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The use of computer mediated communication in providing patient support: A review of the
research literature

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Abstract

Objectives: The aim of this study is to explore how computer mediated communication has been used by a variety of healthcare professionals to support their patients and discuss the implication that this may have for future practice.

Design: A systematized review of the literature.

Data sources: A review of empirical studies within the literature was carried out in April 2016 in CINAHL, MEDLINE, ASSIA, BNI, Psychinfo, and Web of Science databases.

Review methods: The databases searched produced 2930 titles, of which 190 publications were considered relevant to the objectives. Titles and abstracts were then reviewed and duplicates removed producing 67 publications. Exclusion and inclusion criteria were applied. The inclusion criteria were (1) interventions that facilitate two-way communication between any healthcare professional and their patients via a computer; (2) Interventions aimed at providing any type of support e.g. emotional, tangible, informational, or esteem support; (3) English language; (4) Primary empirical studies. Data quality was assessed and thematic analysis applied.

Results: Thirty-one publications were included in this study. Intervention types included Email (n=8), Videoconferencing (n=7), Online Social Support Groups (n=9) and multifaceted interventions (n=7). Three themes emerged from the data including increasing access to healthcare, adding value to healthcare delivery and improving patient outcomes. Twenty-five (81%) of the studies found that computer mediated communication could produce positive effects.

Conclusions: Computer mediated communication could be both what patients want and a way of delivering support to patients in a resource tight environment. This has implications for a range of health support needs and professionals including nurses, midwives, and allied

healthcare professionals. Reviewing the lessons learnt will ensure future interventions are tailored to the support needs of the patients, carefully planned and mindful of the risks.

Background

The NHS constitution (2015) states that it is the responsibility of all staff to take every opportunity to encourage and support patients and colleagues to improve their own health and wellbeing. However the definition of support is all-encompassing and without context can be vague as to the assistance required or given.

The Oxford English dictionary (2018) defines support as something that bears all the weight, or holds up, gives assistance to, or something that gives approval, comfort or encouragement. Support can also suggest a truth of, corroborate findings, or indicate that something is now sustainable, tolerable, or enduring. As a noun, it could include financial support or something in favour of, encouraging or comforting.

Drawing theory from the social scientists, House (1981) best describes the concept of support as belonging to four types: emotional, informational, instrumental and esteem/appraisal support. Dykes, Hall, Burt and Edwards (2003) theory of network support develops House's definition further and incorporates 'network support' whereby help is provided to activate relationships with peers and significant others. Overall support assumes a conversation or interaction between two or more people in which one person requires support and another provides it. For this review, 'support' is defined using the work of House (1981) and Dykes et al. (2003).

Computer mediated communication in healthcare

Historically people would interact, converse, communicate and thus seek and receive support from their healthcare provider face-to-face. More recently, this can occur via computer: At the end of 2011 there were 6 million mobile phone subscriptions corresponding to a global penetration of 86% with 2.3 billion internet users worldwide and 70% of

households in developed countries having internet access (ITU, 2012). Greater access to information on personal devices, smartphones and tablets is now more prevalent for patient's families and clinicians.

Social media or social networks are web 2.0 internet based applications. This version of the internet came about in the 1990's and has allowed user generated content. Patients can therefore continuously organize and form their own groups and networks on social media, share observations and experiences, exchange emotional support, find recognition and understandings, and help other members (Mo & Coulson, 2014). Social media is described as 'no passing fad' with NHS Employers encouraged to take the lead in promoting and encouraging the use of social media in the NHS (NHS confederation, 2017).

Aim of the systematised review

Within this review computer mediated communication is used to define the use of computers, phones or mobile devices to interact and share information, thoughts and ideas with other users. This definition incorporates the use of any of the following platforms: Social media through the development of Web 2.0, Websites, Social projects, Blogs and micro blogs, Twitter, Social networks, and Virtual worlds.

The aim of this review is to explore how computer mediated communication has been used as a tool for providing support to patients by a variety of healthcare professionals and further discuss the implications that this may have for supporting patient care in the future. It aims to stimulate thinking and analyse the benefits and concerns around the use of computer mediated communication in the healthcare setting and meets a personal goal to develop the practice area.

Review process

Search string development began with the identification of keywords, concepts, and phrases central to the phenomenon. These included words such as social media, internet, mobile applications, support, social support, practical support, emotional support, psychological support; patients service users, healthcare, health services. These were then refined and a final search using six databases (CINAHL, MEDLINE, ASSIA, BNI, Psychinfo, and Web of Science) performed in April 2016 was conducted. The databases were chosen for their relevance, notable quality, and extensiveness.

The literature search produced 2930 citations and the titles and abstracts were manually and cursorily screened for eligibility and relevance. Articles were only included if they involved primary research, qualitative or quantitative, written in English, available in online journals, and examined the patients' experiences of computer mediated support interventions such as email, videoconferencing and other forms of support that offered means of two-way communication. This produced 190 publications.

An abstract search of the 190 articles was then completed and duplicates removed leaving 77 publications. Studies excluded were those that analysed content of webpages, content of peer support forums, the general effects of social media, healthcare-seeking behaviours, user-generated content analysis, and recruitment of volunteers and study participants. These did not look at a two-way communication intervention, thus satisfying the inclusion/exclusion criteria. No journal, study designs, or subject filters were placed on the search, however, conference proceedings and abstracts were not included. This stage produced 67 articles.

The full text studies (n=67) were then assessed for relevance using the inclusion and exclusion criteria. In total 31 articles were included for critique in the next stage of the review. Figure 1 summarizes the study selection process.

Article details

Table 1 provides an overview of the thirty-one empirical research studies chosen for inclusion within this review. Study variables including author, title, field of study, taxonomy of intervention, clinical purpose, study design, and sample size were extracted. The Critical Appraisal Skills Programme (CASP) tools (NHS, 2006) were used to assess study quality. These were chosen as they are readily available, tailored to each particular study design, and recommended by the Cochrane collaboration (Higgins and Green, 2009).

