ICT AS A VALORISATION TOOL IN PROMOTING PATIENT-CENTRIC HEALTHCARE SERVICE IN A RESOURCE CONSTRAINED SETTING

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ABSTRACT
Although resource constrained countries face a myriad of challenges, interventions have been made to empower patients to take the ownership of their health and wellbeing. It is enthusing to note that Information and Communication Technologies (ICTs) have played a pivotal role in adding value to the quality of healthcare services in an attempt to make them patient-centric. The benefits of adopting patient-centric approach in the delivery of health care services include provision of better treatment and reduced medical expenses. This is so because a patient makes informed choices about their health and wellbeing in consistent with their personal preferences, desires, values, and beliefs. In addition to this, managing their own health reduces the occurrences of preventable illness. Unfortunately, due to limited resources in developing countries; the uptake of patient-centric services has been low. This paper therefore endeavours to provide a comprehensive comparative analysis of the patient centric services between high income and resource constrained countries. It also outlines the challenges that are encountered in providing patient-centric health care services in low constrained settings. Potential solutions to circumvent the aforementioned challenges are also succinctly discussed.

KEY WORDS

1. Introduction
The prevailing global trend to adopt patient-centric approach in the delivery of healthcare services across the globe cannot be overemphasised. Patient-centric healthcare service empowers patients to regulate and manage the flow of information from multiple sources as they are able to make informed choices about their health and wellbeing in consistent with their personal preferences, desires, values, and beliefs [1, 2]. This entails that patients need to be treated as a unique individual [3]. Patient-centricity encompasses the use of Electronic Medical Records (EMRs), Electronic Health Records (EHRs) and Personal Health Records (PHRs). Arguably, EMR is a health related information which is managed by one health care organisation whereas EHR is created and managed by several healthcare organisations. While PHRs may emanate from various EMRs or EHRs, they are nevertheless controlled by an individual patient [4]. These health tools enable a patient to have a ubiquitous access to better health services. Other benefits of adopting patient-centric approach in the management of healthcare services include provision of better treatment; improved quality of life; cemented mutual trust between the health provider and consumer; improved compliance to medical treatment; cost-effectiveness as a result of adherence to preventive medical measures and less medical hospital admissions due to diminishing preventable episodic illnesses [5-8]. These benefits have motivated the adoption of patient-centric health care service in the developed countries. To this end, World Health Organisation (WHO) envisages that the integrated people-centred health services have the potential to improve patient access to care; to increase patient satisfaction with care, and consequently to reduce overall costs [9]. It is an open secret that ICT’s through provision of communication networks and information management applications have played a pivotal role in enhancing patient-centric care services in high income countries [10, 11]. This means that ICT has proven that it is a valorisation tool that can be used to promote patient-centric healthcare service. It assists in adding value to the provision of e-health and m-health applications. In fact, ICT’s are increasingly supporting the needs of patients and health providers in the delivery of healthcare services [12] [13]. Unfortunately, due to limited resources in developing countries, the uptake of patient-centric services is still low. The next section explains the methodology that was followed in order to answer the research questions. This paper therefore endeavours to provide a comprehensive comparative analysis of the patient centric services between high income and resource constrained countries in sections 3 and 4. It also outlines the challenges that are encountered in providing patient-centric health care services in low constrained settings in section 4. Potential solutions to circumvent the aforementioned challenges are then discussed in section 5. The papers finally give a conclusion in section 6.
2. Method
This paper endeavoured to answer the following research questions:

i) What is the comparative uptake of patient-centric health care systems between high income countries and resource constrained countries?

ii) What are the challenges that are encountered in implementing ICT interventions for patient-centric healthcare systems in resource constrained countries?

iii) What impact do these challenges have on the provision of patient-centric healthcare services in a resource constrained setting?

iv) What role can ICT play in addressing such challenges that are encountered in a patient-centric healthcare system in a resource constrained setting?

