The Strategy Unit.

The Potential Economic Impact of Virtual Outpatient Appointments in the West Midlands: A scoping study

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Job No	453
Prepared by	James de Lacy
Checked by	Fraser Battye, Jagdeep Panesar, David Frith
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1. Executive Summary

NHS commissioners in the West Midlands are interested in understanding the potential impact of a substantial shift towards virtual appointments in place of traditional face-to-face outpatient services for acute hospital services.

This paper aims to inform any case for change for such a shift by scoping the following potential impacts:

A. Productivity gains for West Midlands' businesses through reduced work absenteeism (time off to attend outpatient appointments);

B. Productivity gains to the NHS through a more efficient use of clinical time, and;

C. Reduced patient travel (direct costs to the patient and indirect environmental impact through CO^2 emissions).

In doing so, it builds on a set of assumptions drawn from an earlier study of the economic impact of the NHS in the Black Country and West Birmingham STP conducted by the Strategy Unit and ICF Consulting Limited - *Economic Impact of NHS spending in the Black Country*[1].

Process

The process employed to achieve this involved:

1. Determining the relevant overall quantum of outpatient (OP) appointments – i.e. the appointments relating to the proportion of working age people likely to be in employment;
2. Reviewing the evidence base for examples of virtual appointments, to inform assumptions about the scale of opportunity for virtual appointments, and in which specialties (shown in appendix section 5.2);
3. Producing an estimate of the number of OP appointments for people in work that could be amenable to virtual provision (applying the assumption in 2 to the overall quantum in 1), and;
4. Developing high level estimates of -
    a. Economic productivity impact (£ GVA),
    b. NHS impact (capacity and DNAs),
    c. Patient travel and parking costs (£) and
    d. Reduced environmental impact (CO^2 emissions).

[1] http://www.strategyunit.co.uk/publications/economic-impact-nhs-spending-black-country-full-version

We found that the evidence around relevant interventions largely consists of small scale pilots in a variety of acute specialties. We therefore adopted two parallel models to assess the potential impact of the shift on the defined socio-economic variables:

- The first model examines the potential opportunity from shifting a proportion of West Midlands' OP activity (5%, 10% & 15%) to online consultations across **all specialties** included in the dataset, and;
- The second model applies the evidence from specific **identified specialties** where virtual consultations and technologies have been piloted, and estimates the potential impact from those specialties alone across the West Midlands.

Results

Our analysis estimates that the potential productivity gains to the West Midlands' economy would be **£5.34m GVA** annually if 10% of outpatient follow up appointments across all specialties were shifted to virtual provision, and **£3.81m GVA** annually if 40% of outpatient follow up appointments across the identified specialties were shifted to virtual provision.

In terms of parallel benefits to the NHS, the analysis estimates that a 2.5 minute saving per appointment from moving to virtual provision could free up an additional **5,200 hours** of appointments from a 10% in all follow up appointments or **3,728 hours** from a 40% shift in the identified specialties. The increased convenience and reduced cost of attending appointments may also positively impact DNA rates.

From the patient point of view, where we estimate a cost burden of £5.52 per appointment attended (excluding any lost income), this analysis projects cost savings for West Midlands' patients ranging from **£325k to £973k per annum**. There would of course be some transfer of cost back to NHS providers if overall parking income was reduced as a result of this shift.

We have also estimated potential environmental benefits ranging from **177,845 to 533,535 kg CO^2** annually through reduced travel. This would also be expected to produce a positive health impact over time.

These results need to be read in conjunction with the assumptions highlighted in the main body of the paper.

Suggested next steps

This study has been intended only as a broad exploratory scoping exercise. The analysis has been carried out at a high level, using a series of calculations and assumptions to aid future discussion

about the implications of future policy and resource choice. They should not be taken as predicted values of future economic performance.

More detailed analysis should be carried out to further examine the costs and benefits (including possible unexpected effects) of these and other possible scenarios prior to developing policy advice.

- Refine this high level scoping model by undertaking a further detailed examination of the potential impact through firming up assumptions and introducing model sensitivities as appropriate. This could be achieved by identifying the speciality(s) where:
    - There are high volumes of follow up appointment activity;
    - There is some evidence that the shift to virtual consultation is safe and appropriate, and;
    - There is clinician buy in.

  In conjunction with conducting a more in-depth evidence review and engaging with clinicians to determine the suitability of the selected specialty(ies) and their likely proportions, the outcomes of the detailed modelling may then be used to inform a potential business case for the shift.
- Identifying a local health system as a pilot site to undertake and evaluate a shift to virtual outpatient appointments on a scale not currently available in the evidence.
- Working with wider system partners including the local authority and WMCA regarding the inter-economic and environmental impact.
- Explore the potential impact of an equivalent shift for community services and mental health outpatient services, respectively.
- Understand the potential effect of the shift on the demand of the wider health economy – for example if tests need to be undertaken in other settings e.g. community or primary care.
- More broadly, utilising this type of thinking when considering service changes - i.e. understanding the likely wider economic impact of the change(s).

2. Rationale for the shift

There is growing pressure on the NHS to transform services and look at innovative ways to make efficiency gains, whilst improving performance and enhancing patient experience.

