

# Hospital hygiene in Mongolia and the MeshHp project

Walter Popp<sup>1</sup>, Ulambayar Badarch<sup>2</sup>, Altannavch Tsevegjav<sup>3</sup>, Lkhajii Natsagdorj<sup>4</sup>, Birgit Ross<sup>1</sup>, Ochtsatsral Tsend-Ochir<sup>5</sup>, Muugolog Tsolmon<sup>6</sup>, Myadagmaa Baval<sup>4</sup>, Batsuuri Byambadorj<sup>4</sup>, Tsegmid Purevdash<sup>5</sup>, Khand Zorigt<sup>7</sup>, Sanjaa Ariunbold<sup>5</sup>, Jörg Spors<sup>8</sup>, Thomas Lembeck<sup>8</sup>, Patrick Kreuz<sup>9</sup>, Claude Bodart<sup>10</sup>, Eckhard Nagel<sup>1</sup>

1. University Clinics of Essen, Essen, Germany
2. Chingeltei District Hospital, Ulaanbaatar, Mongolia
3. Second General Hospital, Ulaanbaatar, Mongolia
4. National Central Hospital, Ulaanbaatar, Mongolia
5. City Emergency Centre, Ulaanbaatar, Mongolia
6. National Centre of Communicable Disease, Ulaanbaatar, Mongolia
7. Mongolian emergency service hospital Hygiene project, [www.meshhp.mn](http://www.meshhp.mn)
8. Fire Brigade, Essen, Germany
9. German Embassy, Ulaanbaatar, Mongolia
10. Asian Development Bank, Ulaanbaatar, Mongolia

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## Abstract

Mongolia is a vast country between Russia and China with a small population of about 2.7 million people. Hospital hygiene is on a rather low level at the moment. Main problems are infectious diseases and above all a high rate of hepatitis carriers in the general population as well as hospital staff. As part of a German-Mongolian cooperation of both Ministries of Health a project was initiated in 2010 to improve hospital hygiene in some pilot hospitals in Ulaanbaatar, Mongolia. Some success has been achieved after two years, like vaccination of hospital staff against hepatitis B, using alcoholic hand rub on wards and training of staff.

## Key words

Hepatitis and prevention and control; Vaccination; Hand hygiene; Personnel, hospital; Mongolia

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## Corresponding Author

Walter Popp  
University Clinics of Essen, Essen, Germany  
Email: [walter.popp@uk-essen.de](mailto:walter.popp@uk-essen.de)

## Mongolia – an overview

Mongolia is one of the most sparsely populated countries in the world with a population of only 2.7 million people. Around half of them are living in the capital Ulaanbaatar (UB); one third is still living as nomads in the steppes. In winters temperatures may go down to -50°C and in very harsh winters (Dzud) large numbers of livestock is killed leading to a loss of means of existence for many nomads. Then they move to UB and settle in the outer districts (ger districts), very often without water and electricity supply.

Mongolia was a satellite of USSR until 1990, today Mongolia is the most robust democracy in Central Asia. The country is rich in mineral resources, like anthracite coal, copper, uranium, mineral oil, silver, gold and rare earths. International companies - often in collaboration with Mongolian counterparts - are developing the mining industry at fast pace. Therefore, increasing public revenues are expected from 2013 onwards.

## Health care system in Mongolia

The average life expectancy in Mongolia is about 67 years. One third of the population is younger than 30 years. In Mongolia a national health insurance is available, but not paying for all diagnostics and therapies. Usually, costs are taken for the next located family doctor and district hospital.

The expenditure for health care system is low in Mongolia with only 3.3% of GDP (gross domestic product) – for comparison, it is 15.4% in the US, 10.4% in Germany, 5.4% in Russia and 4.3% in China. From 2013 onwards, big income for Mongolian state is expected from mining boom so that a fast and broad development of healthcare system in Mongolia is basically possible. Also, there is big interest in developing a high level medicine according to Western standards. Even solid organ transplantations have been done in the last years, however structural development of public hospitals is not following this development.

