Long-running telemedicine networks delivering humanitarian services: experience, performance and scientific output

WOOTTON, Richard, et al.

Abstract

To summarize the experience, performance and scientific output of long-running telemedicine networks delivering humanitarian services.

Reference


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Long-running telemedicine networks delivering humanitarian services: experience, performance and scientific output

Richard Wootton, Antoine Geissbuhler, Kamal Jethwani, Carrie Kovarik, Donald A Person, Anton Vladzymyrskyy, Paolo Zanaboni & Maria Zolfo

Objective To summarize the experience, performance and scientific output of long-running telemedicine networks delivering humanitarian services.

Methods Nine long-running networks – those operating for five years or more – were identified and seven provided detailed information about their activities, including performance and scientific output. Information was extracted from peer-reviewed papers describing the networks’ study design, effectiveness, quality, economics, provision of access to care and sustainability. The strength of the evidence was scored as none, poor, average or good.

Findings The seven networks had been operating for a median of 11 years (range: 5–15). All networks provided clinical tele-consultations for humanitarian purposes using store-and-forward methods and five were also involved in some form of education. The smallest network had 15 experts and the largest had more than 500. The clinical caseload was 50 to 500 cases a year. A total of 59 papers had been published by the networks, and 44 were listed in Medline. Based on study design, the strength of the evidence was generally poor by conventional standards (e.g. 29 papers described non-controlled clinical series). Over half of the papers provided evidence of sustainability and improved access to care. Uncertain funding was a common risk factor.

Conclusion Improved collaboration between networks could help attenuate the lack of resources reported by some networks and improve sustainability. Although the evidence base is weak, the networks appear to offer sustainable and clinically useful services. These findings may interest decision-makers in developing countries considering starting, supporting or joining similar telemedicine networks.

Introduction

Telemedicine (i.e. medicine practised at a distance) has been used to improve health care delivery in a wide range of applications. To date, most of the work has taken place in industrialized countries and there is relatively little experience in the developing world. Telemedicine’s fundamental benefit is in improving access to care, and in the developing world such access is often poor. Thus, telemedicine may provide a useful way to reduce inequities and strengthen health systems in developing countries.

In 2005, the World Health Organization (WHO) established a global observatory for e-health to monitor the development of information and communications technologies (ICT) for health care – including telemedicine – and to provide reliable information and guidance on best practices, policies and standards. According to a recent survey, telemedicine has progressed far less in lower-income countries than in high-income countries both in terms of the proportion of countries with established services and the proportion offering pilot telemedicine services. Nonetheless, several telemedicine networks around the world deliver humanitarian services on a routine basis, many to low-income countries. These networks provide tele-consultations for physicians and other health professionals needing advice about the clinical management of difficult cases, and some also provide education. Store-and-forward methods (e.g. e-mail) are often used for communication because they are generally cheaper and more convenient, but real-time methods (e.g. video links) are also used when required. Telemedicine networks delivering humanitarian services may be of interest to decision-makers considering wider implementation.

To ensure effective and appropriate use of telemedicine in resource-limited settings, implementation must be guided by more and better evidence. The objective of the present paper is to summarize the experience gained so far with long-running telemedicine networks delivering humanitarian services; it looks at general information, network performance and scientific output. Long-running networks were selected for study because lack of programme sustainability is a commonly reported problem in telemedicine.

Methods

The work was conducted in three stages: (1) identifying relevant telemedicine networks; (2) collecting information about their activities, and (3) summarizing the resulting data.
Network selection

Long-running telemedicine networks delivering humanitarian services were identified. In this context, “long-running” was defined as having existed for 5 years or more. “Telemedicine” was defined as clinical and educational work at a distance. “Humanitarian services” were defined as actions designed to save lives, alleviate suffering and maintain human dignity delivered unconditionally (i.e. without seeking payment from their recipients). These networks were initially identified by one of the authors based on personal knowledge of the field.

A contact person at each telemedicine network was approached and asked if they knew of any other long-running telemedicine networks. This produced a list of nine networks, all of which were contacted. Two of the nine telemedicine networks were excluded from further consideration: one because it had apparently ceased operating when contacted and another because it never replied. The seven long-running telemedicine networks covered by this paper are shown in Table 1. Respondents, who were always the network coordinators, were invited to co-author this paper in recognition of their contribution to data collection, subsequent data analysis and the preparation of this paper.

