people's health only if they are suited to the diverse political and social contexts, health systems and population groups. Knowledge generated through evidence-informed health policy and practice when applied to the local situation enhances the quality and efficiency of health care. This article describes four case studies on bridging the gap between knowledge and action for health in a tertiary care hospital in Bangkok, Thailand. Gaps between knowledge and action for health are classified into "know-do" and "do-know" gaps with knowledge implementation and knowledge generation being the key measures for bridging the gap.

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## Introduction

Health research findings impact policy, practice and patient outcomes if they are appropriately translated into health-care practice. The 2004 *World report on knowledge for better health* stated that biomedical discoveries could improve people's health only if they are applied specifically to diverse political and social contexts, health systems and population groups. The report laid a strong emphasis on translating knowledge into action to improve health thereby bridging the gap between what is known and what is actually done.<sup>1</sup> Knowledge translation has been a cause for concern and strategies for bridging the gap between practice and evidence have been proposed.<sup>2-5</sup>

I describe four case studies chosen to illustrate how to bridge the gap between knowledge and action for health according to the framework in Siriraj Hospital, Bangkok where the "Knowledge Management to Promote Evidence-Informed Health Care Policy and Practice in Thailand" project has been conducted since 2001. The concept and the framework for knowledge management was based on my experiences at Siriraj Hospital over the first two years of the project (Fig. 1).<sup>6</sup>

Siriraj Hospital is a tertiary-care university hospital in Bangkok, Thailand with 2335 beds (2200 beds in 111 general wards and 135 beds in 10 intensive care units); approximately 10 000 per-

sonnel of which 1300 are physicians (700 faculty members and 600 residents) and 4200 are nurses; with around 1 000 000 outpatient visits and 100 000 inpatients per year.

I have classified the gaps between knowledge and action for health into "know-do" and "do-know" gaps with knowledge implementation and knowledge generation being the key measures for bridging the gap between knowledge and action for health.

## Case Studies

### Knowledge implementation for bridging the "do-know" gap *Heparinized saline flush and peripheral venous catheter patency*

Many hospitalized patients require a peripheral intravenous catheter for the administration of drugs and fluids. The patency of indwelling peripheral intravenous catheters is maintained by a continuous drip of fluid via the catheter or by connecting the catheter to an intravenous catheter lock (IV lock). The IV lock is advantageous as the patient can move around without carrying the fluid bottle. However, an indwelling IV lock has to be periodically flushed with fluid to prevent clots.

The work instruction for the flush procedure in Siriraj Hospital (prepared in 2001 and revised in 2003) recommends using heparinized saline as flush

fluid. A September 2004 survey, on the use of fluids for flushing peripheral intravenous catheters, found that the majority of the patients with IV lock received heparinized saline (89%) as flush fluid while the remaining (11%) received normal saline.<sup>7</sup> This occurred despite the known disadvantages of using heparin for flushing IV locks and the high cost of using heparin — an estimated 2.4 million baht (US\$ 60 000) per year. Evidence from three meta-analyses found no significant difference in the incidence of catheter clot and phlebitis between peripheral intravenous catheters flushed with normal saline and those flushed with 10 units per ml or 50 units per ml of heparinized saline.<sup>8-10</sup> Results from two randomized controlled studies conducted by nurses at Siriraj Hospital and Ramathibodi Hospital in Bangkok reported findings similar to those from the meta-analyses.<sup>11,12</sup> Therefore, the practice of using heparinized saline as flush fluid for maintaining peripheral intravenous catheter patency of hospitalized patients in Siriraj Hospital was not evidence-based and had to be corrected. Many hospitals in Thailand use normal saline as flush fluid for IV lock and three patient-care areas in Siriraj Hospital have used normal saline flush for maintaining peripheral intravenous catheter patency for many years without any problems.

The knowledge management project at Siriraj introduced five knowledge

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implementation strategies/interventions for switching from heparinized saline flush to normal saline flush in 10 medical wards containing 240 beds.

