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Implementation of a telemedicine service to provide skin cancer care in a tertiary plastic surgery unit during COVID-19 - a comprehensive review

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Received 26 April 2021; accepted 12 April 2022

KEYWORDS
Telemedicine; Skin cancer; COVID-19; Plastic surgery; Pandemic

Summary Background: In response to the COVID-19 pandemic, our tertiary skin cancer service had to adapt rapidly to reduce hospital footfall. Consequently, all clinic appointments for skin cancer patients were converted to telephone consultations. This study aims to provide a comprehensive review of this new service.

Methods: This study consisted of three domains: patient and staff experience, efficacy and productivity. Patient and staff experience was assessed through prospective surveys. Efficacy of telephone appointments was assessed through prospective review of clinic coding to evaluate outcomes including rate of conversion to face-to-face appointment. Markers of treatment pathway efficacy included time from referral to surgical listing and the incidence of benign lesions placed on skin cancer pathways. Productivity was evaluated through review of the cumulative number of completed and missed appointments over a 1-month period before and during the pandemic.

Results: All patients were satisfied with the telephone consultation and were preferred to previous experience of face-to-face appointments by 67%. Over 80% of responding clinicians felt telephone clinics should remain as a legacy of COVID-19. Time from referral to scheduling for surgery was significantly shorter for urgent lesions when listed through a teleclinic compared to face-to-face appointment. The telephone service allowed us to maintain 46% of the plastic surgery outpatient activity of May 2019 and missed appointments almost halved.

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https://doi.org/10.1016/j.bjps.2022.04.031
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Introduction
The COVID-19 pandemic has placed a huge burden on hospital services worldwide. In March 2020, National Health Service (NHS) England issued guidance to all hospital trusts to suspend elective services in preparation for an expected surge in hospital admissions from COVID-19 infection. In addition, the U.K. government issued instructions calling for strict social distancing practices and introduced shielding for those deemed ‘Clinically Extremely Vulnerable’. Consequently, hospital services had to re-evaluate how to provide safe and effective patient care within these new constraints.

Our service is the supraregional Plastic Surgery Centre for the Northwest of England and North Wales with a catchment of approximately five million people. This includes the regional centre for Mohs surgery and a tertiary skin cancer service for melanoma. In our unit, all clinic appointments for skin cancer patients were converted to telephone consultations to reduce hospital footfall, potential viral exposure to patients and the number of consultation rooms and staff involved. Telephone consultations ensured timely assessment of new patient referrals and follow-up reviews for skin cancer patients were maintained. One clinic session per week was reserved for face-to-face appointments catering for those identified as having disease progression requiring urgent review or whose needs were not met over the telephone.

The aim of this study was to assess the impact of this unavoidable, large-scale service restructuring in three domains: patient and staff experience, efficacy and productivity.

1. Experience - opinions of the new service by both staff and patient were sought.
2. Efficacy - indicators of efficacy of the service included:
   a. Outcome of telemedicine clinic appointments to evaluate the proportion of patients who were able to progress through their management pathway as a result of their appointment.
   b. Review of surgical management pathways following a decision made through the telemedicine service. Markers included appropriate use of skin cancer treatment pathways, time from initial referral to both surgical listing in clinic and date of surgery.
3. Productivity - indicators of productivity of the service included:
   a. Volume of appointments undertaken
   b. Incidence of ‘missed’ appointments
   c. Duration of telemedicine appointments
   
At the instructed cessation of elective services, our department did not have an established video appointment service. Although in trial at this time, they were not in widespread use and therefore excluded from this study. This study includes telephone consultations with the adjunct of a secure system for photographic images. Images were provided either by the referrer or sent by the patient during the appointment.

Materials and Methods
Experience
Survey questionnaire for patients
A prospective survey consisting of a 12-item questionnaire was conducted from 21 September to 2 October 2020 targeting patients who attended the minor surgery unit for elective surgical treatment of suspected skin cancer. Only patients who had received a telephone consultation from our service were included in the study. The questionnaire surveyed the ease-of-use, interaction quality, satisfaction and patients’ view to future use of telephone services. Open-ended questions on strengths and weaknesses of telephone consultations were used to evaluate patients’ opinions. Thematic analysis was performed for open-ended questions.