Data collection

In September 2011, a questionnaire was sent to each contact person to collect basic information about the networks. This was followed in October 2011 by a second questionnaire designed to collect more detailed information regarding network performance and the evidence base. Each questionnaire contained 20 questions based on the framework for network performance evaluation proposed by Wootton et al.5 This framework takes into account the perspectives of the three main user groups – requesters (i.e. physicians requesting advice on the management of difficult cases), coordinators (i.e. network managers) and experts (i.e. those who respond to the electronic referrals) – and it identifies five performance measures of relevance to each of the three user groups. A third questionnaire was sent in February 2012 to obtain information about governance, liability and confidentiality.

Data summary

From the responses to the questionnaire, a list of the scientific papers describing the work of each network was compiled. Only papers listed in Medline and dealing with telemedicine services were included in the analysis. To summarize their contents, one author extracted information from each published paper on the following: (1) study design; (2) effectiveness; (3) quality; (4) economics; (5) provision of access to care, and (6) sustainability.

A second author, working independently, then graded each point. Study design was assessed using the nine-point scale traditionally employed to measure the strength of the evidence.5 For convenience, the nine levels were converted into a quality score (1 = poor, 2 = average, 3 = good), where levels I–III were considered good, IV–VI average, and VII–IX poor. The other five topics were graded subjectively and assigned a quality score based on the amount of information provided about them (0 = none, 1 = poor, 2 = average, 3 = good). Finally, the results were reviewed by all authors and changed by consensus where necessary. Hence, the papers from each network were reviewed by all the other networks, and this increased the consistency of the results.

Results

General information

The seven networks studied had been in operation from 5 to 15 years (median: 11 years), as shown in Table 2, available at: http://www.who.int/bulletin/volumes/90/5/11-099143. All the networks provide clinical tele-consultations for humanitarian purposes, and five of them were also involved in some form of education.

All networks used store-and-forward (asynchronous) methods for delivering tele-consultations, which confirms that real-time techniques are probably not appropriate in the present context. In addition, one telemedicine network used videoconferencing for consultations pertaining to trauma cases, which usually require an immediate response. Four of the networks offered tele-consultations in all clinical specialties, whereas the other three networks focused on delivering specialist services in areas such as traumatology, orthopaedics, neurosurgery, dermatology and management of patients with human immunodeficiency virus (HIV) infection or acquired immunodeficiency syndrome (AIDS). The source of funding for equipment acquisition and maintenance varied between telemedicine networks but was generally a mix of charitable funds and national or local support.

Four of the five networks delivering tele-education provided detailed information about their activities. Three networks delivered tele-education via asynchronous methods such as computer-based learning or web-based discussion forums. Two networks also used synchronous tele-education delivered through videoconferencing. Educational activities were offered by all the telemedicine networks delivering tele-consultations in specialty areas. Consistent with the clinical activities,
Tele-education was offered for trauma, dermatology and HIV/AIDS case management.

Organizational models were investigated through questions regarding the three main user groups. The number of requesters gives an idea of the size of each network and ranged from 10 to over 500. The number of requesters was loosely associated with the range of clinical services provided but not with the duration of network operation. The number of referring sites ranged from 4 to 399, and the number of countries ranged from 1 to 58. The number of sites and countries where requesters were based was roughly proportional to the number of requesters. Methods were based was roughly proportional to the number of requesters themselves, whereas in another network the requesters were supported in the process by a coordinator. The coordinators and the experts were funded differently; in three of the seven networks coordinators were volunteers, whereas in the other four networks they were paid for their time.

Network performance

Network activity ranged from 50–400 tele-consultations per year. In 2010, the networks managed an average of 209 cases. In 2006–2011, three networks showed a positive trend over the 5-year period, three showed a negative trend, and one showed stable activity. On average, network activity increased by about 10% each year.

The average time to first reply to a request is an important performance measure affecting the value of the clinical tele-consultations to the referer. Estimates from the last 12 months of operation showed that most networks took an average of 24 hours (range: 5.6–72 hours) to provide a first reply to a request. Unanswered replies to requests in 2010 were very few, particularly compared with network activity. Moreover, some requests could not be processed; in some cases, for instance, inadequate images were submitted and the referer was unable to provide satisfactory alternatives. Overall, almost all requests were answered promptly, i.e. within 48 hours. Another performance measure is the possibility of a dialogue between requesters and experts. This feature was available for all seven telemedicine networks. On the other hand, the experts were not always informed of individual patient outcomes. In 2010, the number of cases managed by a network whose individual outcomes were fed back to experts varied from none in some networks to all in others.