Article findings

From the thirty-one articles within this review the use of four main types of computer mediated communication interventions were noted: Email (n=8), Videoconferencing (n=7), Computer mediated social support groups (n=9) and multifaceted interventions (n=7). The definition of Email is a message distributed by electronic means from one computer user to one or more recipients via a network. Videoconferencing is the use of a live, two-way video link between two people in different geographical areas using a computer that provides sound and vision. Computer mediated social support groups link numerous people, with common conditions/illness/diseases via a computer platform such as Facebook or a forum. The multifaceted interventions noted (n=7) looked primarily at an email intervention that also incorporated a package of tools such as email and online social support and/or email and written information.

These interventions covered a range of healthcare fields including primary care (n=5), dermatology (n= 2), diabetes (n=7), sexual health (n=1), epilepsy (n=1), smoking cessation (n=1), paediatrics (n=3), post-partum care (n=4), mental health (n=3) and cancer (n=4). They also covered a variety of geographical areas including the United States of America (USA), UK, Norway, Denmark, Korea, Finland, Australia, Europe, Sweden, Columbia, and Canada.

Both positive and negative outcomes were associated with such interventions but overall, eighty-one percent (25/31) of studies found that computer mediated forms of communication could produce positive effects when used to provide patient support. Largely the findings supported the belief that computer mediated communication could be used to support patients in the healthcare setting.

Thematic analysis

Inductive thematic analysis was applied and three main themes emerged from the data. Thematic analysis involved pinpointing, examining, and recording patterns (or "themes") that emerged when reading and re-reading the data. It was evident that the aims of the interventions were to improve or provide access to health professionals, provide a more valuable service, and support better patient support.

Firstly, the interventions were trying to increase, encourage, and/or provide ways in which patients and healthcare providers could communicate with each other. This theme incorporated discussion around the ease of use, reasons for use, and patient demographics.

Secondly, the interventions were trying to provide a valuable service. Measures of value included quality measures, patient satisfaction levels, an increase in patient health outcome, and ability to complete the task. Cost saving and reduction in waste were also important. Practice environments that experienced high service demands and worked within limited resources held service value in high regard. Value for money was important but equally important were interventions that provided worth, importance, and usefulness.

Lastly, the interventions aimed to provide many types of support to patients for example informational, esteem, tangible and emotional support. Intrapersonal patient outcomes such as reduced anxiety, increasing confidence and self-efficiency were common outcomes within the literature. The following analyses the three themes common throughout the literature within each of the four intervention types.

Email interventions (n=8)

In total, there were eight articles relating to email interventions all of which occurred in a community setting but covered four fields of practice, primary care (n=4) and patients living with diabetes (n=2), cancer (n=1) or epilepsy (n=1).

Ability to access health professional. Email was offered as a way of increasing access to healthcare professionals and meeting informational needs of patients in three studies. Firstly, Cervenka, et al. (2012) delivered a health education program, sending on average six informational emails around diet. Their 3-month prospective cohort study, in the United States, looked at the feasibility, safety and effectiveness of an email administered modified Atkinson diet. They concluded this to be a useful method of communicating health programmes with patients.

Secondly, Bjoernes et al. (2012) aimed to meet the information needs of patients with prostate cancer via an email intervention. They found that the asynchronous nature of email meant that patients did not feel like they were disturbing anyone, that they had time to formulate questions calmly and liked the flexibility of the tool as a means of accessing healthcare at any time and that email increased communication between patients and primary care providers.

Thirdly Roter et al. (2008) showed that most of the physician communication was to accomplish information tasks, with three quarters of emails containing medical information and 10% around lifestyle topics like self-care, and one third of the physician's messages included a question. In fact it was seen in Norway (Bergmo et al. 2005) that email could offset telephone consultations, but not office visits and that email was used for rescheduling office calls, non-urgent healthcare issues, test results or health questions. Repeat prescriptions, sick note renewal, requests for referrals also made up the lower percentages of reasons for email use.

Many outcomes were seen within the literature: Tjora et al. (2005) found that patients thought email provided easier access to primary care yet at the same time found logging into secure emailing systems awkward compared to ordinary email. Unlike Bergmo et al. (2005), who found that email intervention, did not increase access to the GP. Concerning systems, patients self-assessed security risk and preferred ordinary email. Overall, many studies supported the fact that emails from patients were not time consuming for doctors nor were they overused (Bergmo et al. 2005, Tjora et al. 2005 and Cervenka et al. 2005), however low uptake of email in general were noted at the time (Liederman & Morefield, 2003, Bergmo et al. 2005). A quality improvement article written by a paediatrician in the UK more recently reported similar findings from an email audit conducted (Cohn, 2014).

Value of the intervention. Quality, satisfaction, and ability to complete a task were outcomes indicative of the value of an intervention. When assessing the quality of email intervention Harris et al. (2009) were one of three articles looking at how email could benefit diabetic patients and better glycaemic control was found. They hypothesised that email is associated with increased care quality and reduced outpatient use, however direct causation was not possible through this cross sectional analysis.

Harris et al. (2009) added to the literature when discussing the possibility that email alone, without even using it, adds to a 'feeling of security'. Typical verbs used within this study were 'valuable, practical and useful and the quality felt was rated 'good'. The literature was built upon by Turner et al. (2013), who looked at enacted social support email messages. They found enacted emotional support messages improved patient health outcomes in diabetes; this was also mirrored by Petrovski et al. (2015). Oppositely though Turner et al. (2013) state the actual message itself is important and that although email may provide a 'sense of security' (Harris et al. 2009) it is not just the system technology and interaction itself that produces effect, but it is content that is also important.

Concerning satisfaction, Liederman et al. (2002) asked whether email meets patient demand for online interaction. Half of the participants claimed email was much better than the phone and just over half of GP's felt satisfied using email. Despite some satisfaction seen within this survey doctors in the Bjoerne et al.'s study (2012) state that it is vital for online contact to be twenty-four / seven to be of any value, adding another element to the findings.