In order to answer the aforementioned research questions, a systematic review of different journal articles, peer reviewed conference papers and books was conducted. The following steps were followed in the systematic review process:

- Searching of relevant work from multiple sources: describing study characteristics; summarising the evidence and finally interpreting the findings [14]. Articles were sourced from electronic databases such as Science Direct, Google Scholar, web of science and EBSCOhost. Most articles that were considered were from 2002 to 2016. A combination of keywords such as patient-centric, ICT, valorisation, resource constrained setting, public healthcare, developing, underdeveloped, poor setting, implementation, challenges, barriers, and ICT interventions were used to select appropriate articles. This resulted in displaying more than 5,250 articles. Special Boolean operators like AND, OR and NOT were employed in order to alter the scope of the search. These articles were further filtered by year and title of the publication with their relevance to the implementation of ICT in patient-centric environment in a resource constrained setting.

3. Patient-centric care systems in high income countries
The use of ICTs in healthcare systems has accelerated the provision of patient-centric healthcare systems in the developed countries. Many factors that influence the decision to adopt technology are availability of financial and organisational resources; effective procurement processes, conducive government policies; consumer awareness of technologies; consumer trust about confidentiality and usability; and the availability of agreed technology standards for health systems to interoperate and share information [15].

It is therefore not surprising to note that developed countries that have positively addressed the aforementioned factors have made progressively good strides in the provision of patient-centric healthcare services.

3.1 Uptake of patient–centric care systems in high income
The survey that was conducted in the seven countries such as Australia, Canada, Germany, the Netherlands, New Zealand, the United Kingdom, and the United States showed that medical home care was associated with “significantly more positive experiences” [16]. This is so because patient-centric care asserts that a patient is a unique individual to be cared for and not just a medical condition to be treated [4]. Every health provider is taken as a caregiver whose sole aim is to meet the needs of patients [17]. This requires that both the patient's disease and illness experience are well understood by the caregiver. Cordial relationships and communication must exist between the health provider and a health consumer for all parties to mutually benefit from the patient-centric healthcare services. Table 1 summarises the status of the patient-centric care services in some of the developed countries with respect to patient choice, patient information, patient involvement and patient satisfaction.

A 2014 international survey was conducted in 11 countries such as Australia, Canada, France, Germany, the Netherlands, New Zealand, Norway, Sweden, Switzerland, the United Kingdom, and the United States of America. This study compared the performance of these countries on health quality, access, efficiency, equity and health lives. The overall healthcare ranking put the United Kingdom at the top with the United States of America last [18].

3.2 Challenges of the uptake of patient-centric systems in high income countries
Although there is a wide range of patient-centric care services, many developed countries still face some challenges. Aging population and an increase in life expectancy across the globe continue to exert pressure on the health care systems. It is well known that Japan and Italy are among the countries with the world’s highest proportion of older individuals. There is an increase in the prevalence of chronic diseases such as stroke, cancer, diabetes and obesity due to ageing population, changing lifestyles and diet. 63% of the deaths in the world are caused by these chronic diseases [19]. This subsequently has an impact on the rising cost of healthcare services. Frequent and prolonged stay in the hospital is one of the contributing factors to high healthcare costs in developed countries. For instance, it is noteworthy that in the United States of America, 1.7 million patients develop infections while in the hospital of which 99,000 die as a result of that. Furthermore, there are a number of constraints that contribute to the limited access to healthcare services by patients such as shortage of qualified health personnel; uneven distribution of caregivers; migration of nurses from one country to another and lack of health infrastructures [20]. Finally, the adoption of technology in the delivery of healthcare services has met a lot of resistance due to a lack of the following factors: availability of financial and organisational resources;
Table 1: Status of Patient-centric healthcare services in some of developed countries