Little quantitative data were available on the educational activities conducted by the telemedicine networks since their establishment. Data from the RAFT [Réseau en Afrique Francophone pour la Télémédecine] network in sub-Saharan Africa showed an increase in the number of hours of tele-education delivered each year. The telemedicine network of the Institute of Tropical Medicine (ITM) in Antwerp, Belgium, offered online learning and web-based discussion forums, but contact hours could not be quantified.

Scientific output

By the time of the survey, the seven networks had published a total of 59 papers; 44 that dealt with telemedicine and that were indexed in Medline were included in the present study.6–49 The scientific output represented by the 44 papers is summarized in Table 3. Information about study design was available for all papers. In particular, 29 papers represented non-controlled clinical series, with the number of patients observed ranging from a dozen to about 2000. The remaining 15 papers were anecdotes or case reports. Thus, all papers provided evidence classified as poor in strength. Evidence pertaining to programme sustainability and improved access to care was provided by more than half of the papers. One fourth of them also covered quality and effectiveness, while only a few provided any evidence on network economics. Overall, the quality of the scientific output was poor to average.

Other factors

Other factors relevant to the operation of each telemedicine network are summarized in Table 4, available at: http://www.who.int/bulletin/volumes/90/5/11-099143. Although governance varied across the seven networks as a function of differences in organizational models and contexts, medical liability and patient confidentiality were handled in similar ways. The factors concerning sustainability were generally different between networks, and included institutional anchoring, organizational models, technical and clinical solutions, clinical quality and benefits to patients, exit strategy, technology and funding. Uncertainties in funding were a common risk factor. Others had to do with the availability of coordinators, the training of experts, a lack of infrastructure and equipment and similar problems. Questionnaire respondents gave their views about the future plans of their telemedicine networks. These were similar across networks and had to do primarily with expansion to other countries and with the engagement of additional experts. Collaboration with other telemedicine networks was also listed as a feasible and useful plan for the future.
Discussion

The present study summarizes the experience gained to date with existing telemedicine networks that deliver humanitarian services. All of the seven well-established, long-standing networks studied provided reasonable evidence that they were improving access to care in the developing world. However, the overall quality of the scientific output emanating from these networks is still rather weak. This applies to study design and to the evaluation of other important parameters, including effectiveness, service quality and economics. Stronger evidence is therefore needed to increase the appropriate use, scale and impact of telemedicine in resource-limited settings. This need for stronger evidence underscores that more and better evaluations need to be conducted. Given their size and relative success, long-running telemedicine networks should be the subject of controlled evaluations in future.

Another relevant finding from the study pertains to network performance. Measuring the performance of a telemedicine network is essential for understanding whether the network is working as intended or having the desired effect. By adapting a recently developed framework for network performance evaluation, we documented the seven telemedicine networks’ performance and the services they provided. Differences in services and performance could be explained by different organizational models.

Notwithstanding the use of different organizational models, clinical case load was strikingly similar across networks: all seven networks were providing only a few hundred teleconsultations annually. This activity level may stem from the fact that the networks are run by a single individual or a small number of committed enthusiasts or “clinical champions”. Since the present networks collectively appear to meet only a tiny fraction of the potential demand from the developing world, one may wonder why their activity levels are not increasing rapidly. Although the reasons could be many, small-scale organizational models may be one. Future work might therefore be directed at investigating new organizational models that would facilitate large-scale network operation. Improved collaboration between existing networks may prove beneficial as well, since it would attenuate the lack of resources reported by some networks and improve sustainability.

The findings of the present study have two main implications. First, telemedicine networks delivering humanitarian services appear to be sustainable – at least as operated to date – and they deliver clinically useful services. Second, the evidence summarized in this paper, albeit weak, may be useful to decision-makers. It may, for instance, encourage ministries of health in developing countries to establish, support or join similar telemedicine networks.