Support provided by the intervention. Email intervention was found to be useful in simple and complex medical cases. Some concerns raised within the studies were that emails could make healthcare more task focused limiting the ability to have a positive effect on the relationship and rapport. Tjora et al. (2005) nevertheless found email beneficial in complex health problems with feelings of empowerment through the ability to maintain control over one's situation (Bjoernes et al., 2012). Roter et al. (2008) added to this literature when coding the content of email communication. In this instance emotional tone and rapport was evident and patients were found to speak more in email than face-to-face.

In summary. Email intervention could increase access to healthcare and more specifically the asynchronous nature of text provides time to write and formulate a question/response meeting the unmet informational needs, which provides a sense of security. Positively enacted social support emails in three diabetic studies found an increased control in their blood sugar levels. Moving forward from the literature this could be applicable to other areas of practice. Furthermore, engaging with patients and encouraging use would need consideration, due to a noted underuse, as well as consideration for a twenty-four hour email service.

Video conferencing (n=7)

From the seven articles that focused on videoconferencing four fields of practice were identified including paediatrics (n=2), post-partum care (n=2), dermatology (n=2) and diabetes care (n=1).

Ability to access health professionals. The use of videoconferencing in the literature connected people in two ways, either providing patients at home with access to skilled professionals that are hospital based, or through connecting patients in hospital with the outside world.

Two studies that leave a positive impression of videoconferencing was that Lindberg et al. (2007) and Friesen et al. (2015). In Indiana videoconferencing increased access between hospital based lactation consultants and low-income rural families (Friesen et al. 2015). In Sweden videoconferencing linked families to hospital based midwives to provide routine contacts (Lindberg et al. 2007). They found videoconferencing provided patients with access to a skilled professional and that services could reach a wider client base, increasing some patients' access to support (Friesen et al. 2015). Friesen et al. (2015) found videoconferencing easy to implement, more specifically it was quick to establish a connection, easy to handle and make an assessment.

More discouragingly, Lindberg et al. (2007) Gilmour et al. (1998) and Lowitt et al. (1998) found they had poor picture and sound quality and problems controlling the camera. Despite the talk of current advances in technology, Weiss et al. (2001) and Ellis et al. (2013) raised issues relating to technology and technical issues encountered when using the equipment. Additionally, the need for training, resources and funding for staff is identified and any technical difficulties seen as disruptive in both.

Value of the intervention. Two studies, both conducted in 1998 that highlighted the value of videoconferencing were those of Lowitt et al. in the United States and Gilmour et al. in the United Kingdom. They both found that via a videoconferencing intervention dermatologists could successfully diagnose and treat skin conditions through viewing the necessary anatomical areas via videoconferencing. There was a greater confidence in

diagnosing in face-to-face (98%) than by video (85%), but an 85% confidence was still relatively high. Reassuringly there was a high level of agreement with diagnosis (identical in 89% of cases) and management plans were correct in 72% of cases. Both studies were well designed and reported. Interestingly, videoconferencing is now becoming developed in the UK with the invention of www.pushdoctor.co.uk and the value of such interventions will undoubtedly be explored and evaluated as these technologies develop further.

Professionals felt satisfied making assessments and when having contact with families (Lindberg et al. 2007) however, Lowitt et al. (1998) found no difference in patient satisfaction; unless it meant saving on travel and patients reportedly preferred face-to-face interventions. Gilmour et al. (1998) found patients to be positive about videoconferencing and found it was a valuable experience. Lowitt et al. (1998) did add to this by specifically stating that satisfaction is higher in younger generations who are more likely to accept the technology (Gilmour et al. 1998).

Support provided by the intervention. Rich data were gathered from two videoconferencing interventions in the paediatric settings. Weiss et al. (2012) and Ellis et al. (2013) both recognised that whilst a child is in hospital they could become isolated from their peers and hospitalisation can be at the detriment of school attainment. The two studies collectively included four participants in total providing in depth rich data. Both studies reported noticeable changes in behaviour such as increased concentration, greater academic progress, and increased frequency of response. Ellis et al. (2013) found that an ability to maintain relationships between peers and teachers in this instance providing a feeling of normalcy and distraction from illness reducing social isolation, increased mood and academic ability, two things also noted by Weiss et al. (2001). Compared to the telephone contact, videoconferencing has the ability to assist a deeper engagement and presence (Lindberg et al.

2007). This reduced anxiety around attending hospital and increased a mother's confidence around the birth of her baby (Friesen et al. 2015).

On a more negative note, videoconferencing was seen to require facilitation. The teachers often found themselves managing concerns raised over the child's physical appearance, and parents were left as the go-between between the school and hospital (Ellis et al. 2013). In some cases, (18%) the camera made participants feel uncomfortable or embarrassed (17%) (Gilmour et al. 1998).

In summary. Videoconferencing has positive and negative aspects. On a positive note, videoconferencing could provide healthcare services to a wider community and link the outside world to the hospital based patient. Patients found they were satisfied when it saved them time on travel and when they were of a younger generation. Caution is required as the technology itself may cause technical difficulty, which in turn increases workload. Videoconferencing can also cause a patient to feel uncomfortable and it was noted that, although patients had positive experiences, they did prefer face-to-face care.

Computer mediated social support groups (n=9)

Computer mediated social support groups were seen to be used by patients that have diabetes (n=3), cancer (n=2), mental health issues (n=3) and in post-partum care (n=1). Three articles looked solely at online social support as a standalone intervention (Yoo et al., 2012; Oh et al., 2011 and Houston et al., 2002) and the remaining six articles talked of a combination of online social support and electronic information giving. Unlike the multi-faceted interventions, the focus of the studies was around computer mediated social support.