<table>
<thead>
<tr>
<th>No</th>
<th>Country</th>
<th>Access</th>
<th>Patient choice</th>
<th>Patient Information</th>
<th>Patient involvement</th>
<th>Patient Satisfaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>England</td>
<td>All residents</td>
<td>Citizen have the right to make a choice of their General Practitioner, particular doctor and healthcare service provider [21].</td>
<td>Patients have access to information such as costs, exemption of health services, complaints procedures and doctors profiles on <a href="http://www.nhs.uk">http://www.nhs.uk</a> [21].</td>
<td>Citizens have rights to be involved in decisions about their health and in the planning, development and operation of health services [21].</td>
<td>Overall Public satisfaction was at 60% [22].</td>
</tr>
<tr>
<td>2</td>
<td>Germany</td>
<td>All legal residents</td>
<td>A patient has free choice of physicians, hospitals and has the right to the confidentiality of their data.</td>
<td>Many sources such as <a href="https://www.informedhealth.org/">https://www.informedhealth.org/</a>, <a href="http://www.patienteninformation.de/">http://www.patienteninformation.de/</a>. Patients have the right to receive timely information about their proposed treatment.</td>
<td>Patients have a right to determine the type of treatment they should receive and the extent of their treatment.</td>
<td>High level of satisfaction with their regular doctor [23].</td>
</tr>
<tr>
<td>3</td>
<td>Italy</td>
<td>Primary and inpatient care are free at the point of delivery.</td>
<td>Implementation of patients’ rights is not homogeneous.</td>
<td>Citizens’ information rights are covered</td>
<td>Each region has adopted distinctive and different solutions regarding patient involvement.</td>
<td>Italy remained under the European Union (EU) average with 56% level of satisfaction against an EU average of 71% [24].</td>
</tr>
<tr>
<td>4</td>
<td>Netherlands</td>
<td>Residents are mandated to purchase statutory health insurance from private insurers.</td>
<td>Patients have freedom to choose a health insurance policy with the health insurer.</td>
<td>Physicians are obliged to inform their patients about the planned examination and treatment and about developments regarding the examination, their medical condition and the treatment.</td>
<td>Patients are involved in making choices about their insurers and health providers.</td>
<td>Level of satisfaction is as high as 86% as compared to 71% across the Organization for Economic Cooperation and Development (OECD) [25].</td>
</tr>
<tr>
<td>5</td>
<td>Spain</td>
<td>National Health Service provides universal health coverage which is free at the point of delivery.</td>
<td>Patient has right to privacy, dignity, confidentiality. Choice to a physician is less developed.</td>
<td>The 1986 Health Care General Act empowers patients to have an access to information about health services.</td>
<td>Patients have the right to decide about their treatment.</td>
<td>More than 7 out of 10 adults report a favourable opinion of the public health system [26].</td>
</tr>
<tr>
<td>6</td>
<td>United States of America</td>
<td>Patients have rapid access to specialized health care services. However, More than one-third (37%) of U.S. adults reported forgoing a recommended test, treatment, or follow-up care because of cost.</td>
<td>Patient's Bill of Rights empowers patients to choose health providers and plans.</td>
<td>Patients have a right to accurate and easily-understood information about their health plan, health care professionals, and health care facilities.</td>
<td>The Health Insurance Portability and Accountability Act (HIPAA) of 1996 empowers patients to make decision about the privacy and confidentiality of their health.</td>
<td>USA ranks highly on preventive care and waiting times for specialist care but low on access to needed services and ability to obtain prompt attention from primary care physicians [18].</td>
</tr>
<tr>
<td>7</td>
<td>Canada</td>
<td>The publicly funded healthcare system is free at the point of use.</td>
<td>Residents are at liberty to choose the physician, hospital or long-term care facility.</td>
<td>Health information is provided by hospitals, physicians, through books, pamphlets and web sites.</td>
<td>Canadian Institute for Health Information (CIHI) ensures the confidentiality, integrity and availability of its health information through a comprehensive and integrated privacy and security program.</td>
<td>Canada ranks second from the bottom of US healthcare international survey of 2014 among 11 countries such as UK, Switzerland [18, 27].</td>
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</tbody>
</table>
effectiveness in the procurement and decision making process; efficiency in sharing information within the health service; good organisation structures and willingness to try new technologies; willingness of the management to adopt new innovations; availability of government polices to embrace new technology; appropriate technology to address consumer concerns about confidentiality and usability; willingness of consumers to appreciate the benefits of introducing new technology; availability of agreed technology standards; and ability of the vendors of technology to build an investment case and attract funding [15]. For instance, in Europe, the aforementioned problems have been compounded due to a number of reasons. Firstly, information technology is not widely used to meet the needs of patients. Secondly, there is inadequate home care, social care and nurse care and acute shortage of nurses, dieticians, social workers in the primary health care. Besides this, health systems are fragmented compelling patients to rely mostly on the services of physicians and specialists.

