National telemedicine system in Slovenia for remote interpretation of pre-transfusion testing

Marjeta Macek Kvanka, Marko Breskvar, Mojca Simc
Blood Transfusion Centre of Slovenia, Šlajmerjeva 6,
Ljubljana 1000, Slovenia
marjeta.macek@ztm.si; marko.breskvar@ztm.si; mojca.simc@ztm.si

Background

Several activities in transfusion medicine could benefit from the application of telemedicine (TM) [1]. In the Slovenian blood transfusion service, telemedicine has been used for a centralized remote interpretation of pre-transfusion testing since 2008. The aim of the development and implementation of TM in the 2005–2008 period was to enable an expert from the central reference laboratory to give advice to the staff in any transfusion laboratory of regional hospitals where pre-transfusion tests were performed. The TM system was initially developed by the leading professional transfusion medicine institution Blood Transfusion Centre of Slovenia (BTCS) in cooperation with the Faculty of Electrical Engineering, University of Ljubljana [2]. After 2008, the reorganization of blood transfusion service started: the former transfusion departments of regional hospitals gradually became dislocated transfusion centres (TCs) of the BTCS or the Maribor Centre for Transfusion Medicine (7 and 2 affiliated TCs respectively). These two blood establishments then took responsibility for the organization of the non-stop work at the affiliated TCs. Physicians from the hospitals who used to interpret routine pre-transfusion testing when transfusion medicine specialist was not available were no longer involved. Faced with the situation of the shortage of transfusion medicine doctors (TMDs) needed for the organization of continuous work (24/7) at dislocated TCs, telemedicine that has already been implemented offers a solution. Consequently, its use was extended from giving advice in the case of complicated patients to the interpretation of pre-transfusion and prenatal tests for all routine patients. Due to the increasing use in the following years, the BTCS with partners decided for a complete rewrite and upgrade of TM system, which was finally implemented in 2013 [3]. Tele-transfusion medicine was the first national TM system in Slovenia that operates routinely. Here, our experiences from the perspective of its users and patients are presented.

Organization of blood transfusion service

Blood transfusion service in Slovenia is comprised of:

- independent BTCS with 6 affiliated transfusion centres (TCs) and one hospital blood bank (BB),
- the Centre for Transfusion medicine (CTM) Maribor with 2 affiliated TCs being part of the University Clinical Centre Maribor,
- general hospital-associated CTM Celje.

Before blood transfusion is given, obligatory pre-transfusion tests are needed to confirm patient-donor compatibility. They are performed in all 12 transfusion laboratories throughout Slovenia 24/7. The tests are performed by skilled laboratory technicians using gel ID-cards. The results are interpreted and signed by a TMD. Only in three main blood establishments is a TMD constantly available (24/7) for the interpretation of pre-transfusion tests on site among other obligations. In other nine transfusion laboratories, TM service is used when a TMD is not on site.

Telemedicine for remote interpretation of pre-transfusion testing

The TM service is organized regionally in the Ljubljana and Maribor regions (Fig.1).

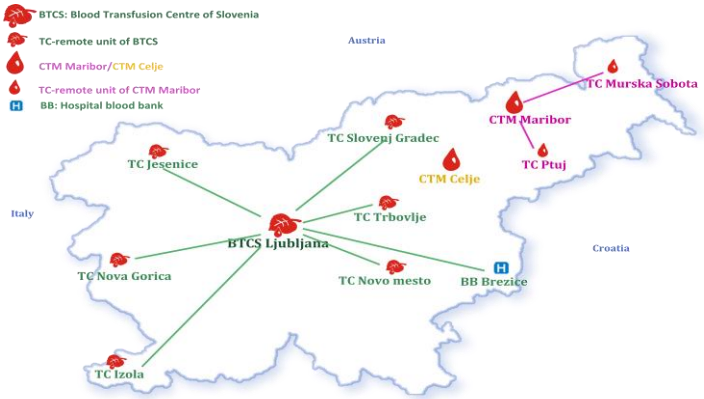

Figure 1: Pre-transfusion tests from 9 remote transfusion centres are interpreted via TM by a teleconsultant from Ljubljana (7 TCs) or Maribor (2 TCs) region