Ability to access health professional. These groups were found to be easy to access via many platforms including Facebook or webpages by many different groups of people. Any user has a choice to simply read posts written by others, dubbed as 'lurkers' or choose to

add their own content if they wish, therefore dubbed as ‘approachers’ (Yoo et al.2012). Yoo et al. further describes how ‘approachers’ would typically post around the middle of the intervention whereas ‘lurkers’ would use avoidance coping strategies and comment at the end of the intervention highlighting different types of users.

Similarly, to the other interventions anonymity was again advantageous relieving anxiety and embarrassment around questions asked. Emotional support specifically was an important factor in computer mediated social support groups and a factor that predicts engagement (Yoo et al., 2012). In regards to engagement Glasgow et al. (2003) found that, engagement was greater when the ‘digital divide’ was minimal, meaning that older generation may have limited use or access to computers. Yoo et al. (2012) added that those more comfortable with computers used them more and that cessation in use occurred at around a year, indicating that interventions may have a ‘ceiling effect’, a time when they are no longer useful. Characteristically the older and more alone the person (Yoo et al. 2012), and the lower social support and close tangible support (Houston et al. 2002) the more patients engaged in online support. Similar to email intervention, twenty-four hour access was important (Oh and Lee, 2011).

Value of the intervention. These groups were not always found to be of great value to the patient. Glasgow et al. (2003) implemented three interventions groups (access to online information, access to a tailored self-management support via an online coach, access to online social support). Overall results were uniform across all three interventions however; the patterns of change did favour the usage of the computer mediated social support and the self-management conditions. Secondly, Shaw et al. (2007) trialled another three-point system for patients with cancer that addressed how patients learn. Unlike the positive finding of Cervenka et al. (2012), when implementing the email Atkins diet, their study only partially supported the hypothesis that information availability and interactive services were associated

with higher health information competence and only partially supports their second hypothesis that interactive services may supplement and extend learning (Shaw et al. 2007). In this instance, the use of computer mediated social support groups did not contribute to an enhanced learning outcome. Additionally, in this study the 'ask the expert' service was not related to perceived information competence (Shaw et al., 2007) whereas Cervenka et al. (2012) felt it viable through a series of emails to deliver health education materials.

Looking specifically at types of support offered through this intervention Yoo et al. (2012), despite adding to the literature around 'lurkers' and 'approachers', found that the combination of personal coach and computer mediated communication did not result in the greater emotional support being received. Statistically though, this intervention proved slightly more beneficial than the information and control conditions. Dissimilarly, Oh and Lee (2011) saw that the need was greater for informational support, followed by a need for emotional support and then esteem support.

Satisfaction was also an indicator of value. Salonen et al. (2012) set out to test the hypothesis that parents that have access to web information, computer mediated social support, and email access with a professional would have increased satisfaction and parenting self-efficacy during the post-partum period. This was not found and no significant difference seen between group users and group non-users in parent satisfaction.

Similarly, Castillo et al. (2013) offered a package of social support, a self-management program, and electronic information for people who had suffered traumatic injuries aimed at increasing self-efficacy and patient activation with the key outcomes being to improve physical and mental health and reducing anxiety. Satisfaction was high in this study with 86% saying they would recommend the support group to a friend. Although the effects did not differ significantly between groups with respect to self-efficiency, a significant difference in rates of depression was found between treatment groups. This highlights the

potential benefit for online social support in patients with depression, something highlighted by Houston et al. (2002).

Encouragingly, Houston et al. (2002) looked at a prospective cohort study of 103 computer mediated social support group users with chronic depression and social isolation. They assessed the interactions of the computer mediated groups for depression and face-to-face depression care. Ninety-five percent of participants agreed that chatting in the online groups helped their symptoms and one-third preferred social media to face-to-face counselling. They also stated that healthcare providers knew they supplemented face-to-face sessions with the online group and that this encouraged them to ask questions. This was echoed in a study by Oh and Lee (2011) reinforcing this information. Relating this back to previous findings, receiving emotional support, having low levels of close social support, and being comfortable using a computer could have lent to these high numbers finding benefit in this intervention, thus perhaps defining the type of person that might be suited to computer mediated social support.

Support provided by the intervention. Empowerment, perceived support, and psychosocial support were achieved via computer mediated social support. Oh and Lee (2012) looked specifically at online support and empowerment in their observational study. Their snapshot, showing the effects of support groups over time, found that online activity positivity relates to perceived support (the more the participant used computer mediated social support the more supported they felt), the greater the perceived support the more they felt empowered and the more they felt empowered the more they spoke with the doctor.

Barrera et al. (2002) and Glasgow et al. (2003) both conducted randomised controlled trials, offering information, access to a personal coach, computer mediated social support or a combination of the latter, over a period of ten months (Glasgow et al., 2003) or three months (Barrera et al., 2002). Both saw participants receiving online support as the only condition

that had increased perceived social support. Participants however were novice internet users and the results may have been greater in patients who were familiar and happy using the computer as already discussed. To add to this further Oh and Lee (2011) found that the duration of group membership, frequency of visits to the group and time spent in the community all positively related to a whether a patient felt, or did not feel, supported by the group. Furthermore, posting to an online support groups facilitates an identity within the group leading to more expression over time and an increase in emotional support received (Yoo et al., 2012).

As far back as 1993, Gallienne et al. offered access to a computer mediated social support and an email intervention to caregivers of relatives with Alzheimer's disease and was well received. In this instance, psychosocial support, defined as meeting the informational/instrumental and emotional/spiritual support needs of a person, had a positive effect. The study itself however only referenced three interactions from the forty-seven people that had access to the site, making generalisation of the findings difficult, however Houston et al. (2002) mirror these finding strengthening the argument. They also highlighted that training for practitioners was required.

In Summary. Computer mediated social support groups have produced an array of positive and neutral outcomes. The groups are easily accessible, easy to use and the patient may 'lurk' reading the posts of others or 'approach' the group and write their own posts. 'Lurking' on its own can provide much needed perceived support, however it was seen that the more a person engages and posts on the group the greater the perception of support. Again, a degree of anonymity provided comfort and that availability twenty-four hours a day was perceived as supportive. With regards to patient outcomes, the ability to enhance learning, supplement leaning or gain information competence was not found. No improvement in self-efficacy amongst new parents or trauma patients was seen.