Nationally in 2016-17, there were 118.6 million outpatient appointments, which is nearly double that of 2006-07, increasing from 63.2 million appointments. The number of attended appointments has also risen significantly, from 51.9 million in 2006-07 to 93.9 million in 2016-17.[2]

Of the 93.9 million who attended appointments, 51.3 million people were of working age (16-64). Assuming an employment rate of 75%[3], 38.5 million of these patients would have been in employment.

In the process of attending these appointments, these workers have produced negative socio-economic impacts. These adverse effects were in the form of lost productivity (the opportunity cost incurred by not being able to work for the required period – travelling, waiting for and attending the appointment), the direct cost incurred by the individual from travel and parking, and the environmental effects of the CO^2 emissions from the travel.

One of the methods available for transforming outpatient services is the utilisation of technologies to undertake virtual consultations.

Not only would such a shift negate the need for patients to attend face-to-face appointments - with their associated travel time and cost, waiting time and general inconvenience - it would also have positive impacts on productivity and the environment. If implemented effectively, there is the potential to reap benefits in NHS provider efficiency and cost effectiveness, with increased throughput and reallocation of scarce resources, whilst improving patient satisfaction from transforming their experience of outpatient services. This assumes that clinical and technical appropriateness of the appointments selected and therefore there are no adverse impacts of making the switch to virtual appointments.

Logic model

Virtual and remote access technologies such as Skype are developing to be increasingly more refined, reliable and sophisticated. They are also becoming more accessible to patients as familiarity with such technologies continues to improve across age ranges.

[2] NHS Digital (2017) https://digital.nhs.uk/data-and-information/publications/statistical/hospital-outpatient-activity/hospital-outpatient-activity-2016-17

[3] Office of National Statistics (2018) https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/timeseries/lf24/lms)

The suitability of utilising this method will obviously vary depending upon the specialty and appointment type. (However, it seems that there is a potential opportunity from its implementation that should be explored, which is summarised in this paper).

Figure 1 below outlines a basic logic model for this exercise.

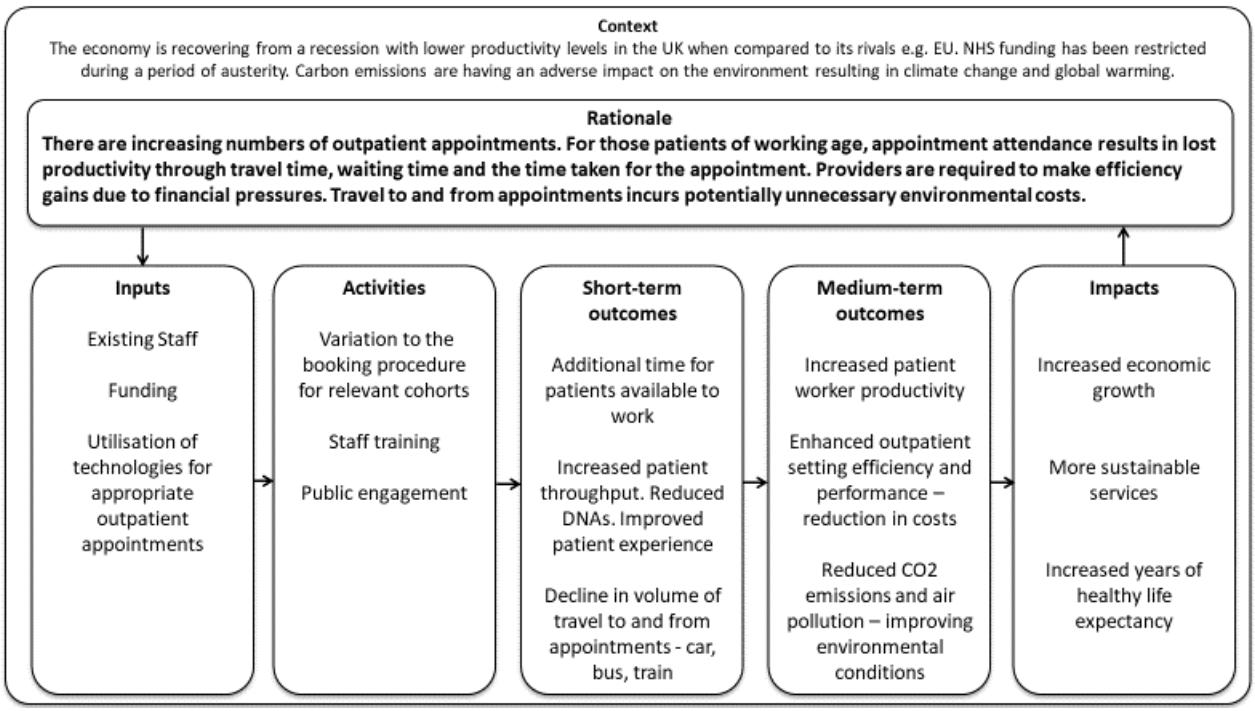

Figure 1: Logic Model

3. Socio-economic analysis

The paper will now begin to develop the model to investigate the case for change for the shift to virtual consultations. This will involve calculating high level estimations for economic productivity impact (£ GVA), NHS impact (capacity and missed appointments), patient travel and parking costs (£) and environmental impact (CO^2 emissions). In order to do this, a set of assumptions have been made that are highlighted below, which need to be read in conjunction with the analysis.