4. Patient-centric health care systems in resource constrained countries

Regardless of whether a person lives either in a high income country or in a resource constrained setting, every human being needs a good health. Many people associate patient centred healthcare service with the developed countries only. However, literature has shown that patient-centricity is still effective and applicable in the resource constrained setting [28]. In fact, a healthy person is more productive and contributes more to the economic growth of the nation [29]. It is therefore essential that good health systems must be put in place to provide quality health services for every individual even in developing countries [13] [30].

4.1 Barriers to adoption of patient-centric care system in the developing countries

Health systems in the developing countries face a lot of challenges. Scarcity of essential resources in the health sector in developing countries poses a major challenge. Despite high prevalence rate of non-communicable diseases in these settings, the provision of basic healthcare services remains derisively pathetic. There are usually inadequate medical supplies and non-functioning medical equipment in dilapidated, crumbling and congested health facilities. Most hospitals run short of potable water. Shortage of electricity in health facilities remain the order of the day. Financial, procurement and accounting systems remain porous thus compromising accountability and transparency of resources [31]. These problems are exacerbated by critical shortage of human resources including physicians, nurses and social workers. Unfortunately, even the trained and qualified health professionals migrate from developing countries to high income countries in search for better pay and better working conditions. These challenges have an adverse impact on the access to basic healthcare services by patients. Despite success stories of ICT usage in the healthcare sector, developing countries still face challenges in incorporating ICT interventions. It cannot be overemphasised that ICTs have assisted to improve the quality and efficiency of care thereby enhancing health consumer confidence and self-management in the health system [32].

Table 2: Barriers to adoption of patient-centric care system in the developing countries

<table>
<thead>
<tr>
<th>No</th>
<th>Barrier</th>
<th>Description</th>
<th>Impact on provision of patient centric health care services</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>Poor and inadequate infrastructure [33].</td>
<td>Few health facilities, dilapidated health facilities, poor network roads, lack of medical equipment, inadequate software and hardware.</td>
<td>Few health facilities lead to congestion in health facilities compromising privacy and confidentiality.</td>
</tr>
<tr>
<td>2</td>
<td>Financial constraints [34].</td>
<td>Poor funding and reliance on donor funding.</td>
<td>Inadequate funding contribute to poor health services delivery.</td>
</tr>
<tr>
<td>3</td>
<td>Lack of political will [35].</td>
<td>Political leaders and decision makers influence distribution of funds.</td>
<td>If funds are diverted to satisfy a political will, the quality of healthcare services is compromised.</td>
</tr>
<tr>
<td>4</td>
<td>Diverse culture [36].</td>
<td>For example, patients may prefer traditional to modern therapies.</td>
<td>For instance, in Indonesia utilization of prenatal care increased with the control a woman exercises over household finances [37]. Some pregnant women in Malawi preferred to be attended by Traditional Birth Attendants (TBAs) than formal trained midwives [38].</td>
</tr>
<tr>
<td>5</td>
<td>Overpopulation [39].</td>
<td>Overpopulation results in putting pressure on the limited health resources.</td>
<td>Overpopulation leads to congestion in health facilities compromising the quality of health services.</td>
</tr>
</tbody>
</table>
Table 2 summarises the major problems developing countries encounters when introducing ICT in the delivery of patient-centric care. It also outlines the proposed solution to the respective challenges.

### 4.2 Applicability of patient–centric systems in resource constrained settings

Although resource constrained countries have a myriad of challenges, they have managed to initiate mobile health systems and electronic health systems in order to meet the needs of the patients. The ultimate goal of these systems is to create a conducive environment for a patient to make an informed decision about their health in consistent with their values, preferences and beliefs [48]. For patients to take ownership of their health and wellbeing, they must be empowered with information since literacy optimises patient-centricity. Fortunately, ICT has been proven to add value to the quality of healthcare services [49]. Table 3 summarises some of the mobile health applications that aim at satisfying the needs of a patient in a resource constrained setting.