1. Disseminating evidence-based clinical practice policy on using flush fluid for maintaining peripheral intravenous catheter patency to responsible personnel.
2. Reminding prescribers to use normal saline flush instead of heparinized saline flush.
3. Providing technical advice to nurses on using normal saline flush in the event of peripheral intravenous catheter clot.
4. Confirming the necessity of using heparinized saline flush with the prescriber.
5. Setting up a regulation that if the prescriber really wanted to use heparinized saline flush: an asterisk should be placed next to the prescription otherwise the nurse would use normal saline flush. This regulation was added because many prescribers called the IV lock “heparin lock” and prescribed “heparin lock” even though they did not intend to use heparin.

The information on using flush fluids was collected from physicians’ order sheets in the medical records at baseline in February 2005, and then every two to four weeks during the intervention period up to June 2005 and six months after implementing the interventions. All hospitalized patients in medical wards who had IV locks received heparinized saline flush at baseline. After

knowledge interventions 1–4 were applied, from March to May 2005, in 75% of the patients with IV locks flush fluid was switched to normal saline. Normal saline flush completely replaced the practice of using heparinized saline flush after the inclusion of administrative intervention 5 from June to November 2005. The hospital administrator subsequently adopted these strategies as a policy for the entire hospital in January 2006. In addition to the publication of this observation<sup>7</sup> and its policy implications, this knowledge implementation resulted in enormous savings in terms of resources for the patients and the hospital.

### Knowledge generation for bridging the “do-know” gap: Urinary drainage bag change regimen

Urinary tract infection (UTI) is a common complication among patients with an indwelling urethral catheter. Each change of the urinary drainage bag predisposes the patient to developing UTI, and increases personnel time, expense and plastic waste. During the preparation meeting for Siriraj Hospital’s accreditation in August 2001, there was a conflict between the nurse practitioners and the infection control committee regarding the frequency of urine bag changes for patients with short-term urinary catheter. The nurses’ guideline recommended a urine bag change every three days but the infection control committee said it should not be changed on such a routine basis.

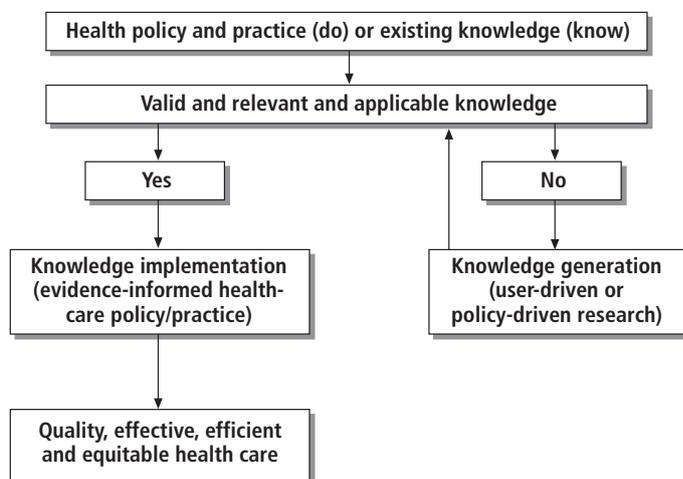
A review of the literature showed only one relevant study that compared urine bag changing regimens in 12 elderly long-term urinary catheterized patients.<sup>13</sup> The study found no significant clinical or microbiological differences between patients who had a daily urine bag change and those who had a weekly bag change. This study, however, was not applicable to Siriraj Hospital because it was conducted on long-term catheterized elderly patients. A guideline for preventing infections associated with the insertion and maintenance of short-term indwelling urethral catheters in acute care recommended that urinary drainage bags should be changed when clinically indicated, without any supporting evidence.<sup>14</sup> In this respect, neither the nurses’ guideline nor the infection control committee’s recommendation were based on valid evidence.

A randomized controlled trial on the incidence of UTI, among hospitalized patients with short-term indwelling urethral catheters, which compared a three-day urinary drainage bag change to a no-change found no significant difference in the incidence of UTI between the two groups.<sup>15</sup> This result was adopted as a policy endorsed by the Dean of Faculty of Medicine, Siriraj Hospital for the entire hospital from February 2002 and disseminated to infection control nurses during the national workshop on prevention and control of nosocomial infections in July 2002. In addition to a publication<sup>15</sup> and policy implications, it saved on costs, personnel time and plastic waste.