A 17/18 HES outpatient data set has been utilised to determine the overall quantum of outpatient appointments. This includes outpatient data for all secondary care providers across the West Midlands geographical footprint. The list of organisations included in the data set can be found in appendix section 5.1

The data has then been adjusted for those patients that are of working age (15-64). To determine the number of appointments and attendances of patients of working age who are likely to be employed, the figures above have been multiplied by the employment rate of the West Midlands (74%). The calculations also factor in the proportion of people (12%) that attend outpatient appointments who are already absent from work, whether that be through annual leave, long term sickness or that the appointment has been scheduled out of hours. Lastly, activity has been stripped out where a procedure has taken place as part of the appointment. This is because such appointments would not be appropriate for virtual consultation and are therefore not deemed to be relevant to this scoping exercise.

Table 1: Employed population activity 17/18

	All	First	Follow ups
Total no. of appointments	2,423,898	807,157	1,616,741
Total no. of attendances	1,845,342	594,763	1,250,579

Table 1 shows that the relevant overall quantum of outpatient appointments for this study is 1.85m. Using this, the remaining sections of this paper will look to explore the case for the shift to virtual provision in more detail.

Shaw et al (2018)[4] highlight that previous studies on the subject of the use of online consultations have been small scale, samples are select in nature and the lack of studies that provide negative conclusions on the technology bring uncertainties in relation to potential publication bias. Literature on the subject in general is sparse and although the evidence suggests there is potential for the use of remote access technologies in this context in principle, the majority of the evidence reviewed related to minor one-off experiments. Consequently, it is hard to generalise and difficult to make an accurate assumption of the likely proportions of outpatient appointments that are

[4] Shaw S, Wherton J, Vijayaraghavan S, Morris J, Bhattacharya S, Hanson P, et al. Advantages and limitations of virtual online consultations in a NHS acute trust: the VOCAL mixed-methods study. Health Serv Deliv Res 2018;6(21).

appropriate for virtual consultations – which was the original intention of this project – without further detailed investigation.

The literature highlights the examples of specialties where the shift could potentially be achieved **in principle**. Potential proportions of suitability for specialties can therefore be derived from these previous studies but the reliability of such assumptions should be noted. There is also no evidence - found as a result of the review - of a shift being achieved on a large scale across multiple specialties.

Therefore, this paper utilises two separate models to assess the potential impact of the shift on the different socio-economic variables.

The first model takes a high-level view by examining the potential opportunity of shifting a proportion of activity to online consultations across **all specialties** included in the dataset. This model uses a set of assumptions of the proportions of suitability - 5%, 10%, and 15%. These assumptions are not based on an evidence base and have been included as a wider illustration of the potential impact. The list of all specialties included in the dataset can be found in the appendix section 5.1.

The second model factors in the specific **identified specialties** from the evidence review, where virtual consultations and technologies have been piloted previously. It also factors in the proportions of patients deemed eligible for such consultations that have been loosely derived from the evidence. These ranged from 30% to 50% of patients of the cohort population so we have modelled the potential impact of a shift of 30%, 40% and 50%. Again, due to the limitations of the studies reviewed, the reliability of these proportions and their applicability to this study should be scrutinised. The specialties that have been included in the analysis are:

- Endocrinology
- Gastroenterology
- Medical and Clinical Oncology
- Orthopaedics
- Plastic Surgery
- Urology.

The summary of the evidence review can be found in the appendix section 5.2.

3.1 Economic productivity impact

This section aims to examine the potential economic productivity impact of shifting outpatient appointments from traditional face to face appointments to virtual consultations. The measure that has been used for this assessment is Gross Value Added (GVA) per head. GVA represents a measure of economic impact defined as the additional income to an area generated from economic activity and the production of goods and services. [5]

The benefit to the economy is based on an assumption that there is no decrease in the quality of healthcare individuals receive. It assumes that patients receiving a consultation via video conferencing are equally likely to be reviewed as effectively as patients receiving their appointment face-to-face. It also assumes that the patients will not need a second, face-to-face appointment to confirm their diagnosis. It also assumes that the savings in NHS expenditure are reallocated to other local services.

In order to conduct analysis that follows, a number of assumptions needed to be made. It is therefore important that these are reviewed in conjunction with the analysis so that they can be understood and taken into account. These assumptions are displayed in the table below.

Table 2: Economic impact assumptions

Category	Assumption	Source
Average GVA per head	£28.30 per hour	Office of National Statistics: Sub regional Productivity (2016)
West Midlands employment rate	74% Breakdown: Full time – 73% (Average 37.2 hours per week) Part Time – 27% (Average 16.3 hours per week)	Office of National Statistics: Regional labour market statistics in the UK: June 2018
Travel Times	Home to hospital: 36.92 minutes Work to hospital: 27.69 minutes	Department of Transport journey time statistics Labour Force Survey
Waiting time in hospital	51.3 minutes	NHS outpatient survey; NHS guidance on arrival times

[5] ONS (2018) https://www.ons.gov.uk/economy/grossvalueaddedgva

Duration of outpatient appointment	20 minutes	NHS guidance on duration of appointment
Proportion of outpatient appointments taken when patient is out of work (annual leave/long term sick, out of hours)	12%	NHS data on out of hours provision
Employment status of patients	Assume that individuals of same age are equally likely to attend outpatient appointment regardless of their employment status.	