Multi-faceted interventions (n=7)

The fields of study included sexual health (n=1), cancer care (n=1), smoking cessation (n=1), post-partum care (n=1), primary care (n=1) and diabetes care (n=1).

Ability to access healthcare professional. Two studies implemented mobile apps to support patients. Mobile apps can be accessed by anyone via an app store making accessibility easy. For smartphone users in Columbia, Lopez et al. (2014) devised a mobile application 'app' that provided information around sexual and reproductive health for young adults and offered asynchronous chats with a doctor as required. Similarly, Danbjorg et al. (2014) detailed an 'app' available to postnatal women for 7 days following hospital discharge aiming to meet unmet information needs. Information, pre-empted automatic messages and online chat were available. Parents in this instance liked that they could search information rather than having to resort to asking, that it was asynchronous and therefore they had time to construct questions. Parents also felt it offered an acceptable way to seek help after early discharge and felt that they did not hesitate to contact nurses as opposed to telephone contact, all of which increased access to healthcare.

Value of the intervention. The value of the mobile app interventions mentioned above was eclectic. On one hand well over half (74.6%) of users in the Lopez et al. study (2014) thought that in person sexual health advice was ineffective and half of the 48 participants thought the virtual method was ineffective. The tool itself did not influence sexual practices. Despite this half of the users felt that it could provide reassurance and that having access to the app was felt important by 92.3% of users and rated overall as 'good'. Participants also enjoyed interactive links that they could watch in their own time and that they could send pictures and receive long useful answers (Danbjorg et al., 2014) adding value to the intervention.

Positively, 'Webchoice' is another example of a multifaceted intervention program that offers a package containing email contact with a professional, computer mediated communication, online information and a self-management program (Grimsbo et al., 2011). The aim was to meet unmet care needs of patients with cancer and look at outcome measures on a patient's symptoms, distress, self-efficacy, quality of life, social support, and depression. This study identified that patients often felt as though they were 'left hanging' between appointments and this intervention provided reassurance and information. Interestingly patients used the online patient nurse communication as a place for venting; writing of experiences and frustrations with the healthcare system and the nurses would respond and listen, responding to them personally (Grimsbo et al., 2011).

Rather than looking at the use of interventions Varsi et al. (2013) performed the first study in this review into the non-use of an intervention. They found that the information was simply available elsewhere, that patients did not have worries about security or about bothering people and did not know what they did not know so were happy and had no concerns. Computer mediated communication was not an alternative to other forms of health information and people's preference was for written or spoken forms of communication.

Elaborating further, Patten et al (2006) and Patten et al. (2007) provide a two-sided story. Patten et al. (2006) offered smoking cessation to adolescents in the United States via an adapted 'Webchoice' program that they called CHESS aimed at 'stomping out smoking'. This intervention proved to be ineffective with no participant being abstinent from smoking at week four. They found engagement was hard and after just three weeks less than one third accessed the site. This was raised earlier by Yoo et al. (2012) demonstrating that each intervention has a possible 'ceiling effect'. They found that when people felt they would no longer benefit then they promptly ceased use and again a 'ceiling' to use was noted. The difference between this study and Grimsbo et al. (2011) was that the information was not tailored to the participant. This could have been the result of a comparison being made between this and a face-to-face consultation which did provide tailored information. Patten et al. (2007) then looked at this study but more directly at the frequency and type of use of the different components of CHESS. They found that females were more likely to utilize this intervention, with the interactive part being the most used. To add to this further the CMSS group was the most used part of the intervention and the 'ask a professional' and discussion board used least of all.

Lastly, a randomised controlled trial carried out in Canada (2012), which supported people with diabetes (Pacaud et al. 2012), offered synchronous and asynchronous communication via email, online information, and online social support. By looking directly at diabetic control of blood sugar levels, they found the intervention to have little impact on blood glucose control. However, there were statistically significant correlations between the website users and improved knowledge, self-care and self-efficacy.

Support provided by the intervention. As noted above providing health information via an app is one way of providing timely information that can provide a feeling of control support and reassurance (Danbjorg et al., 2014). Caution is required to ensure the messages

do not cause anxiety (Varsi et al., 2013). A concern around online education is that when people know more they could worry more, and what they do not know cannot cause worry. Ethically the application should aim to do no harm. The intervention provided the feeling of having a 'lifeline', being in control with a sense of security and Independence (Danbjorg et al. 2014). Danbjorg et al. (2014) talks of achieving mastery through experience, which strengthens parental self-efficiency.

In Summary. Comparing multifaceted intervention was problematic due to the variations between interventions; however, common themes did emerge from the data. Optimistically, people again liked the asynchronous aspects that allowed them to write their story. They liked to share pictures and messages. Many of the interventions provided a sense of security and reassurance despite the interventions proving ineffective for example in smoking cessation and in the post-partum care. Increased self-efficacy was not evident and engagement was seen as difficult. In one study into non-use of the intervention, it was clear that people either did not feel they needed to use the intervention or they had access to information and support elsewhere and tailored information is required.

Discussion

The aim of this study was to explore how computer mediated communication has been used in the healthcare setting to support patients and discuss the implication that this may have for future practice. What was found was that healthcare is changing and that new ways of delivering care were much needed. Historically people sought healthcare advice or information face to face. Nowadays the increased availability of various forms of computers and other devices such as phones, tablets, and laptops means greater access to advice and information. Consumerism, control of healthcare costs, increasing demand on healthcare and shorter stays in hospital has also led to scattered interventions and less personalised care. All

of the above has led to a redefining of the relationship between healthcare provider and patient.