Survey questionnaire for medical staff
A prospective online survey was sent to all doctors (n=49) working within Whiston Hospital’s Plastic Surgery Department which included 24 consultants, 8 specialty registrars and 17 trust grade doctors. The 9-item questionnaire covered productivity (time spent on each patient), satisfaction, educational needs and future use of telemedicine. Strengths and weaknesses of a telephone service were asked in the form of open-ended questions to assess medical staff’s opinions. Thematic analysis was performed for open-ended questions.

Efficacy
Outcome of telemedicine clinic appointments
Prospective evaluation of telephone clinic outcome codes was undertaken over a two-week period. Positive indicators that patients were progressing along their treatment pathway included the scheduling of surgery and discharge to primary care. A negative indicator was the conversion to a face-to-face appointment as a result of their needs not being met by the telephone appointment.

Surgical treatment pathways
Surgical treatment pathways were reviewed for 55 consecutive non-pigmented lesions biopsied in May 2020 from

Conclusion: Patients and clinicians have responded positively to the new service. This study highlights the merits of an ongoing telephone clinic service for select patients on resolution of the COVID-19 impact on health services.

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patients who were listed for surgical excision through a telephone consultation. Lesions were included if they were suspected to be malignant and placed on a cancer treatment pathway. Our two treatment pathways are ‘urgent’ for suspected melanoma or cutaneous squamous cell carcinoma (SCC) and ‘semi-urgent’ for suspected basal cell carcinoma (BCC) with target treatment times of 31 and 90 days, respectively. Pigmented lesions were excluded as our department infrequently undertook diagnostic biopsies of pigmented lesions prior to the pandemic. During the pandemic, we experienced a rise in Dermatology assessed pigmented lesions for biopsy due limitations on their capacity.

Histology results were reviewed to assess diagnostic concordance and the appropriate use of urgent and semi-urgent surgical pathways. Furthermore, the time from initial referral to both scheduling for surgery and date of surgery was reviewed.

**Productivity**

**Volume of completed and ‘missed’ appointments**
Retrospective analysis was undertaken of the number of completed and missed appointments throughout May 2020. These figures were compared against the pre-pandemic face-to-face outpatient service in May 2019. ‘Missed’ telemedicine appointments were coded for failed patient contact during the clinic session.

**Duration of telemedicine appointments**
Prospective evaluation of surgeon-reported appointment timings was undertaken over a 2-week period.

Statistical analysis was conducted using StatsDirect v3 software (StatsDirect Ltd., Merseyside, U.K.). Categorical variables were compared utilizing a chi-squared test. Where expected frequencies were too small for squared, Fisher’s exact test was used. Continuous, parametric data were compared using unpaired t-test and Mann-Whitney U test if non-parametric. Statistical significance was defined as a p-value <0.05.

**Results**

**Experience**

**Patient survey (see Table 1)**
Fifty-eight individual responses were collected during the 2-week period yielding a 74% response rate. Fifteen patients reported that they did not receive a telephone consultation prior to surgery were excluded from the study.

Seventy per cent of patients rated their telephone clinic appointment as ‘excellent’, 25% as ‘good’ and the remaining 5% rated the appointment as ‘fair’. Sixty-eight per cent of patients were (1) very satisfied with their telephone clinic appointment and (2) reported that the teleconsultation was extremely effective in dealing with their respective health concern. Eighty per cent of patients responded that they definitely received the kind of service they expected during their teleconsultation and 77% of patients responded that almost all their needs were attended to. All patients reported that they would both be happy to have another telephone appointment if they had a similar problem in the future and recommend the department’s telemedicine service to their friends and family.

When asked whether they preferred the telephone appointment to a face-to-face appointment, 67% responded positively, 31% preferred the latter and 2% remained neutral. Sixty-three per cent of respondents gave reasons for preferring a telephone appointment, including less time spent on travel (n=18), time saved off work (n=9) and reduced impact on family commitments (n=6). Eleven patients provided reasons for opting against telephone consultations, including concerns over the clinician’s inability to visualise the skin lesion over the telephone (n=7) and the adequacy for long term monitoring for patients with high-risk skin cancers (n=1).

**Staff survey (see Table 2)**
A 53% (n=26/49) staff response rate was achieved with an even distribution of respondents from all grades (10 consultants, 7 specialty registrars and 9 trust grade registrars). The majority of doctors (n=15) conduct 1-2 half-day sessions of telephone clinics for skin cancer per week. Four registrars reported undertaking three to five sessions of telephone clinics per week during the pandemic.