Current situation – traditional consultations

Method:

The cost to the economy of employed individuals attending outpatient appointments is estimated on the duration of time an individual spends absent from work because of the appointment. This assumes that the time for appointments is lost time to employers and that employees do not work additional overtime as a result of attending appointments.

There are three separate components to this duration of absence:

- The time an individual spends travelling to and from the outpatient setting to attend their appointment (27.69 minutes x2);
- The duration of time an individual spends waiting in the outpatient setting for their appointment to begin (51.3 minutes), and;
- The duration of their appointment (20 minutes).

These three portions of time are multiplied by the GVA per head to estimate the value of the loss to the economy per appointment.

Using the assumption in the table above, it is estimated that in the traditional face to face consultation model, the average GVA loss per appointment equals £59.75.

To calculate the total economic impact to the region, the loss per appointment is multiplied by the activity figures for employed patients that were introduced in the previous section. Adjustments have also been made to factor in the impact of part time workers.

Results:

Table 3: Total GVA impact of traditional face to face consultations

	All	First	Follow ups
Total GVA impact of outpatient attendances - Traditional	£93,589,140	£30,164,257	£63,424,883

The results indicate that the total economic impact of patients attending outpatient appointments who are of working age and are in employment is estimated to be £93.59m. £63.42m of this lost productivity is attributable to follow up appointments alone.

Carer impact

As an aside, it is also a fairly common occurrence that patients are accompanied by a 'carer' to appointments (usually an informal carer in the form of a friend or relative). A proportion of these 'carers' will be in employment and their attendance at the appointment will therefore impact upon productivity. This not only applies to appointments for patients of working age but also to appointments all age groups.

Table 4: Carer assumptions

Category	Assumption	Source
Outpatient appointments that require a carer	30% of total outpatient appointments	Macmillan Cancer Support (2015): Evaluations of the South Yorkshire, Bassetlaw and North Derbyshire Survivorship Programme
Employment rate of carers supporting outpatient appointments	35%	Annual Population Survey

This has been factored into the parallel analysis, which provides a total impact figure through amalgamating the impact of carers with the working population totals shown.

Table 5: Total GVA impact of traditional face to face consultations including carers

	All	First	Follow ups
Total GVA impact of attendances (including carers)	£121,591,443	£38,650,364	£82,941,079

The addition of an allowance for lost productivity of 'carers' increases the total economic impact to £121.59m for all attendances and £82.94m attributable to follow up appointments. It should be noted that there may be some double counting between population in this high-level calculation, which has been included to illustrate potential additional opportunities.

The impact of carers is not included as a factor in the remainder of the paper's investigation.

Potential impact of shift to virtual consultations

The introduction of online consultation technologies has the potential to reduce the economic impact of outpatient appointment attendance. This is through a reduction in the time that the patient is absent from work as the requirement to travel to, from and wait for the appointment is eliminated. Assuming that the duration of the outpatient appointment remains consistent to that of a traditional appointment, the time absent from work reduces from 2.1 hours to just the appointment time of 20 minutes. This is a saving of 1.8 hours. At an average GVA rate of £28.30 per hour, the economic impact is reduced to £9.43 GVA lost per appointment, which is an average saving of £50.32 GVA per appointment. This assumes there is not a waiting time factor introduced where the patient is required to wait for the consultant/nurse to 'join' the virtual consultation.

This GVA impact can then be factored into model by multiplying it by outpatient attendance activity.

Results:

Table 6: Potential total GVA impact of virtual consultations

	All	First	Follow ups
Total GVA impact of outpatient attendances - Virtual	£14,775,677	£4,762,276	£10,013,401

As it can be seen from the results in the table above, the economic impact of outpatient appointments is significantly reduced with the utilisation of virtual consultations when compared to traditional face to face appointments. This is attributable to a considerable reduction in the time that the patient is absent from work.

However, this calculation will be radically overstated as it includes activity for all types of appointment and for all specialties. In reality, virtual consultations may not be able to be utilised in all instances due to factors such as clinical appropriateness, practicality and technical achievability.

The literature reviewed (appendix section 5.2) indicates that many of the previous studies on the use of virtual consultations have been focused on follow up appointments. This may suggest that first consultations may not be appropriate or beneficial to be conducted virtually. Therefore, the remainder of this analysis will assume that virtual consultations are only suitable for follow up appointments and that first appointments continue via traditional methods. This means that first appointments are not included in the calculations. This will ensure that prudent estimates of impact are produced.

All specialties

By examining the impact across all specialties, the potential savings of the shift have been initially estimated in the table below using the assumed suitability proportions of 5%, 10% and 15% of follow up activity.