This systematized review provided details of 31 empirical studies that use a range of computer mediated support interventions including Email, videoconferencing, online social support groups, and multifaceted interventions. These show a positive effect overall on a patient's access to services, the value of the healthcare offered and health outcomes. As always, there are lessons to be learnt from all fields of practice. The research is leading us to believe that computer technology could be both what patients want and a way of delivering healthcare to meet the patients' needs. The uniqueness of computer mediated communication has led to a steady increase in the popularity of computer mediated social support groups (White and Dorman, 2001) for example, and there are many similarities between the interventions that will be discussed further.

Email and computer mediated social support groups are both text based and written asynchronously with or without anonymity. The patients have time to tell their story, at their own speed and think about what they are writing from the comfort of their own home. A degree of anonymity is advantageous in all intervention types so is an important point to note moving forward especially if new interventions do not allow for this.

There are also similarities between videoconferencing and social media. Videoconferencing is now possible through many social media platforms and users can send pictures to share and enhance written word or perform 'live chats'. It is worth noting that even until very recently concerns around quality of image and sound were seen. The literature highlights that younger generations are more comfortable with this form of technology which is promising as breastfeeding mothers, women of child bearing age, do fit this demographic. For this reason computer mediated communication interventions may also be beneficial for specific groups of breastfeeding mothers known to have lower rates of breastfeeding for

example teenage mothers (Wambach et al. 2011), mothers with lower literacy (Rahman et al. 2012), or mother of lower socio-economic status (Fatunde et al. 2017). These interventions could provide an alternative to written text in a form that is easily accessible to them. Video, like computer mediated social support, has the advantage of connecting people from around the world boasting no travel costs and at very little expense. Findings suggest patients were satisfied with video interventions when it saved them time on travel. It is plausible that a breastfeeding assessment could be completed in this way, given the positive results found in Tele dermatology to view and observe the patient in some detail. Noted in the literature was concern that video interventions can cause anxiety, unease or embarrassment and a realisation that although video was welcomed patients did prefer face-to-face contact. This again highlights a need for more research in this area.

Similarly, the multifaceted approaches, using other elements of email and computer mediated social support groups, shared advantages. Social media was beneficial, like email and the multifaceted interventions, in meeting unmet informational needs and the esteem needs of parents. The benefits of these interventions are seen within the tailored information response and not seen in general information giving. Patients did like to search information alone, watching and re-watching useful videos. Importantly this has implications for practice when posting breastfeeding information that was not prompted for and sharing links and videos that were not requested. Oppositely, the multifaceted apps were used to foster a sense of empowerment and mastery around their situation helping to build confidence and reduce anxiety thus being considered as valuable but with careful consideration.

Such considerations include practitioners being mindful that their tool is easy to use and that training and supervision is provided. Interventions must be assessed carefully to prevent waste of resources or cause harm. The literature has shown how information giving alone can prove ineffective and automatic messages can raise anxieties. The professional

must think about whether the informational part of the intervention could be achieved more easily elsewhere, whether patients would prefer to seek information elsewhere and whether the very best information is provided. Computer mediated communication is demonstrated as being able to provide timely, appropriate and efficient care to families. However, training and additional resources are required and although computer mediated communication offers a more flexible approach it is noted that the most effective interventions are available 24/7.

Additionally, it must be noted that in many studies uptake of the interventions was low and that a 'ceiling' of use observed. When the patient deemed the intervention no longer helpful they disengaged. If implementing a computer mediated support intervention, a plan for promoting usage would be beneficial and thought put into how the intervention will be promoted and encouraged to prevent low uptake.

Only two of the 31 articles looked at non-use of an available intervention. It was noted that in many cases people either thought they did not need support or information, or had access to support and information elsewhere. The implication of this for practice is that the benefits of any interventions moving forward need to be stated and clear so that the patients know what is on offer and what they are likely to achieve from it.

Moving forward research conducted in this area would benefit from careful consideration of the types of support on offer and the desired outcome. Matching specific support types, such as emotional support, tangible support, esteem support (House, 1981), to specific outcomes, such as self-efficacy or confidence for example, would add further clarity to the benefits of any intervention. From this review other outcomes have been explored and should be considered such as self-efficacy, empowerment, and levels of perceived social support. The need to define the different types of support using a social science model, and applying these as outcome measures to provide depth to the research that is currently lacking when moving forward.

Study Limitations

The limitations of this systematized review are that all the interventions were quite unique and different in structure, practice area and participants, making comparability difficult. The review also excluded articles that were not written in English or that were not available via the online databases.

Conclusion

This review has highlighted some key thinking points for nurses, midwives and allied health professionals who are, or may be thinking about developing, using, or advising patients' use of computer mediated forms of communication interventions in order to better support their patients. Computer mediated communication is timely, accessible and an exciting prospect too many nurses in the current resources tight environment. Reviewing the lessons learnt from previous support interventions will ensure that such interventions are tailored to the specific needs of the patients, well thought out, carefully planned and limit potential risks.