### Knowledge implementation for bridging the “know-do” gap Semi-recumbent positioning to prevent ventilator/associated pneumonia

Pneumonia is a common complication among patients on a respirator, causing high mortality and morbidity. While there is evidence that the supine position is a risk factor for ventilator-associated pneumonia (VAP),<sup>16–18</sup> a clinical study revealed that the semi-recumbent position prevented VAP with a relative risk reduction of 76% (95% confidence interval (CI): 27–93%) and number-needed-to-treat (NNT) of four.<sup>19</sup> An evidence-based clinical practice guideline recommends the semi-recumbent position as an intervention to prevent VAP.<sup>20</sup> These findings were valid, relevant and applicable to the

Fig. 1. Framework for bridging the gap between knowledge and action for health



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patients in Siriraj Hospital. A survey of the body position of patients on respirators in 14 medical wards of Siriraj Hospital during February–March 2003 showed that only 17% of the patients were in semi-recumbent position. A total of 27% of the residents and nurses in 14 medical wards recommended the semi-recumbent position for patients on respirators. However, the reasons for this response were not based on evidence for pneumonia prevention from the literature but mainly physiological, such as better lung expansion, better oxygenation and decreased intra-thoracic pressure.

The knowledge management project at Siriraj developed and executed strategies for knowledge implementation in the target populations — residents and nurses. These were:

1. informing the target population about the evidence during a quality improvement conference meeting in July 2003;
2. disseminating a one-page clinical practice policy in Thai containing information on the significance of the problem, the evidence, recommendation, grade of recommendation, contraindications for and warnings about the semi-recumbent position and the relevant references;
3. creating awareness among health-care personnel by placing a specific sign at the patient's bed. The front side of the sign would read, "This patient should be placed in a semi-recumbent position", while the back of the sign contained "indications, contraindications and warnings about the semi-recumbent position".

Because this was a no-cost simple intervention, a compliance rate greater than 90% was expected. However, a survey in July–August 2003, after the implementation of the aforementioned strategies, revealed that only 41% of patients on respirators in the 14 medical wards were placed in the semi-recumbent position, significantly higher than 17% at baseline ( $P < 0.005$ ), but the compliance was considered unsatisfactory. Therefore, additional strategies, such as feedback of observations to nurses, a reminder system and increasing awareness were implemented. Repeat surveys during November–December 2003 and March–April 2004 revealed that 56% and 76% of the patients on respirators in 14 medical wards, respectively, were placed in the semi-recumbent position. A survey of

739 adult patients on respirators in all intensive care units during October and December 2003 revealed that 68% of them were placed in a semi-recumbent position. The incidence of VAP per 1000 ventilation days decreased from 11.3 during January–December 2002 to 9.2 and 9.4 during October–December 2003 and January–June 2004, respectively. This decrease was not large because compliance with the semi-recumbent position was still modest. The lessons learned from these attempts showed that knowledge translation strategies are not easy even for implementing a simple and free intervention.

### Knowledge generation for bridging the "know-do" gap *Antibiotic prophylaxis for preventing infection in cancer patients*

The majority of patients who receive chemotherapy for the treatment of cancer develop neutropenia and thus are susceptible to bacterial infections. Bacterial flora in the oral cavity and gut of chemotherapy-induced neutropenic patients themselves cause these infections. Reports from two meta-analyses, which determined the efficacy of oral prophylactic antibiotics in afebrile neutropenic patients due to cancer chemotherapy, showed that oral prophylactic antibiotics, fluoroquinolones and cotrimoxazole, decreased bacteraemia and infection-related mortality due to bacterial causes during neutropenic episodes.<sup>21,22</sup> Although, evidence from these meta-analyses was valid and relevant to Thai patients, the issue of applicability was a concern. Most of the primary studies included in the meta-analyses were conducted in developed countries, where antibiotics are not available without prescription. In Thailand, however, antibiotics can be purchased without prescription, and fluoroquinolones and cotrimoxazole are commonly given to patients with acute diarrhoea and upper respiratory infections. Fluoroquinolones are also used as a growth stimulator in the shrimp industry in Thailand, and thus commonly available. Moreover, it is not known if bacterial flora in the oral cavity and gut of Thai patients who have cancer chemotherapy-induced neutropenia are susceptible to fluoroquinolones and cotrimoxazole, and whether they should receive such antibiotics.