Table 7: Potential GVA impact of switch for proportions of all specialties

	Proportion of all specialties		
	5%	10%	15%
Total no. of FUp attendances	62,529	125,058	187,587
GVA impact of FUp attendances - Traditional	£3,171,244	£6,342,488	£9,513,732
GVA impact of FUp attendances - Virtual	£500,670	£1,001,340	£1,502,010
Potential GVA impact of switch	**£2,670,574**	**£5,341,148**	**£8,011,722**

From the results in Table 7, it can be seen that the potential GVA impact of the switch is between £2.67m and £8.01m, if 5%-15% of all specialties were targeted for those patients who are of working age and in employment.

Identified specialties

The next stage of the analysis looks to factor in the specialties that have been identified by the evidence review. This uses the range of assumptions in relation to the proportions of suitable patients for the use of the technology that have been derived from the literature (noting the limitations discussed previously).

Table 8: Potential GVA impact of switch for proportions of identified specialties

	Proportion of identified specialties		
	30%	40%	50%
Total no. of FUp attendances	67,100	89,467	111,834
GVA impact of FUp attendances - Traditional	£3,403,077	£4,537,436	£5,671,795
GVA impact of FUp attendances - Virtual	£537,271	£716,362	£895,452
Potential GVA impact of switch	**£2,865,806**	**£3,821,074**	**£4,776,343**

The analysis has estimated that if 30%-50% of follow up outpatient appointments for selected specialties are shifted to virtual provision, then this can have a potential economic impact in the range of £2.87m and £4.78m, for those patients who are of working age and in employment.

As one benchmark to gauge the economic significance of these impacts, the national Growth Deal programme of government grant funding for local economies, funds the Black Country Growth Deal programme by an average of £23m a year (£162m for the period 2015-21).

In conclusion, the analysis above identifies potential significant economic benefits from shifting selected outpatient appointments to virtual consultations from traditional face to face appointments. The impact is attributable to the reduction in the time that the patient/employee is absent from work, curbing the GVA lost per appointment. This impact of course assumes that the patient uses the equivalent time saved from using the new technology to generate economic activity.

3.2 NHS impact

The next section of this paper looks to analyse the potential impact of the shift on the NHS. This will firstly look at the implications for the NHS in terms of the potential to increase capacity. Then it will examine the possibility of reducing waste by decreasing the levels of 'did not attends' (DNAs).

Capacity

The evidence highlights potential efficiency savings from using virtual and remote access technologies in relation to appointment duration times. Where examined, a number of studies highlight either no significant differences between the two methods, or slightly shorter durations when using online technologies. Although, no definitive figures are provided. This paper will again use a set of assumed proportions to examine the potential capacity impact if certain efficiency savings could be made. These will be; no difference in duration, a 2.5-minute saving and a 5-minute saving.

Method:

The appointment time assumption of 20 minutes from previous sections has been used in the calculations as a baseline and multiplied by total activity. This calculation has then been conducted for the other selected appointment durations and the results have then been compared, highlighting the effect on capacity. The difference has then been used to calculate the additional appointments that could be conducted with the equivalent capacity,

There is an assumption that the preparation and review time of each appointment that is undertaken virtually by the outpatient department remains equal to that of the traditional appointment. The analysis has also assumed that outpatient departments are already working at full capacity and that any released capacity gets reallocated.

The effect on capacity also does not take into account any adverse impacts in efficiency that may arise from utilising the new technologies such as; judging a patient's suitability for virtual consultation, troubleshooting and IT issues, and patient setup on technologies.

Results:

All specialties

Table 9: Capacity saving by appointment durations – all specialties

	Proportion of all specialties		
	5%	**10%**	**15%**
Total no. of FUp attendances	62,529	125,058	187,587
Total capacity saved - 17.5-minute appointment (hours)	2,605	5,211	7,816
Total capacity saved - 15-minute appointment (hours)	5,211	10,421	15,632

As shown in Table 9, if the use of virtual consultations achieves a 2.5-minute efficiency saving per appointment, it could free up 2.60k to 7.82k hours of resource. At 17.5 minutes per appointment then this could equate to an additional 8.93k to 26.80k follow up appointments that could be carried out with the reallocated resource.

Identified specialties

Table 10: Capacity saving by appointment durations – identified specialties

	Proportion of identified specialties		
	30%	**40%**	**50%**
Total no. of FUp attendances	67,100	89,467	111,834
Total capacity saved - 17.5-minute appointment (hours)	2,796	3,728	4,660
Total capacity saved - 15-minute appointment (hours)	5,592	7,456	9,319

Similarly, with the identified specialties, reducing the follow up appointment duration through the use of remote access technologies for the working population may result in efficiency savings, as shown in Table 10. If appointment duration is successfully reduced to 17.5 minutes, then this may result in an efficiency saving of 2.80k to 4.66k hours, which if then reallocated, this resource could conduct an additional 9.59k to 15.98k appointments.

The reallocation element of this analysis has assumed that outpatient providers will reallocate resource to complete additional follow up appointments via virtual consultation. However, it may be the case that providers will choose to utilise this resource to complete additional first appointments to reduce waiting times. As discussed previously, these appointment types may not be appropriate for remote access technologies.