## Infectious diseases in Mongolia

The most common infectious disease in Mongolia is tuberculosis with more than 4,000 new cases per year.<sup>1,2</sup> Resistance data are available and show a moderate resistance to common tuberculostatics.<sup>3</sup>

An emerging problem are sexually transmitted diseases (STDs), like syphilis, gonorrhoea and Chlamydia infections. In 2009, 17,000 cases were reported and in screening of pregnant women 2.0% had syphilis, 1.2% gonorrhoea and 2.1% trichomoniasis.<sup>1,4</sup> At present HIV/AIDS still seems to be a rare disease in Mongolia with a prevalence below 0.1%.<sup>2</sup>

Diarrhoeal diseases are common. Close contact to animals in countryside explains even cases of tularemia, Q-fever, brucellosis, anthrax, rabies and plague.

## Hepatitis in Mongolia

The main health problem in Mongolia is the high rate of hepatitis B and C carriers.<sup>1</sup> Health Science University of Mongolia reports that more than 77% of Mongolians have been infected with HBV virus at some time in their lives.<sup>5</sup> Primary liver cancer is the most common cancer in both sexes.<sup>1,2</sup> The risk is additionally increased because of high alcohol (vodka) consumption.<sup>6-8</sup> For comparison, in Germany 0.6% of the population are carriers of hepatitis B virus and 0.4% of hepatitis C.<sup>9</sup>

Table I shows the rates of hepatitis carriers in different studies. The data show that between 15 and 25% of Mongolians might be carriers of hepatitis B and C virus and, therefore, be infectious. It must be kept in mind that the laboratory methods might not always have been valid, this is especially the case for elder studies.

The study of Baatarkhuu *et al.* shows an increase of hepatitis C virus carriers with age from 2.5% in those under 10 years to 32.6% over 60 years old.<sup>14</sup>

There are different reasons discussed for the high hepatitis prevalence in Mongolia:

- Blood products are not consequently tested in countryside.<sup>16</sup>
- Traditional medicine (bloodletting – kind of folk medicine in rural areas), acupuncture, tattooing, especially in countryside.<sup>16</sup>
- Self injection practice in families and toothbrush sharing, especially in rural areas.<sup>17,18</sup> It was reported (pers. communication) that in former decades one glass syringe was used for all family members and only placed in boiling water.
- Insufficient reprocessing of medical devices. This

**Table I. Hepatitis B and C carriers in Mongolia**

Year	Group	N	Hepatitis B	Hepatitis C	Reference
< 1998	outpatients	150	28.7 %	48.0 %	Fujioka 1998 <sup>10</sup>
2002	adults	249	10 %	14 %	Takahashi 2004 <sup>11</sup>
2003	Blood donors	17,537	7.7 %	7.5 %	Oyunbileg 2004 <sup>12</sup>
2004	Blood donors	403	8.2 %	5.2 %	Tsatsralt-Od 2005 <sup>13</sup>
2003-2005	adults	1,512		11.0 %	Baatarkhuu 2008 <sup>14</sup>
	nurses	96		20.8 %	
2004-2005	Blood donors 18/19y males	923	7.8 %	9.6 %	Tserenpuntsag 2010 <sup>15</sup>
		96	19.8 %	5.3 %	
2009	Army soldiers	> 550	15.5 %	2.0 %	Pers. communication

is presumed especially for dentists in rural areas.

- Many IV applications of drugs in hospitals without real indications (e.g. vitamins).<sup>18-20</sup>
- Pregnancy: It must be an open question whether hepatitis was transmitted sexually or during delivery (e.g. use of non sterile instruments).
- Insufficient vaccination: Very often rather old vaccines are bought on the international market by some NGO shortly before storability is over. Another reason may be transport in winter to countryside with the risk of freezing.<sup>21-23</sup>
- Sexual behaviour: Little is known about that, but increasing number of STDs is hinting to this possible reason.

Some of these causes may no longer exist, e.g. usage of one glass syringe in a family. A lot are still only present at the countryside, like insufficient testing of blood products, bloodletting or substandard vaccines.

The study of Baatarkhuu *et al.* shows a high HCV carrier status in nurses.<sup>14</sup> In one big hospital in UB, employees doctor reported very high virus carrier rates in surgery, sterilisation unit and engineers (pers. communication). In healthcare workers, it should be expected that hepatitis B carrier status is much more common than HCV because the risk of an infection by sharps with comparable amount of blood is around 10 times higher from hepatitis B than C.<sup>24,25</sup> Data from the general population show that hepatitis B is much more often reported than C, e.g. 748 new cases of hepatitis B and 128 new cases of hepatitis C in 2009.<sup>1</sup> Despite this situation very few healthcare workers – estimated

10% - are vaccinated against hepatitis B, which would eliminate the biggest risk for them to get a cirrhosis and liver cancer. Vaccination is not expensive, with costs of around 15,000 Tugrik (€10) for 3 doses.