Most doctors reported using an average 10-15 min (n=12) or more than 15 min (n=10) for each new patient referral over the telephone. A similar time was spent over the telephone with follow-up appointments; 42% (n=11) spent 10-15 min and 23% (n=6) spent 7-10 min.

Eighty-one per cent of doctors agreed that telephone consultations should be a regular feature of the department’s skin cancer service post-pandemic but only 65% felt that it is cost-effective. Only 58% reported that teleconsultation was effective in dealing with their patients’ concerns. Most doctors (81%) felt that further training in risk management and consultation skills are needed if the telemedicine service is made permanent.

In the thematic analysis of the free-text, 20 out of 26 individuals voiced concerns regarding the suitability of teleclinics for disabled and vulnerable patient groups and the inability to physically examine patients. Reported advantages included that the service is COVID safe (n=8), convenient for both patients (n=5) and staff (n=3), and an effective mode of consultation for a selected cohort of patients who are technologically competent and possess a low-risk skin cancer profile (n=12).

**Efficacy**

**Outcome of telemedicine clinic appointments**
During the 2-week observation period, 258 telemedicine consultations were undertaken, comprising 210 follow-up (81%) and 48 (19%) new appointments. The majority of patients (n=111; 43%) continued on standard skin cancer follow-up pathways, 65 (25%) of patients were added to the waiting list for surgery, 60 (23%) were successfully discharged back to primary care and 9 (3.5%) were referred onto another hospital speciality. Conversion to face-to-face appointment was required in 12 (4.7%) cases.
Surgical treatment pathways (see Table 3)
Patient age was comparable between the two groups (72 years in 2019 vs. 74 years in 2020). In 2019, histology proved 62% of excised lesions were malignant, 18% pre-malignant or in situ disease and 20% benign. The most commonly excised lesion was a BCC (49%) and clinical and histopathological concordance was 67%. Referrals were predominantly from primary care (51%). In 2020, histology proved 75% of lesions were malignant, 11% were pre-malignant or in situ disease and 15% were benign. The most commonly excised lesion was SCC (47%). Clinical and histopathological concordance was 73%. Referrals were predominantly from Dermatology (60%). Although listed for surgery through a telephone appointment, 64% had a prior face-to-face consultation with Dermatology and 26% with their general practitioner.

The proportion of patients on the urgent cancer pathway was larger in 2020 (27% in 2019 vs. 90% in 2020). For newly referred skin lesions, mean time from initial referral to surgical scheduling for lesions subsequently placed on the urgent surgical pathway was significantly shorter in 2020 (19 days in 2019 vs. 12 days in 2020; p = 0.01). Fewer days from initial referral to date of surgery was demonstrated for these lesions but this fell short of statistical significance (35 days vs. 27 days in 2020, p = 0.06). A trend of shorter time from initial referral to both surgical scheduling and date of surgery was found for the semi-urgent pathway, but this did not meet statistical significance.

In both 2019 and 2020, there were no instances of histologically proven urgent malignancies on the semi-urgent pathway and all but one patient received treatment within the target times. This patient was on the semi-urgent pathway in 2019 and chose to have surgery one week later than the target time. There was no statistical difference in the incidence of histologically proven benign lesions between the two groups.

Productivity
Volume of completed and ‘missed’ appointments
In May 2020, 1,581 (494 new and 1,087 follow-up) appointments were scheduled. This equates to 46% of appointments scheduled under ‘normal’ circumstances in May 2019. These appointments represent the entirety of the plastic surgery outpatient service (excluding trauma) in May 2020, as all other non-urgent, subspecialty services were suspended except for the new telemedicine skin cancer service. There were 74 (4.5%) missed appointments in May 2020 compared to 298 (7.8%) ‘DNAs’ in May 2019.