Therefore, it can be seen that the shift to virtual consultations for suitable outpatient appointments for the working age and employed population may have a positive impact upon NHS capacity constraints. This analysis is again focused upon the working age population, so the impact could be enhanced further as virtual consultations will also be appropriate to other age groups not included in this study.

Did not attends (DNAs)

The paper will now look to examine the potential impact upon a reduction in patients that DNA appointments. DNAs not only dissipate the NHS's scarce resources through wasting doctors and nurses time but also causes delays in the treatment of other patients.

Nationally, the proportion of DNAs are highest for age groups that are of working age. Those aged 30-39 were the group with the highest proportion of the total appointments that were not attended, with 15.4%.[6]

The same behaviour is exhibited at a local level within the dataset, with 7.9% and 7.7% of total DNAs being attributable to those aged 25-29 and 30-34, respectively. As a whole, the majority of the working age population exhibit the highest levels of DNAs as a proportion of total DNAs.

Although the exact reason for DNA is not known – this suggests that the current outpatient model may not be most suitable for the working population and warrants further investigation. NHS Improvement[7] highlight that factors that affect the DNA rate include; the distance that patients need to travel, plus the requirement for patients to get time off work. Both of these factors will be either be removed or alleviated by the introduction of virtual consultations. The Skype pilot in Newham's DAWN scheme reported reducing DNAs from 30-50% to 16%[8], suggesting that the shift to virtual consultations may be able to make an impact in this area.

Method:

The models below look to estimate the potential NHS efficiency gains that can be achieved as a result of reducing DNAs. This is done by calculating the time lost as a result of DNAs currently by multiplying the total number of DNAs for outpatient appointments for those who are employed by the assumed standard appointment time (20 minutes). This focuses on capacity available to conduct outpatient follow up appointments only and assumes that currently the full appointment duration is wasted capacity when a DNA occurs. In reality, the capacity may be utilised for other purposes.

As not all DNAs will be attributable to factors such as travel and time off work, the model assumes that the utilisation of virtual consultations will not entirely eliminate the incidence of them. Consequently, the models look to estimate the value of the capacity available/the additional resource that could be utilised, if DNAs were reduced by 15%, 20%, and 25% respectively as a result of the shift.

Results:

[6] NHS Digital (2017) https://digital.nhs.uk/data-and-information/publications/statistical/hospital-outpatient-activity/hospital-outpatient-activity-2016-17
[7] NHS Improvement (2017) https://improvement.nhs.uk/documents/2108/reducing-dna.pdf
[8] NHSE (2016) https://www.england.nhs.uk/2016/01/newham-diabetes-pilot-scheme/

All specialties

Table 11: Additional capacity utilised conducting follow up outpatient appointments as planned following reduction in DNAs – all specialties

	Proportion of all specialties		
	5%	10%	15%
15% reduction in DNA (hours)	510	1020	1530
20% reduction in DNA (hours)	680	1360	2040
25% reduction in DNA (hours)	850	1700	2550

It can be seen from the results that if virtual consultations were, for example, able to reduce DNAs by 15%, then this may result in between 510 hours to 1530 hours of capacity now utilised as planned, when the shift is across 5% to 15% of all specialties.

Identified specialties

Table 12: Additional capacity utilised conducting follow up outpatient appointments as planned following reduction in DNAs – identified specialties

	Proportion of identified specialties		
	30%	40%	50%
15% reduction in DNA (hours)	576	768	960
20% reduction in DNA (hours)	768	1024	1280
25% reduction in DNA (hours)	960	1280	1600

If the shift of the proportions of identified specialties resulted in a reduction of 15% of DNAs – this could result in a range of between 576 and 960 hours of resource more effectively utilised to conduct outpatient appointments as planned, which was previously lost to DNAs.

Therefore, the analysis estimates that if the shift to virtual consultations can successfully reduce DNAs at the proportions suggested, then this can have a positive impact upon NHS resources and their utilisation. This can be of benefit to both staff and patients as well as NHS finances.

In summary the model has estimated that potential efficiency gains can be made by the NHS from the shift, where appointment durations can be reduced. This may result in additional capacity available for resources that can then be reallocated to meet demand elsewhere. However, it is important to note that, as previously highlighted in the evidence review, the recent VOCAL study suggests that previous evaluations may have been open to bias, meaning making such efficiency savings may be difficult in reality.

The analysis has also investigated what the potential benefits may be if virtual consultations were able to reduce the amount of missed appointments through offering a more accessible service for the working population. Although it is not covered here, there is also the potential to model the workforce impact of the shift – including but not limited to the reduced travel requirements for clinicians.

3.3 Patient travel and parking costs:

The next section of the paper looks at the implications of the shift from traditional face to face style appointments to virtual consultations in relation to patient travel and parking costs.