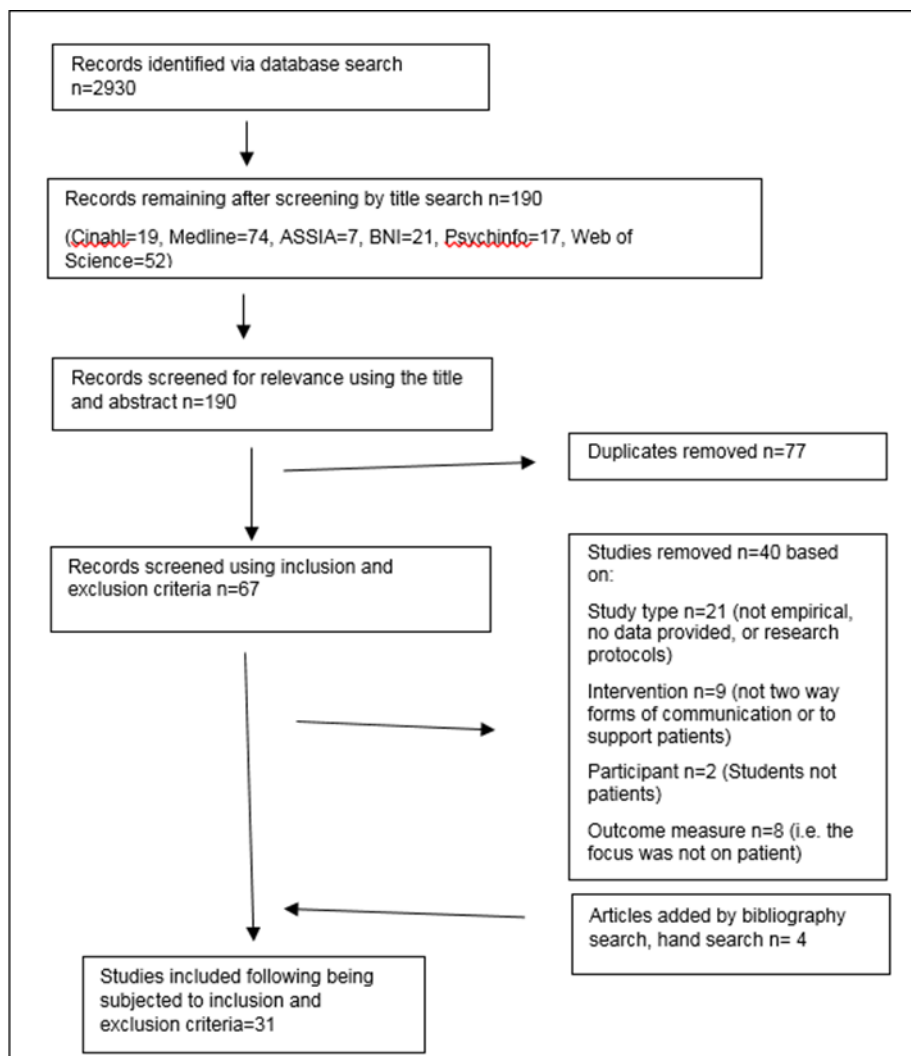


Figure 1. Study selection process

Authors	Title / year	Field/ location of study	Taxonomy of intervention	Clinical purpose	Study design	Sample
Barrera, Glasgow, McKay, Boles & Feil.	Do internet-based support interventions change perception of social support? An experimental trial of approaches for supporting diabetes self-management (2002)	Diabetes/ USA	Multifaceted: online social support, coach + information	Providing social support online	Randomised controlled trial	160 Diabetic patients
Bergmo, Kummervold, Gammon & Dahl.	Electronic patient provider communication: will it offset office visits and telephone consultations in primary care? (2005)	GP / Norway	Email	Could secure web-based messaging systems be an effective way of providing patient care?	Randomised controlled trial	6 GPs + 200 patients
Bjoernes, Laursen, Delmar, Cummings & Nohr.	A dialogue-based web application enhances personalized access to healthcare professionals- an intervention study (2012)	Cancer/ Denmark	Email	Explore patient experiences of online contacts with healthcare professionals	Survey	34 patients with cancer

Castillo, Wegener, Newell, Carlini, Bradford, Heins, Wysocki, Pollak, Teter & MacKenzie.	Improving outcomes at level 1 trauma centres: An early evaluation of the trauma survivors network (2013)	Mental health/ USA	Multifaceted: online support, information and a self-management program	Providing social support online	Randomised controlled trial	251 trauma survivors
Danbjørg, Wagner, Kristensen & Clemensen.	Intervention among new parents followed up by an interview study exploring their experiences of telemedicine after early postnatal discharge (2014)	Maternity/ Denmark	Email + information + automatic messages	Does the app provide a sense of security and self-efficiency?	Semi structured interview	Interviews with 27 mums and 11 dads
Ellis, Drew, Wakefield, Saikal, Punch & Cohn	Results of a nurse led intervention: connecting paediatric cancer patients from the hospital to the school using videoconferencing technologies (2013)	Paediatric oncology, UK	Videoconferencing	feasibility and perceived outcome of videoconferencing linking children to school	Semi structured interviews	8 parents, 3 patients (5-18), 5 teachers (n=16)
Friesen, Hormuth, Petersen & Babbitt	Using videoconferencing technology to provide breastfeeding support to low income women: Connecting hospital based lactation consultants with clients receiving	Breastfeeding/ USA	Videoconferencing	Feasibility of linking children with school	Interviews	35 post partum mothers

	care at a community health centre (2015)					
Gallienne, Moore & Brennan	Alzheimer's caregivers psychosocial support via computer networks (1993)	Alzheimer's/ USA	Online social support + online information + self-management program	Look at the experiences of providing psychosocial support to caregivers of people with Alzheimer's disease.	Case study	3 adults
Gilmour, Campbell, Loane, Esmail, Griffiths, Roland, Parry, Corbett, Eedy, Gore, Matthews, Steel & Wootton.	Comparison of Tele-consultations and face to face consultations: preliminary results of a united kingdom multicentre Tele-dermatology study (1998)	Dermatology/ UK	Videoconferencing	To compare face to face consultations with those preformed from a distance using computer technology	Exploratory/ interview	155 patients
Glasgow, Boles, Mckay, Feil & Barrera.	The D-Net diabetes self-management program: long-term implementation, outcomes, and generalization results (2003)	Diabetes / USA	Online social support + online information + internet based self-management	D-net intervention evaluation	Randomised controlled trial	320 diabetic patients

Grimsbø, Finset & Ruland.	Left Hanging in the Air. Experiences of Living with Cancer as Expressed Through E-mail Communications with Oncology Nurses (2011)	Breast and prostate cancer/ Norway	Email + information + online social support.	Explore the use and content of emails between patient and nurse...snapshot of experience	Qualitative content analysis	276 messages between nurses and patients
Harris, Haneuse, Martin & Ralston.	Diabetes quality of care and outpatient utilization associated with electronic patient-provider messaging: a cross-sectional analysis (2009)	Diabetes / USA	Email	Utilisation of outpatient systems.	Cross sectional analysis	5274 messages between patients and health care providers
Houston, Cooper & Ford	Internet Support Groups for Depression: A 1-Year Prospective Cohort Study (2002)	Mental health/ USA, Canada, Australia, Europe	Online Social support	Describe characteristics of users of depression support group online and assess there were changes in depressive symptoms and social support.	1 year prospective cohort study: internet survey at base 6 months and one year	130 mostly women in their 40s