The present study has several limitations. For one thing, the list of networks studied may not be exhaustive; other long-running telemedicine networks around the world may also be delivering humanitarian services. However, we believe that we have covered the main active networks. Furthermore, the study was not a systematic review and the assessment of the quality of the scientific studies emanating from the networks was necessarily subjective. Moreover, we examined only successful networks (and arguably, experience from unsuccessful networks may be equally informative). Finally, the experience of the telemedicine networks was reviewed by people responding on behalf of the networks and may reflect reporting bias.

The present study emphasizes the need to generate stronger evidence and more and better evaluations of telemedicine networks and their effectiveness in improving outcomes and access to health care. Future research should address these topics. Nonetheless, the present study provides reasonable grounds for supporting the future expansion of telemedicine networks offering humanitarian services in developing countries.

Acknowledgements

We are grateful to our colleagues in the various networks for their willingness to share the data about network operation.

Competing interests: None declared.

<table>
<thead>
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<th>Measure</th>
<th>Study design</th>
<th>Effectiveness</th>
<th>Quality</th>
<th>Economics</th>
<th>Access to care</th>
<th>Sustainability</th>
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<td>14</td>
<td>6</td>
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<td>Range of quality scores</td>
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<td>1-2</td>
<td>1-2</td>
<td>1-2</td>
<td>1-2</td>
</tr>
</tbody>
</table>

[Table 3. Quality of the scientific output of the telemedicine networks delivering humanitarian services, based on 44 papers]

* 0 = none; 1 = poor; 2 = average; 3 = good.

ملخص

شبكات التطبيق عن بعد العاملة منذ فترة طويلة في مجال تقديم الخدمات الإنسانية: الخبرة والأداء والنتائج العلمية

العرض تلخص الخبرة والأداء والنتائج العلمية لشبكات التطبيق عن بعد العاملة منذ فترة طويلة في مجال تقديم الخدمات الإنسانية، للبحث عن تحليل دقيق لهذه الشبكات للتنبؤ بالاستدامة ونوعية النتائج. هذه الشبكات تتميز بتقديم نوعية عالية من الخدمات، وهي تعمل بشكل جيد بمساحة واسعة (1-15). وقد تمت جميع الشبكات في وقت مبكر من الأداء الأساسي باستخدام طرق التخزين والمراقبة، وتتضمن خدماتها أيضًا في بعض أشكال التعليم. تم التوصيف الأصغر من مناسبة أو متوسط أو جيد وفقًا للنتائج، مما يكون له تأثيرًا على النتائج. العاملة منذ فترة طويلة – التي تعمل منذ خمس سنوات أو أكثر – وقد تمت معادلة هذه المعلومات لتعزيز أثرها في ذلك الأداء والنتائج العلمية. وتم استخلاص المعلومات من الأوراق التي خضعت للمراجعة من جانب الأقران، والتي تصف تصميم دراسة

Telemedicine networks delivering humanitarian services

Richard Wootton et al.

Research

Abstract

Objectives
Methods
Results
Conclusion

Résumé

Réseaux de télémédecine à long terme offrant des services humanitaires: expérience, performances et production scientifique

Objectif
Méthodes
Résultats
Conclusion

Резюме

Действующие продолжительное время телемедицинские сети, предоставляющие гуманитарные услуги: опыт, эффективность и научные результаты

Цель
Методы
Результаты

لاستنتاج من الممكن أن يساعد تخفيض التعاون بين الشبكات في تحقيق قلة الموارد التي أبلغت عنها بعض الشبكات في تحسين الاستدامة. ويرجع ضعف قاعدة البيانات تقوم الشبكات على ما يبدو لعرض خدمات مستدامة ومفيدة سريريًا. وقد تشهي هذه النتائج صداع الفكر في البلدان النامية في التفكير فيما يتعلق بتطبيق عن بعد مشاية أو دعمها أو المشاركة فيها. وذلك عن طريق الشبكات 500 خبيرًا بينما ضمت أكبرها ما يزيد عن 15 شبكة سنوًا. 500 إلى 500 ويو كان عبء الحالات السريري ما بين 44 وربة، وتم إدراج 29 ورقية في Medline، وتم إدراج الشبكات ما إجماليه 59 ورقية، وتم إدراج 29 ورقية في ورقية سلاسل سريريًا غير خاضعة للرقابة. وقدنت ما يزيد عن نصف الأوراق بنتائج الاستدامة وتحسين الوصول إلى الرعاية. وكان التمويل غير المضمون أحد عوامل الخطر المشتركة.