Again, for this analysis to be undertaken a number of assumptions have needed to be made. These are shown in the table below:

Table 13 – Patient travel and parking cost assumptions

Category	Assumption	Source
Average speed on local A Roads (West Midlands)	25.9 mph 40.32 km/h	Department for Transport statistics (2017)
Average CO^2 emissions of new passenger cars (UK)	121.1g CO^2/km	European Automobile Manufacturers Association
Average Petrol Price (West Midlands)	119.1 p/litre	AA Fuel Price Report (March 2018)
Average new care fuel consumption (UK)	52.2 mpg 18.36 km/l	Department for Transport statistics (2016)
Average parking cost (West Midlands)	£2.00 per hour	Department of Health: NHS car-parking management: environment and sustainability (2015)
Proportion of journeys taken by car	64%	Department for Transport: Transport statistics (2015)
Bus fare	£4.60 (day saver)	National Express West Midlands

The analysis does not take into account other costs associated with car travel including:

- Tax
- Insurance
- Depreciation incurred from mileage, damage to vehicles etc.

Method:

The travel distance (23.49km) by car to and from appointments has been estimated by multiplying the average travel time for car journeys (0.58 hours) by average speed assumptions. Combining this

with average petrol prices for the West Midlands and average fuel economy of new cars provides the average total cost of travel per appointment.

Parking costs are calculated by multiplying the average parking cost per hour by the average time spent in the outpatient setting – made up of the combination of the waiting and appointment time (1.19 hours). The calculation assumes that the patient is required to pay for the full additional hour of parking, which also allows for travel to and from the car.

The standard cost for travel by public transport has assumed to be the cost of travel by bus as this makes up the largest proportion of public transport travel.

Table 14 – Patient travel and parking costs per appointment

Travel and parking cost	
Average Fuel cost per appointment	£1.52
Average parking cost	£4.00
Total average car journey cost per appointment	£5.52
Bus fare per appointment	£4.60

The average cost for a patient of attending an appointment by car can be estimated to be £5.52. This is made up of both travel and parking costs.

Utilising the outpatient attendance activity and the average journey cost per appointment by car and by bus, the total patient cost of attending outpatient follow up appointments in the traditional setting can be estimated.

Results:

All specialties

Table 15 – Total patient travel and parking costs – all specialties

	Proportion of all specialties		
	5%	**10%**	**15%**
Total no. of FUp attendances	62,529	125,058	187,587
Total patient travel and parking costs saving	£324,605	£649,210	£973,816

The results of the analysis in Table 15 show that if selected outpatient attendances – for selected proportions of all specialties – were shifted to virtual consultations then this would save between £0.32m and £0.97m for patients in terms of travel and parking costs.

Identified specialties

Table 16 – Total patient travel and parking costs – identified specialties

	Proportion of identified specialties		
	30%	**40%**	**50%**
Total no. of FUp attendances	67,100	89,467	111,834
Total patient travel and parking costs saving	£348,335	£464,447	£580,559

Analysing the impact of the selected proportions of the identified specialties, it can be seen that the shift may have an impact on patient costs of between £0.35m and £0.58m.

It is important to note that the shift may adversely impact NHS income where parking revenue reduces as a result.

To keep within the scope of this paper, calculations are for the working age and employed population only. However, the shift would also benefit patients of other age groups, where the shift is appropriate.

3.4 Environmental impact

The final element of this analysis aims to examine the potential environmental impact of the shift to virtual outpatient appointments where they are appropriate. Once more a number of assumptions need to be made:

Table 17 – environmental impact assumptions

Travel assumptions	
Distance	23.49km
Average car CO^2 emissions	121.10 g CO^2/km
Car CO^2 emissions from travel per appointment	2.84 kg CO^2

Method:

The CO^2 emissions from travel per appointment are calculated by multiplying the distance travelled to and from the appointment by average CO^2 emissions per kilometre. This analysis has calculated the environmental impact of attending face to face appointments by car only. Public transport inputs have not been included in the calculations.

Results:

All specialties

Table 18 – Total CO^2 emissions – all specialties

	Proportion of all specialties		
	5%	10%	15%
Total no. of FUp attendances	62,529	125,058	187,587
Total CO^2 emissions saving (kg CO^2)	177,845	355,690	533,535

The results of the analysis are shown in Table 18 above. It can be seen that the shift of selected proportions across all specialties may result in a total CO^2 emissions saving of between 0.18m kg CO^2 and 0.53m kg CO^2 across the West Midlands.

Identified specialties

Table 19 – Total CO^2 emissions – identified specialties

	Proportion of identified specialties		
	30%	40%	50%
Total no. of FUp attendances	67,100	89,467	111,834
Total CO^2 emissions saving (kg CO^2)	190,846	254,462	318,077

For the proportions of identified specialties, it is estimated that there is potential for a reduction in emissions of 0.19m kg CO^2 and 0.32m kg CO^2.

The CO^2 emission savings may actually be much greater than the results shown. This is because the assumptions used for average CO^2 emissions figures are produced in laboratory conditions by car manufacturers. In reality cars are much more inefficient due to factors such as driving style and the condition/age of the car resulting in higher emission levels. This will be offset somewhat for those patients who travel via public transport.

It can therefore be seen that the shift to virtual consultations and the resulting reduced requirement to travel can have a positive impact on environmental conditions of the West Midlands. In turn, this can contribute to improving the healthy life years of the local population, which may have an impact on the long-term demand for health and care services.