After receiving a request for blood components, a technician performs the obligatory pre-transfusion tests using ID-gel cards and creates a TM session (Fig. 2) with captured images of the ID-gel cards for each patient. The

sessions are sent to a regional teleconsultant on the other location who is responsible for several remote transfusion laboratories (7 or 2 in each region) at the same time. Since he can work from any transfusion location, all TMDs within the region can be involved in providing TM service. The consultant is informed about every arrived session by an SMS and voice alarm on mobile phone. Urgent sessions are exposed in red colour.

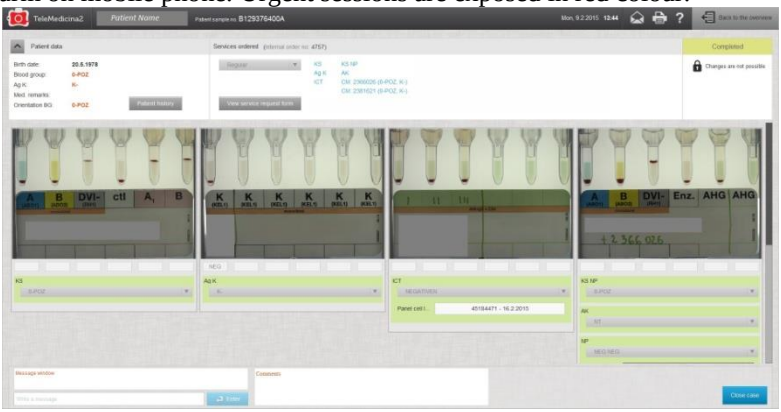

Figure 2: A telemedicine session includes patient data with transfusion history and previous test results, attached request form and ordered tests with captured images of gel cards

The TM system is connected with the national transfusion information system DATEC. From its database, the consultant gets information about patient data, transfusion history and previous results of immunohaematology tests for patients and donors. Additionally, a request form is attached to each session. This is how a teleconsultant gets the same information as s/he would if working on site. After a teleconsultant has interpreted and validated the results, the session is sent back to the technician. The results are issued in DATEC and with electronic signature.

Methods

In order to evaluate the significance of telemedicine, statistical data obtained from the transfusion information system DATEC and TM system were analysed. The satisfaction of the TM users (consultants and technicians) was evaluated by two surveys.

Results

The growing importance of the TM is supported by numbers. Since the beginning of 2008, the number of TM sessions has increased from 290 to

21,220 in 2014. The proportion of patients from dislocated TCs whose pre-transfusion tests are interpreted by TM gradually increased to 50% on average in 2014 (the range being from nearly 100% to 45% in different TCs). The TM system enables prompt responses: 54% of sessions are concluded within 30 minutes and 88% within one hour. Eighty per cent of the TM users (8 teleconsultants and 32 technicians) have claimed that the TM service is indispensible and 20% that it is very important for everyday practice [4].

Conclusions

Since 2008, a unique national TM system for remote interpretation of pre-transfusion and prenatal testing has been used successfully in Slovenia. Comparable experiences from other countries are limited [1]. The use of TM has a strong impact on the improved and timely transfusion service for patients, improved relationship between BTS and hospitals, improved organization and rationalization of work in TCs and on substantial cost savings. TM allows pre-transfusion tests nation-wide to be interpreted 24/7 by TMDs who are the most experienced especially in solving complicated cases. Consequently, increased patient's safety is expected and the same quality of service for all the patients regardless of time and location is provided. Apart from that, clinicians get improved transfusion service without their involvement. The TM system has proved to be reliable and secure and has been highly appreciated by its users [4].

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