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</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>Low technology acceptance [40]</td>
<td>Insecurity that technology may invade patient privacy and confidentiality</td>
<td>A patient may shun a modern health provider in preference to traditional therapist.</td>
</tr>
<tr>
<td>7</td>
<td>Minimal research [35].</td>
<td>Due to poor funding, there is minimal research to advance knowledge in healthcare.</td>
<td>Little collaboration in research results in low adoption of innovations in healthcare.</td>
</tr>
<tr>
<td>8</td>
<td>Limited connectivity [36].</td>
<td>Poor internet availability.</td>
<td>Patients cannot easily access up-to-date and accurate health information.</td>
</tr>
<tr>
<td>9</td>
<td>Lack of interoperability standards [41].</td>
<td>Some legacy and modern systems cannot exchange information.</td>
<td>Accessing health information across different platforms remains a hassle.</td>
</tr>
<tr>
<td>10</td>
<td>Low literacy levels [42].</td>
<td>A high illiteracy rate has an adverse impact on acceptance of technology.</td>
<td>Patients do not feel confident to manage their own health.</td>
</tr>
<tr>
<td>11</td>
<td>Inadequate human resource [43, 44].</td>
<td>There are few skilled health personnel.</td>
<td>This compromises the quality of the health services.</td>
</tr>
<tr>
<td>12</td>
<td>Scarcity of essential drugs and equipment [45].</td>
<td>Limited funding contributes to scarcity of drugs.</td>
<td>Lack of essential drugs has an adverse effect on availability and quality of health care services.</td>
</tr>
<tr>
<td>13</td>
<td>Lack of policies and legal framework [46].</td>
<td>Policies and legal framework may enforce confidence in adopting technology.</td>
<td>Lack of legal framework induces fear in both health provider and consumers with respect to human rights and privacy.</td>
</tr>
<tr>
<td>14</td>
<td>High prevalence rate of non-communicable diseases [47].</td>
<td>This creates a burden on already resource constrained environment.</td>
<td>Quality of healthcare services is compromised.</td>
</tr>
</tbody>
</table>

**Table 3: Applicability of mobile health applications in some of the resource constrained settings**

<table>
<thead>
<tr>
<th>No</th>
<th>Mobile Project</th>
<th>Countries</th>
<th>Applicability to patient-centricity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Health workers in rural areas used mobile phones to get advice from specialists [50].</td>
<td>Botswana</td>
<td>Better, convenient and quicker diagnoses were made on patients.</td>
</tr>
<tr>
<td>2</td>
<td>Community health workers in rural areas used mobile phones to report about patients adherence to treatments to specialists [51].</td>
<td>Malawi</td>
<td>This saved time and other transport costs.</td>
</tr>
<tr>
<td>3</td>
<td>Community-based peer health workers (PHW) used mobile phones to text higher level providers with patient-specific clinical AIDS information [52].</td>
<td>Uganda</td>
<td>Unfortunately, patients were concerned about their privacy.</td>
</tr>
<tr>
<td>4</td>
<td>Mobile phone text messaging reminded patients to adhere to malaria treatment guidelines [53].</td>
<td>Kenya</td>
<td>This improved compliance to malaria treatment guidelines. It also improved the quality of treatment in a resource constrained environment.</td>
</tr>
<tr>
<td>5</td>
<td>SMS messaging was used to provide real time updates [54, 55].</td>
<td>Kenya, Tanzania</td>
<td>This improved the availability and supply of drugs enabling patients to access better quality care.</td>
</tr>
</tbody>
</table>

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5. Results and discussion

This paper has highlighted the disparities in the uptake of patient-centric health care systems between high income countries and resource constrained countries. Table 1 and Table 2 have illustrated that developed countries are well advanced in the implementation of patient-centric healthcare systems while resource constrained countries are rocked with a myriad of challenges. It is therefore not surprising these challenges have an impact on the provision of patient centric healthcare services in a resource constrained setting as further depicted in Table 2. Literature has shown that ICT can play a pivotal role in addressing such challenges that are encountered in a patient-centric healthcare system in low constrained setting. To this end, Table 3 illustrates how ICT mobile applications have supported patient-centric healthcare in a resource constrained settings.