提供人道主义服务的长期远程医疗网络: 经验、业绩和科技产出

目的
方法
结果
结论

摘要

提供人道主义服务的长期远程医疗网络：经验、业绩和科技产出

目的

总结提供人道主义服务的长期远程医疗网络的经验、业绩和科技产出。

方法

识别出九个长期运行的网络（运行五年或更久），其中有七个提供有关其活动的详细信息，包括业绩和科技产出。从描述网络的研究设计、效益、质量、经济、医疗服务途径供应和持续性并经同行评审的论文中提取信息。以“无”、“差”、“一般”和“良好”评价证据的强度。

结果

七个网络平均运行了 11 年（范围为 5-15 年）。所有的网络均使用存储和转发方法提供人道主义临床远程诊治，其中五个网络还涉及某种形式的教育。最小的网络拥有 15 名专家，最大的网络拥有 500 多名专家。每年处理的临床病例数目为 50 至 500 例。这些网络发表的论文共有 59 篇，其中 44 篇被 Medline 收录。根据研究设计，按常规标准，证据的强度普遍得到差评（例如，29 篇论文介绍非对照临床系列）。超过半数的论文提供了可持续性和医疗服务途径改善的证据。资金不确定是常见风险因素。

结论

网络间更好的合作有助于减轻某些网络报道的资源缺乏问题，还可提高持续性。尽管证据基础薄弱，网络似乎能够提供可持续性和临床上有用的服务。这些研究结果可能会引起发展中国家正在考虑启动、支持或加入类似的远程医疗网络的决策者的兴趣。
Resumen

Redes de telemedicina de larga trayectoria que ofrecen servicios humanitarios: experiencia, rendimiento y resultados científicos

Objetivo Resumir la experiencia, el rendimiento y los resultados científicos de las redes de telemedicina de larga trayectoria que ofrecen servicios humanitarios.

Métodos Se identificaron nueve redes de larga trayectoria (aquellas que llevaban 5 años o más en funcionamiento). Siete de estas redes proporcionaron información detallada sobre sus actividades, incluyendo aspectos como el rendimiento y los resultados científicos. La información se extrajo a partir de documentos con revisores externos que describían el diseño de estudio de las redes, así como su efectividad, calidad, economía, acceso a la asistencia y sostenibilidad. La solidez probatoria se clasificó como nula, mala, normal o buena.

Resultados Las siete redes llevaban una media de 11 años en funcionamiento (intervalo: 5–15). Todas las redes proporcionaban teleconsultas clínicas con fines humanitarios utilizando métodos de almacenamiento y transmisión. Cinco de ellas también estaban implicadas en alguna forma de educación. La red más pequeña contaba con 15 expertos, frente a los más de 500 de la red más grande. El número de casos anuales fue de entre 50 y 500. Las redes han publicado un total de 59 documentos, 44 de ellos están recogidos en Medline. En base al diseño del estudio, la solidez probatoria fue en general mala para los estándares convencionales (por ejemplo, 29 documentos describían series clínicas no controladas). Más de la mitad de los documentos evidenciaron la sostenibilidad y el acceso mejorado a la asistencia. La falta de certidumbre en lo relativo a la financiación fue un factor de riesgo común.

Conclusión Una mejora de la colaboración entre redes puede ayudar a atenuar la falta de recursos observada en algunas redes, así como a mejorar la sostenibilidad. Aunque la base probatoria es débil, las redes ofrecen servicios humanitarios y clínicamente útiles. Estos resultados pueden ser interesantes para los responsables políticos en países en vías de desarrollo, para la puesta en marcha, el apoyo o la adhesión a redes de telemedicina similares.