Duration of telemedicine appointments
Prospective evaluation of 132 telephone consultations was undertaken. The average duration of new patient appointments was longer than for follow up (8 min 48 seconds vs. 6 min 29 seconds). During the observation period, 11 patients required a second phone consultation within the same clinic session in order to complete the appointment.
**Table 2**

| Staff Survey Questions                                                                 | Consultant | Trust grade | Specialty Registrar |
|---------------------------------------------------------------------------------------|------------|-------------|---------------------|
| 1. What is your job role?                                                              | 42% (n=10/24) | 53% (n=9/17) | 88% (n=7/8)         |
| 2. In a typical week how often do you do teleclinics?                                  |            |             |                     |
| a. 1-2 sessions                                                                       | 90% (9)    | 33% (3)     | 43% (3)             |
| b. 2-3 sessions                                                                       | 10% (1)    | 56% (5)     | 14% (1)             |
| c. 3-5 sessions                                                                       | 0          | 11% (1)     | 42% (3)             |
| 3. On average how long does it take you to finish a telephone consultation for a new referral? |            |             |                     |
| a. <5 min                                                                             | 0          | 0           | 29% (2)             |
| b. 5-7 min                                                                            | 30% (3)    | 0           | 14% (1)             |
| c. 7-10 min                                                                           | 40% (4)    | 11% (1)     | 14% (1)             |
| d. 10-15min                                                                           | 20% (2)    | 67% (6)     | 3                   |
| e. >15 mins                                                                           | 40% (4)    | 22% (2)     | 57% (4)             |
| 4. On average how long does it take you to finish a telephone consultation for a follow up referral? |            |             |                     |
| a. <5 min                                                                             | 0          | 0           | 29% (2)             |
| b. 5-7 min                                                                            | 30% (3)    | 0           | 14% (1)             |
| c. 7-10 min                                                                           | 40% (4)    | 11% (1)     | 14% (1)             |
| d. 10-15min                                                                           | 20% (2)    | 67% (6)     | 3                   |
| e. >15 mins                                                                           | 40% (4)    | 22% (2)     | 57% (4)             |
| 5. Do you think telephone clinics should be a regular feature moving forwards?         |            |             |                     |
| Yes= 100% No = 0                                                                      |            | Yes= 67% No= 33% | Yes= 71% No= 29%  |
| 6. Do you think further education in risk management and consultation skills are required if teleclinics are to be a permanent feature after COVID-19? |            |             |                     |
| a. Strongly agree                                                                     | 30% (3)    | 22% (2)     | 43% (3)             |
| b. Agree                                                                             | 40% (4)    | 67% (6)     | 43% (3)             |
| c. Neither agree nor disagree                                                         | 20% (2)    | 11% (1)     | 0                   |
| d. Disagree                                                                          | 10% (1)    | 0           | 11% (1)             |
| e. Strongly disagree                                                                  | 0          | 0           | 0                   |
| 7. Do you think teleclinics are cost-effective?                                        |            |             |                     |
| a. Strongly agree                                                                     | 20% (2)    | 33% (3)     | 0                   |
| b. Agree                                                                             | 40% (4)    | 56% (5)     | 43% (3)             |
| c. Disagree                                                                          | 30% (3)    | 11% (1)     | 43% (3)             |
| d. Strongly disagree                                                                  | 10% (1)    | 0           | 11% (1)             |
| 8. The telephone appointments help me to deal effectively with my patients           |            |             |                     |
| a. Strongly agree                                                                     | 30% (3)    | 0           | 11% (1)             |
| b. Agree                                                                             | 50% (5)    | 56% (5)     | 11% (1)             |
| c. Disagree                                                                          | 10% (1)    | 44% (4)     | 57% (4)             |
| d. Strongly disagree                                                                  | 10% (1)    | 0           | 11% (1)             |
| 9. In your own words what do you like or dislike about telephone clinics? Please give one point for each. |            |             |                     |
Discussion

Telemedicine services and technological adjuncts to face-to-face consultations have been in place long before the COVID-19 pandemic. A systematic review of the use of telemedicine in Plastic Surgery services demonstrated its application in trauma assessment, burns care, wound management and post-operative monitoring. Telemedicine services have many advantages including patient convenience, reduction in travel time, reduction in the number of clinic visits, reduced costs and increased access to those living in rural areas. However, there are problems with accessibility for those with communication difficulties, those unfamiliar with, or with limited access to, technology devices. There are concerns regarding privacy, safeguarding of vulnerable patients and distinguishing clinical situations in which a direct physical examination is necessary. As a result of the increased use of telemedicine during the pandemic, the General Medical Council (GMC) published ethical guidance on remote consultations in 2020.