#### Antibiotic policy in Mongolia

In Mongolia, antibiotics are available in many supermarkets and also can be bought in pharmacies in hospitals. Despite sale of non prescribed antibiotics is forbidden,<sup>18</sup> it is presumed that their use is very common. Togoobaatar *et al.* studied 540 households with at least one child under the age of 5 years and reported that 42% had used non-prescribed antibiotics during the previous 6 months.<sup>18</sup>

In our visit in May 2012, it was possible to get the rates of antibiotic use in one of the big hospitals (500 beds, 20,000 inpatients in a year) in UB. The most commonly used antibiotics were cefazolin, ampicillin, gentamicin and cefotaxime. Over the years since 2006, the use of cefotaxime (3rd generation cephalosporine) has increased from 3% in 2006 to 31% in 2011, whereas ampicillin use decreased from 50% in 2006 to 13% in 2011. The use of cefazolin, a first generation cephalosporine with better activity against staphylococci, remained in the same level over the years. Carbapenems (imipenem) are rarely used substances in this hospital, the use was about 200 doses in 2011 which is rather low compared to 92,466 doses of cefazolin.

Until now, no valid resistance data are available for Mongolia. A rate of 20-30% Meticillin resistant

*Staphylococcus aureus* (MRSA) for UB was reported around 10 years ago but without any written proof.<sup>4</sup> A very small study done in 4 big hospitals in UB in 2000-2002, showed 3% MRSA in 207 *Staphylococcus aureus* strains investigated.<sup>26</sup> It is told that very often antibiotics are given with operations; this might be a reason why wound infections seem to be rather low. The study of Ider *et al.* found that in only 19% of infections microbiological diagnostics were done and antibiotics were given without sensitivity testing in 92% of cases.<sup>27</sup>

### Hospital hygiene in Mongolia and the MeshHp Project

Reporting of healthcare associated infections (HAI) is mandatory but not done sufficiently. According to official reporting, there is a rate of 0.01 – 0.05% of HAI.<sup>27</sup> An Australian/Mongolian group in a prevalence study, determined a rate of 5.4%<sup>27</sup> which is comparable to European results and seems realistic according to usual medicine (few devices on ICU, few “big” operations) and wide spread use of antibiotics.

At the end of 2009, an employee of the German Embassy in Mongolia contacted the Hospital Hygiene of the University Hospital of Essen, Germany. In June 2010, doctors of Hospital Hygiene of the University Clinics of Essen and Ulm and members of the Essen Fire Department visited first some hospitals and emergency service in UB. It was decided to fund a project to improve hospital hygiene in some pilot hospitals in UB and also improve hygiene and medical service in the emergency service of UB. This “Mongolian emergency service hospital Hygiene project” (MeshHp) now has its own website ([www.meshHp.mn](http://www.meshHp.mn)) and is part of the cooperation of the Mongolian and German Ministries of Health.

At the moment there are 4 pilot units in UB:

- National Central Hospital (similar to University Clinics),
- Chingeltei District Hospital, a secondary care hospital in one of the biggest (ger) districts,
- Second General hospital, a tertiary care hospital, and
- City Emergency Centre, the ambulance service for UB.

The idea is to improve hygiene situation in the pilot hospitals and in City Emergency Centre so that they

can work as a lighthouse project for other hospitals. Therefore, a lot is done to improve skills and knowledge of the staff in the context of a “train the trainers”. Training is given during visits of German experts to Mongolia, which include lectures in different hospitals, but also practical training like how to use bio-indicators for control of sterilizers or UV-box for training of hand hygiene. All the visits include a lot of audits in different hospitals and wards so that the Germans have quite a good overview about the hygiene situation in healthcare system in UB which make them more and more interesting as a sort of external expert for the Mongolian Ministry of Health (there were different meetings with the respective ministers and vice-ministers) and project financiers like Asian Development Bank (ADB). All the lectures and written recommendations are available on the MeshHp website, a lot of them also in Mongolian language.

Until June 2012, German experts have been in Mongolia up to 10 times and 4 Mongolian groups have been in Essen, Germany. The Mongolian groups usually consist of 4 – 10 people from different institutions, hygiene staff as well as heads of institutions or administration staff. Most of the time spent in Germany, they visit different hospitals, departments and wards, sterilization units, cleaning services, endoscopy, kitchens etc.