References


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44. Vassallo DJ. A guide to sending e-mail telemedicine referrals. Tro Dop 2003;33:34–5. PMID:12568519
<table>
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<th>Pacific Island Health Care Project</th>
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<th>Swinfen Charitable Trust</th>
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<td>HIV/AIDS</td>
<td>All specialties</td>
<td>All specialties</td>
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<td>Equipment purchase and maintenance</td>
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<td>Belgian Development Cooperation for web site maintenance and education of participants based in resource-limited settings</td>
<td>US$ 250,000 start-up grant. Continued funding as part of core budget in jurisdictions and the TAMC</td>
<td>Revenue from other sites, block grant from Partners HealthCare</td>
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<td>More than 500</td>
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<td>Accreditation of requesters</td>
<td>Someone in the network knows them personally</td>
<td>Alumni of the SCART/eSCART course; physicians working in resource-limited settings for international organizations; manual approval of a membership</td>
<td>Approval by the medical director based on recommendations of ministers/secretaries of health and local laws and regulations of jurisdictions</td>
<td>None</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. of experts</td>
<td>25</td>
<td>Approximately 20</td>
<td>30</td>
<td>513</td>
<td>502 (not all are active)</td>
<td>Have to be physicians (service not for the patients directly)</td>
</tr>
<tr>
<td>No. of expert sites</td>
<td>6</td>
<td>6</td>
<td>14</td>
<td></td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>No. of countries</td>
<td>3</td>
<td>5</td>
<td>1</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Location of experts</td>
<td>Same country that the requests are from; other industrialized countries</td>
<td>Other developing countries; other industrialized countries</td>
<td>Other industrialized countries</td>
<td>Other industrialized countries</td>
<td>Same country where the requests are from; other developing countries</td>
<td>Other industrialized countries</td>
</tr>
<tr>
<td>Accreditation of experts</td>
<td>Experience in dermatology in the developing world; internal review of experts; training</td>
<td>Linked with institutional collaborations; relevant work experience in resource-limited settings</td>
<td>Selected and approved by the medical director, vetted by the Surgeon General of the US Army, certified by TAMC, licensed by at least one of the 50 states in the USA</td>
<td>Practising physicians within the network subject to rules and accreditation requirements by the State of Massachusetts</td>
<td>Verification of credentials by local coordinator</td>
<td>Known personally to someone on the board or to a third party known by them</td>
</tr>
<tr>
<td>Funding of experts</td>
<td>The consultants are volunteers</td>
<td>The consultants are volunteers</td>
<td>The consultants are volunteers</td>
<td>The consultants are volunteers</td>
<td>The consultants are volunteers</td>
<td>The network pays for their time</td>
</tr>
<tr>
<td>coordinators</td>
<td>Made by requesters</td>
<td>Made by a coordinator</td>
<td>Made by the medical director</td>
<td>Made by both requesters and a coordinator</td>
<td>Made by a coordinator</td>
<td>Made by a coordinator</td>
</tr>
<tr>
<td>Funding of coordinators</td>
<td>The coordinators are volunteers</td>
<td>The network pays for their time</td>
<td>Medical director is a volunteer</td>
<td>The network pays for their time</td>
<td>The coordinators are volunteers</td>
<td>The network pays for their time</td>
</tr>
</tbody>
</table>

**AIDS, acquired immunodeficiency syndrome; HIV, human immunodeficiency virus; ITM, Institute of Tropical Medicine; RAFT, Réseau en Afrique Francophone pour la Télémedecine; SCART, short course on antiretroviral treatment; TAMC, Tripler Army Medical Center; US$, United States dollars.**
Table 4. **Other features of the telemedicine networks delivering humanitarian services**