This situation led the way for knowledge generation on the susceptibility of

bacteria isolated from the oral cavity and gut of Thai patients with cancer chemotherapy-induced neutropenia. A study to determine the susceptibility of bacteria colonized in the oral cavity and/or gut of 140 Thai patients with cancer chemotherapy-induced neutropenia to oral antibiotics available in Thailand is currently being conducted. Preliminary results suggest that bacterial flora isolated from some patients are resistant to many oral antibiotics. By the end of 2006 it will be confirmed whether oral antibiotics would be beneficial for Thai patients before knowledge implementation of "to use" or "not to use" oral prophylactic antibiotics in Thai patients with cancer chemotherapy-induced neutropenia takes place.

## Conclusions and recommendations

The gap between what we know and what we practice, i.e. the know-do gap, is mentioned in the literature, and translating research findings into practice by knowledge implementation has been attempted. The case studies described in this article found that another category of gap — the do-know gap, i.e. the gap between what we practice and what we know, is also common in health-care systems in developing countries. Knowledge generation is also an important measure to bridge the gap between knowledge and action for health and it is hoped that the above-mentioned case studies will encourage responsible institutions in developing countries to invest more resources in promoting professional communicators or intermediaries to narrow the gap as well as develop a culture where decisions taken by policy-makers, health professionals and the public are based on evidence. ■

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## Résumé

### Comblant le fossé entre savoir et action en faveur de la santé : études de cas

Les découvertes dans le domaine biomédical ne peuvent déboucher sur des améliorations en matière de santé publique que si elles sont adaptées aux divers contextes politiques et sociaux, systèmes de santé et groupes de population. Les connaissances acquises à travers l'application à la situation locale de politiques et de pratiques sanitaires s'inspirant d'éléments factuels permettent d'améliorer la qualité et l'efficacité des soins de santé prodigués. L'article présente quatre études de cas examinant comment établir

un pont entre les connaissances et les interventions en faveur de la santé dans un hôpital dispensant des soins tertiaire de Bangkok en Thaïlande. Les ponts à établir entre connaissances et interventions sanitaires sont répartis en deux catégories, «savoir-faire» et «faire-savoir», la mise en œuvre des connaissances et la génération de données étant des mesures clés pour créer de tels liens.

## Resumen

### Cerrar la brecha entre los conocimientos y la acción sanitaria: estudios de casos

Los descubrimientos biomédicos sólo redundan en mejoras de la salud de las personas cuando están adaptados a los diversos contextos políticos y sociales, sistemas de salud y grupos de población. Los conocimientos que generan las políticas y prácticas sanitarias basadas en la evidencia cuando se aplican a la situación local fomentan la calidad y eficiencia de la atención sanitaria. En este artículo se describen cuatro estudios de casos sobre la

manera de corregir la brecha existente entre los conocimientos y la acción sanitaria en un hospital de atención terciaria de Bangkok, Tailandia. Las brechas teórico-prácticas en materia de salud son de dos tipos: «conocimientos-acción» y «acción-conocimientos», y las soluciones para corregirlas radican en la aplicación de conocimientos y la generación de conocimientos, respectivamente.

## ملخص

### رأب الفجوة بين المعارف والعمل من أجل الصحة: دراسة حالات

بين المعارف والعمل من أجل الصحة في إحدى مستشفيات الرعاية الثالثة في بانكوك في تايلاند. فالفجوات بين المعارف والعمل من أجل الصحة تصنّف إلى فجوات المعرفة للعمل وفجوات العمل للمعرفة، ويبقى كل من تنفيذ المعارف وتوليدها الوسيّلتين الأكثر أهمية في رأب هذه الفجوة.

لا يمكن للمكتشفات الطبية والبيولوجية أن تحسّن من حياة الناس ما لم تكن متناسبة مع السياق السياسي والاجتماعي ومع النظم الصحية ومع المجموعات السكانية. وتتولّد المعارف من خلال السياسات والممارسات الصحية المسندة بالبيّنات، وإثر تطبيقها على الوضع المحلي فإنها ستعزّز الجودة والفعالية في الرعاية الصحية. ويصف هذا المقال أربع دراسات للحالات حول رأب الفجوة

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