Our study has demonstrated high levels of patient satisfaction with the telephone service. Positive patient experience with telemedicine services has been reported in both Plastic Surgery and Dermatology prior to the pandemic. Patient satisfaction has been reported in the context of post-operative evaluation both over video and telephone consultation. A single-institution review of telehealth services found significantly higher patient satisfaction scores across all consultations (face-to-face and video) during the pandemic compared to the pre-COVID period. This is likely due to change in patient expectation as a result of the well-publicised impact on healthcare services and highlights the importance of ongoing evaluation.

There is less literature on the perceptions of the healthcare provider on telemedicine. A recent survey of aesthetic consultant surgeons found that 64% would use video consultations for pre- and post-operative assessments. A recent survey of 1,250 U.K. doctors found that 70% of respondents have seen benefits of telemedicine during the pandemic. However, 76% were worried about missing something and 60% are more worried about a claim or investigation arising. Interestingly, surgeons surveyed in our study reported much longer consultation times compared to our prospective evaluation. In addition, we found mixed opinions regarding the effectiveness of dealing with patients over the phone. However, we found the incidence of both second phone consultations and conversion to face-face-appointments was low. The majority (81%) of our respondents felt they needed further training in risk management and consultation skills specific to telephone clinics. These findings suggest that there is further work required to investigate these concerns and support clinicians unfamiliar with telemedicine. Recent GMC guidance and educational modules on remote consultations from indemnity providers is starting to address this demand.

In contrast to previously published papers, our study found an increase in the rate of diagnostic concordance for suspected skin cancer when listed through a teleclinic. In addition, our rate of suspected cancer that was proven benign on biopsy was lower when listed through our teleclinic service compared to the “normal” face-to-face service. This is almost certainly a reflection of selection bias, with a higher level of suspicion for lesions referred during the pandemic by the patient and the referrer. In general, the literature reports higher skin cancer diagnostic concordance with face-to-face consultation than with
telemedicine. However, inconsistencies in study methodologies limit accurate comparison, and some authors have reported high levels of accuracy with diagnoses made over telemedicine services.\(^1\) The adjunct of teledermoscopy appears to improve diagnostic accuracy but requires both clinician and patient education to be effective.\(^2\) Rather than a high rate of diagnostic concordance, we would argue that a low rate of benign lesions excised on the urgent cancer pathway in combination with maintaining cancer treatment target times is a more accurate marker of service efficacy. Efficient use of operating capacity is even more important in the context of the pandemic where it has and continues to be significantly reduced.

Studies have demonstrated that the time from referral to treatment is shorter when telemedicine services are used in both plastic surgery trauma services\(^3\) and Mohs surgery.\(^4\) Our study found a significantly shorter time from initial referral to surgical scheduling for urgent lesions during our teleclinic service compared to ‘normal’ service. We also found a shorter time from initial referral to surgery but this fell just short of statistical significance. The ability to assess patients and initiate treatment on the urgent cancer pathway sooner demonstrates a significant advantage of the new service.

The COVID-19 pandemic has forced us to work differently in order to continue to provide patient care. Despite this there has been a significant fall in the number of skin cancer diagnoses during the pandemic.\(^5\) The reasons for this are not clear and are likely to include multiple factors such as patient fear or reluctance to seek advice and difficulties (or perceived difficulties) in accessing care. Consequently, there is an expected surge in skin cancer diagnoses as the impact of the pandemic on medical services is reduced and services will have to adapt again to manage this increased demand. There are positive findings from this study to support the ongoing use of a telephone clinic service. We would advocate the ongoing use of a telephone-based service in conjunction with a secure photography referral system and robust triage and safeguarding processes, in the following circumstances:

a) To provide patients with diagnoses and post-operative advice for benign and completely excised lesions that do not require ongoing tertiary care input.

b) For preoperative counselling for complete excision of histologically confirmed lesions in non-cosmetically sensitive areas.

c) For preoperative counselling for Mohs excision of histologically confirmed lesions.

The reduced burden on our hospital services as a result of the pandemic has allowed us to move to a ‘hybrid’ outpatient model. Consultant-led outpatient clinics have been reinstated with templates adapted to consist of both face-to-face and telephone appointments. Ongoing evaluation of telemedicine services across specialties from the perspectives of both the patient and surgeon in addition to service efficacy is required as we enter the post-COVID era.

**Declaration of Competing Interest**

None

**Acknowledgements**

None

**Funding**

None

**Ethical Approval**

Not applicable.

**Patient Consent**

Written consent for survey result publication was obtain from all patients involved.

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