Leiderman & Morefield.	Web Messaging: a new tool for patient-physician communication (2003)	Primary care / USA	Email	Improving communication between primary care provider and patient	Survey	238 patients
Lindberg, Ohrling & Christensson.	Midwives experiences using videoconferencing to support parents who were discharged early after childbirth (2007)	Midwifery/ Sweden	Videoconferencing	Increased support for parents	Mixed method study	7 post-partum mothers
Lopez, Ramirez, Valenzuela, Arguello, Saenz, Trujillo, Correal, Fajardo & Dominguez.	Sexual and Reproductive Health for Young Adults in Columbia: ‘Teleconsultation’ using mobile devices (2014)	sexual health/ Columbia	Email + information	Improving sexual health in young adults	Survey	58 patients
Lowitt, Keesler, Kauffman, Hooper, Siegael & Burnett	Tele-dermatology and in person examinations (1998)	Dermatology / USA	Videoconferencing	Could dermatology clinics be done from a distance	Interview	139 patients
Mackenzie, Terao, Bosarge, Henry, Klees, Morrison & Kossoff	E-mail management of the Modified Atkins Diet for adults with epilepsy is feasible and effective (2012)	Neurology/ USA	Email	Evaluate the feasibility, safety, and effectiveness of an email	3-month cohort study	22 Adults

				administered dietary therapy for refractory epilepsy in adults.		
Oh & Lee	The effects of computer-mediated social support in online communities on patient empowerment and doctor-patient communication (2012)	Diabetes/ Korea	Online Social support	Test the mechanism through computer mediated social support influenced intention to talk to a Doctor. How a sense of empowerment acted as a mediator in this decision.	Internet survey	464 diabetic patients who currently use diabetes online communities
Pacaud, Kelley, Downey & Chiasson	Successful delivery of diabetes self-care education and follow up through e-health media (2012)	Diabetes / Canada	Email + online information + virtual appointments	Care and follow up for diabetic patients online	Randomised controlled trial/ longitudinal study	79 patients

Patten, Rock, Meis, Decker, Colligan, Pingreem Doenlas, Offord, Boberg & Gusftafson	Frequency and type of use of a home-based internet intervention for adolescent smoking cessation (2007)	Smoking cessation/ USA	Email + online social support + online information	Reducing smoking rates in adolescents	Content analysis	70 adolescents
Patten, Croghan, Meis, Decker, Pigree, Colligan, Dornelas, Offord, Boberg, Baumberger, Hurt & Gustafson.	Randomized clinical trial of an internet based versus brief office intervention for adolescent smoking cessation (2006)	Smoking cessation / USA	Email + online social support + online information	Reducing smoking rates in adolescents	Randomised controlled trial	139 adolescents
Petrovski, Zivkovic & Stratrova	Social Media and Diabetes: Can Facebook and Skype Improve Glucose Control in Patients With Type 1 Diabetes on Pump Therapy? One-Year Experience (2008)	Diabetes/ USA	Videoconferencing	Evaluate results from SM (FB and Skype) and care link software as tools to provide DM control	Randomise controlled trial	56 children and adolescents with type 1 diabetes aged 14-23.
Roter , Larson, Sands, Ford & Houston	Can E-Mail Messages Between Patients and Physicians Be Patient-Centred (2008)	GP /USA	Email	Explores the extent to which email messages patient and GP	Content Analysis	8 volunteers from a larger study

				mimic tradition communication dynamics.		
Salonone, Kaunonen, Astedt-Kurki, Jarvenoaa, Isoaho & Terkka.	Effectiveness of an internet based intervention enhancing Finnish parents' parenting satisfaction and parenting self-efficacy during the post-partum period (2010)	Midwifery / Finland	Online social support + online information + access to a professional	Evaluate the effectiveness of an internet-based intervention to support mother s and father.	Quasi-experimental design with a non-equivalent control group	354 mothers
Shaw, Baker, Witherly, Hawkins, McTavish & Gustafson	How women with breast cancer learn using interactive cancer communication systems (2007)	Cancer / USA	Social support online + online information + personalised information	Which district services within CHESS contribute most to the effect	Randomised controlled trial	231 patients
Tjora, Tran & Faxvaag	Privacy vs. Usability: A Qualitative Exploration of Patients' Experiences With Secure Internet Communication With Their General Practitioner (2005)	GP/ Norway	Email	Experiences of people using medaxess	Semi structured interviews	15 patients
Turner, Robinson, Tian, Neustadtl,	Can Messages Make a Difference? The Association Between E-Mail Messages and	Diabetes/ USA	Email	Examine the impact of social support messages	Non-randomised	41 patients

Angelus, Russell, Mun, & Levine	Health Outcomes in Diabetes Patients (2013)			on patient health outcomes	prospective study	
Varsi, Gammon, Wibe & Ruland.	Patients reported reasons for non-use of an internet based patient provider communication service: Qualitative study (2013)	Paediatric care/ Norway	Email + information + online social support.	Exploring non-use of Email	Interviews	22 patients
Weiss, Whieley, Treviranus, & Fels	Pebbles: A personal technology for meeting educational, social and emotional needs of hospitalised children (2001)	Paediatrics/ Canada	Videoconferencing	Improving educational social and emotional needs of children.	Case study	1 child
Yoo, Chi, Kwon, Yang, Cho, McLaughlin, Among, Shah & Gustafson.	Predictors of the change in the expression of emotional support within an online cancer support group: A longitudinal study (2013)	Cancer / USA	Online social support	Social support change over time	Thematic analysis	18064 messages between patients and a healthcare provider.

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