A number of recommendations can be suggested to circumvent the aforementioned problems. For instance, it is therefore necessary that all countries in the developing countries should collaborate to embrace patient-centric approach in the delivery of healthcare services. Health providers are encouraged to include the views of patients at each phase of introducing ICT interventions in the public health care system. User-centric health systems must be designed so that they are useful, usable and learnable. The design of the systems must place a patient at the centre of the whole process of system design. These systems must be tailored to the needs, preferences, beliefs and values of patients in a resource constrained environment. Imposed ICT interventions will not work since they may not address local and national needs.

For financial constrained settings, less expensive technology is recommended to be adopted. One example is the deployment of open source software such as OpenMRS. This is electronic medical record system was designed for developing to support the care of patients. Currently, the software has been successfully deployed in the following countries: Argentina, Botswana, Cambodia, Congo, Ethiopia, Gabon, Ghana, Haiti, Honduras, India, Indonesia, Kenya, Lesotho, Malawi, Malaysia, Mali, Mozambique, Nepal, Nicaragua, Nigeria, Pakistan, Peru, Philippines, Rwanda, Senegal, South Africa, Sri Lanka, Tanzania, The Gambia, Uganda, United States of America, Zanzibar, Zimbabwe, and many other places. It is exciting to note that many stakeholders including individuals, government and for-profit and non-profit organisations are supportive of the system.

Many recommendations can be made if the adoption of ICT interventions in patient-centric care is to be a success. Deliberate efforts must be made to improve healthcare infrastructures possibly through public and private partnerships. Decision makers and policy makers must invest in increasing financial allocation to healthcare systems and ICT interventions. Initiatives must be made to address population inflation which consequently put much pressure on the limited health resources. High illiteracy levels in the developing countries can be curbed by making primary school education compulsory and also increasing enrolment of students at all levels of education system. ICT courses need to be introduced at an early stage to motivate the citizenry to appreciate the usage of technology in all sectors. This will consequently improve the acceptance of technology in the healthcare sector by both health consumers and health providers. Government and other stake holders must collaboratively work together to formulate policies, standards and legal frameworks that will facilitate the protection of rights and privacy of both health consumers and health providers.

6. Conclusion

The prevailing global trend to adopt patient-centric approach in the delivery of healthcare services across the globe cannot be overemphasised. Some benefits of adopting patient-centric approach in the delivery of health care services include provision of better treatment and reduced medical expenses. Regardless of whether a person lives either in a high income country or in a resource constrained setting, every human being needs a good health. Although resource constrained countries face a myriad of challenges, interventions must be made to empower patients to take the ownership of their health and wellbeing. This paper has therefore endeavoured to provide a comprehensive comparative analysis of the patient centric services between high income and resource constrained countries. It has been noted that ICT has played a pivotal role in adding a value to the quality of healthcare services. The paper has also highlighted the challenges that are encountered in providing patient-centric health care services in low constrained settings. Finally, potential solutions to circumvent the aforementioned challenges have also been succinctly discussed.

<table>
<thead>
<tr>
<th>No</th>
<th>Mobile Project</th>
<th>Countries</th>
<th>Applicability to patient-centricity</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>SMS was used to report active cases of malaria</td>
<td>Zambia</td>
<td>The reporting of the cases proved to be timely.</td>
</tr>
<tr>
<td></td>
<td>[56]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Cell phones were used to collect pregnancy data</td>
<td>Liberia</td>
<td>This improved the quality of data and reduced data losses.</td>
</tr>
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<td></td>
<td>from remote areas in Liberia [57].</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>SMS was used to relay family planning messages</td>
<td>Tanzania</td>
<td>It was reported that SMS was a good means to reach out to younger women</td>
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<tr>
<td></td>
<td>[58].</td>
<td></td>
<td>and sexually reproductive mothers.</td>
</tr>
</tbody>
</table>
References