<table>
<thead>
<tr>
<th>Factor</th>
<th>Africa Teledermatology Project</th>
<th>ITM Telemedicine Project</th>
<th>Partners Online Specialty Consultations</th>
<th>RAFT Swinfen Charitable Trust</th>
<th>Teletrauma</th>
</tr>
</thead>
<tbody>
<tr>
<td>Governance</td>
<td>Site managed by a core group. IT support from the Medical University of Graz; clinical work from Carrie Kovarik</td>
<td>Funding for the project was obtained through a grant from the Directorate General for Development Cooperation</td>
<td>The project was established in 1990 by TACM and is sponsored by the US Congress. It is certified in Federal Law and governed by a medical director</td>
<td>The project is hosted at the division for e-health and telemedicine at Geneva University Hospitals. The focal points in each participating country are responsible for the national governance</td>
<td>General management is by the Regional Trauma Hospital. The methods are according to the Ukrainian Telemedicine and E-Health Development NGO</td>
</tr>
<tr>
<td>Medical liability</td>
<td>Reliance on the “Good Samaritan” clause; liability not completely eliminated.</td>
<td>Experts belong to the ITM or partner institutions</td>
<td>Physicians sign a terms and conditions statement when referring patients to the network</td>
<td>It is the referring physician’s responsibility to apply the expert’s advice. The identity and credentials of experts are verified by the national coordination team</td>
<td>It is a not-for-profit telemedicine service. United Kingdom medical insurers cover doctor-to-doctor advice according to the so-called “Good Samaritan” clause</td>
</tr>
<tr>
<td>Patient confidentiality</td>
<td>Data held on a secure server; access to cases only permitted by requesters and experts. Use of full-face photos, names or dates of birth is discouraged. Patient consent is obtained</td>
<td>Referrers sign a “policies agreement” and a disclaimer is made available on the web site. The second-opinion advice is free of charge</td>
<td>Patient Referral Form; informed consent document. Data are stored in a secure, password protected database. HIPAA rules, privacy impact statements and Privacy Act System of Record Notice</td>
<td>Data are loaded to a secure web site. An encryption service is used for e-mails</td>
<td>Patient consent is obtained. Anonymized data are stored in a secure server</td>
</tr>
<tr>
<td>Sustainability factors</td>
<td>Motivation, personal relationship and trust of requesters and experts</td>
<td>Institutional project</td>
<td>Provision of travel and definitive medical care for indigenous persons at no cost to the patient or to the jurisdiction; funding included in core budget to support graduate medical education</td>
<td>Teleconsultations are also commercially available to patients in other developed countries. This produces the financial margin necessary to sustain this programme in Cambodia</td>
<td>Teletrauma works within the health-care system in Ukraine. Consultations are part of the physicians’ duties and are free for patients</td>
</tr>
<tr>
<td>Risk factors and challenges</td>
<td>Work on minimal funding but need of some continued funding for web site maintenance</td>
<td>Lack of infrastructure, technical and medical expertise, deteriorating equipment. Inadequate financial resources; inadequate administrative, logistical, and ancillary support</td>
<td>Market demand in developed countries; capacity to offer free consultations to patients in Cambodia; lack of training of local experts in Cambodia</td>
<td>Cost of Internet connectivity</td>
<td>Introduction of telemedicine into clinical protocols in trauma and orthopaedics</td>
</tr>
</tbody>
</table>

(continues ...)

Funding for the project was obtained through a grant from the Medical University of Graz; clinical work from Carrie Kovarik. The project was established in 1990 by TACM and is sponsored by the US Congress. It is certified in Federal Law and governed by a medical director. The network is managed by the Center for Connected Health, a non-profit teaching hospital. There are two dedicated coordinators and one corporate manager. The project is hosted at the division for e-health and telemedicine at Geneva University Hospitals. The focal points in each participating country are responsible for the national governance. Physicians sign a terms and conditions statement when referring patients to the network.

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<table>
<thead>
<tr>
<th>Factor</th>
<th>Africa Teledermatology Project</th>
<th>ITM Telemedicine</th>
<th>Pacific Island Health Care Project</th>
<th>Partners Online Specialty Consultations</th>
<th>RAFT</th>
<th>Swinfen Charitable Trust</th>
<th>Teletrauma</th>
</tr>
</thead>
<tbody>
<tr>
<td>Future plans</td>
<td>Reach new locations and countries, engage the few dermatologists in the African countries where consults are provided to become experts; expand the educational activities</td>
<td>Collaboration with other networks, under an international umbrella</td>
<td>Continue to improve access to care, expedite referrals/consultations, and continue to mine the PIHCP database for education and training</td>
<td>Train local experts to take over tiers 1 and 2 of severity of incoming requests; expand to other countries (China, India), with local non-profit partners</td>
<td>Expand within countries to reach district hospitals throughout Africa (as well as pilot projects in Latin America)</td>
<td>Become part of a network of networks</td>
<td>Telemedicine has to be introduced into clinical protocols in trauma and orthopaedics</td>
</tr>
</tbody>
</table>

HIPAA, Health Insurance Portability and Accountability Act; ITM, Institute of Tropical Medicine; NGO, nongovernmental organization; PIHCP, Pacific Island Health Care Project; RAFT, Réseau en Afrique Francophone pour la Télémedecine; TAMC, Tripler Army Medical Center.