Mongolia is the country with highest rate of German speaking population worldwide (1%). In reality, English is much more common now so that conversation and training is usually done in English, nearly always by means of additional translation in Mongolian language.

Main results in the pilot hospitals until now:

- All pilot hospitals started to install dispensers with alcoholic hand rub. The alcoholic hand rub is produced by the hospitals according to WHO recommendations. Also permanent training of staff is done with use of blackbox (UV light).
- All pilot hospitals started to vaccinate their staff against hepatitis B.
- Some improvements are reached in sterilization units, e.g. introduction of Bowie Dick test and safer use of ethylene oxide sterilizer. But there are big basic problems (old containers, very few and old instruments, 30 years old autoclaves, no washer disinfectors) needing investments which are not possible from the MeshHp project.

- A lot of training (Train the trainers; capacity building) has been done and more importantly the pilot hospital hygiene staff are seen as experts and asked from other hospitals for help.

In May 2012, first symposium "Hospital hygiene in Mongolia" took place, bringing together 150 participants from UB but also from the countryside. The symposium was initiated and co-organized by the MeshHp group and supported by the German and Mongolian Ministries of Health and ADB.

### Discussion

Since 2010, the MeshHp project is working in Mongolia in 4 pilot hospitals and City Emergency Centre. One of the successful results of this project is that nearly all healthcare workers without hepatitis B antigen are vaccinated against hepatitis B. This reduces dramatically their risk for cirrhosis and possible subsequent liver cancer. Also the risks for patients by these workers is brought to zero, at least regarding hepatitis B.

Co-initiated by MeshHp project, ADB is planning to support the Mongolian Government with a \$38 million loan to strengthen hospital hygiene, waste management and blood safety. Within this project (Health 5), improvement of sterilization units and vaccination of staff will be addressed, also in close cooperation with MeshHp project.

From the experience of the MeshHp project three main problems have to be addressed as next steps:

- The hepatitis B vaccination campaign will not reduce the risk for patients by hepatitis B antigen positive staff who is not vaccinated. It is known that certain jobs in hospital have a high risk of staff injuries and, by blood of staff, of infections to patients. This is especially proven for cardiac surgeons, dentists, gynaecologists and orthopaedists.<sup>28-31</sup> The virus carrier rates might reach 40% of staff in some departments. This problem can only be addressed by treatment of virus carrier staff so that a big number of them will lose their carrier status and infectivity.<sup>28</sup>
- During the work it was seen that microbiology laboratory quality is very low in Mongolia, even in UB. Very often, only few bacteria are determined,

more often no resistance testing is done, there are no statistics available at all in nearly all of the hospitals – neither about bacteria nor resistance. Laboratory substances are very often lacking or changing so that methods may not be valid, also ring tests are not done. This is why MeshHp project as well as the upcoming ADB project Health 5 will address this issue in the next years.

- In close connection to this issue, antibiotics policy has to be discussed and addressed. More knowledge is needed about resistance rates of bacteria in healthcare sector and about antibiotics prescription data in hospitals. Based on this, recommendations might be developed for a sustainable use of antibiotics. Also unrestricted selling of antibiotics in hospitals and supermarkets has to be critically discussed with police.

This list of problems is in accordance with a study of an Australian/Mongolian group done in 2008.<sup>32,33</sup> Based on interviews, they found a lot of problems for implementing a good hospital hygiene policy, like lack of expertise in the ministries, punishment of reporting real numbers of infections, too many decision makers on political level, non working hygiene committees, limited capacity of laboratory system, not regulated antibiotic usage or poor hand hygiene compliance.

The MeshHp project is a sort of grassroot project, most of all only having funds for flights and hotel costs. Despite of this, the project seems to be more and more interesting for politicians and decision makers. One reason for that might be the concentration on few pilot units in which improvements can be demonstrated. The second reason might be the interest of respective persons in the others' country and people. One of the German guys has been 10 times in Mongolia in 2 years, several of the Mongolians have been twice in Germany. Work with the guests is not restricted to working hours only, but also includes a lot of contacts in free time, on weekends and in the evening. Based on this, close friendships developed extending to more and more people in both countries. Based on this, also an official cooperation between the cities of Essen and Ulaanbaatar developed out of the MeshHp project which was signed by both Mayors in May 2012 in Ulaanbaatar.

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