4. Conclusions and next steps

This scoping paper has examined the case for change for the shift of suitable outpatient appointments from traditional face to face consultations to virtual consultations. This has been done focusing on the working population of the West Midlands who are in employment.

It has estimated that there may be considerable productivity gains achieved as a result of the shift, through a reduction in absenteeism from work of those patients who are in employment. This means that there is a greater amount of time available to work, increasing their productivity, which will be of benefit to the wider West Midlands economy through contributing to economic growth.

The analysis has also looked to estimate the potential efficiency gains that can be made by the NHS from the shift, if appointment durations can be reduced by the use of technology. This is through the availability of additional capacity, meaning that resources can be reallocated to meet demand elsewhere. The NHS may also further benefit through offering a more convenient service for the working population, which in turn may reduce the amount of appointments where patient's DNA.

Further to this, it can be seen from the model that patients will incur lower costs as they will no longer be required to travel to/from and then park for their appointment. This increased disposable income may then further benefit the local economy though increased consumer spending (multiplier effect). However, as there will a reduction in the number of patients using parking facilities, this will result in a reduction in NHS parking income.

Finally, the paper looked at the potential environmental impact of the shift and found – again owing to the reduction in travel – that it may result in improved environmental conditions through reduced emissions. Ultimately the reduction in pollution levels may in turn benefit the local population in terms of increasing the number of healthy life years. This can advantageous in the long term for health and care services through reduced demand.

It should be noted that this analysis provides an analytical framework for assessing the socio-economic impact of making outpatient services more accessible to patients who are in employment. However, this does not represent a complete business case for service change. These topics would have to be explored in greater detail before any service change was proposed.

Suggested next steps:

- Refine this high level, rough model by undertaking a further detailed examination of the potential impact through firming up assumptions and introducing model sensitivities as appropriate. This could be achieved by identifying the speciality(s) where:
    - there are high volumes of follow up appointment activity;
    - there is some evidence that the shift to virtual consultation is safe and appropriate.

- there is clinician buy in/interest;

In conjunction with conducting a more in-depth evidence review and engaging with clinicians to determine the suitability of the selected specialty(s) and their likely proportions, the outcomes of the detailed modelling may then be used to inform a potential business case for the shift.

- Identifying a local health system as a pilot site to undertaken and evaluate a shift to virtual outpatient appointments on a scale not currently available in the evidence;
- Working with wider system partners including the local authority and WMCA regarding the inter-economic and environmental impact;
- Explore the potential impact of an equivalent shift for community services and mental health outpatient services, respectively;
- Understand the potential effect of the shift on the demand of the wider health economy – for example if tests need to be undertaken in other settings e.g. community or primary care;
- More broadly, utilising this type of thinking when considering service changes. I.e. understanding the likely wider economic impact of the change(s).

5. Appendix

5.1 Wider dataset

Table A1 – Organisations included in the data set

Commissioners
NHS Birmingham Cross City CCG
NHS Birmingham and South-Central CCG
NHS Cannock Chase CCG
NHS Dudley CCG
NHS ENGLAND MIDLANDS AND EAST (WEST MIDLANDS)
NHS Herefordshire CCG
NHS Redditch and Bromsgrove CCG
NHS Sandwell and West Birmingham CCG
NHS Shropshire CCG
NHS Solihull CCG
NHS South Worcestershire CCG
NHS Stafford and Surrounds CCG
NHS Stoke on Trent CCG
NHS Telford and Wrekin CCG
NHS Walsall CCG
NHS Wolverhampton CCG
NHS Wyre Forest CCG
WEST MIDLANDS COMMISSIONING HUB
NHS East Staffordshire CCG
NHS Coventry and Rugby CCG
NHS North Staffordshire CCG
NHS South East Staffordshire and Seisdon Peninsula CCG
NHS South Warwickshire CCG
NHS Warwickshire North CCG
Providers
Birmingham Women's and Children's NHS Foundation Trust
Burton Hospital NHS Foundation Trust
George Eliot Hospital NHS Trust
Heart of England NHS Foundation Trust
Sandwell and West Birmingham Hospitals NHS Trust
Shrewsbury and Telford Hospitals NHS Trust
South Warwickshire NHS Foundation Trust

Dudley Group of Hospitals NHS Trust
The Robert Jones and Agnes Hunt Royal Orthopaedic Hospital NHS Foundation Trust
The Royal Orthopaedic Hospital NHS Foundation Trust
Royal Wolverhampton NHS Trust
University Hospitals Birmingham NHS Foundation Trust
University Hospitals Coventry and Warwickshire NHS Trust
University Hospitals of North Midlands NHS Trust
Walsall Hospital NHS Trust
Worcestershire Acute Hospitals NHS Trust (Acute)
Wye Valley NHS Trust (Acute)

Table A2 – Total appointments and attendance for the West Midlands

	All Population		
	All	First	Follow ups
Total no. of appointments	9,531,168	3,282,177	6,248,991
Total no. of attendances	8,024,741	2,747,761	5,276,980

Table A3.1 - Total appointments and attendance for those of working age (15-64):

	Working Age Population		
	All	First	Follow ups
Total no. of appointments	5,278,984	1,920,378	3,358,606
Total no. of attendances	4,379,081	1,589,366	2,789,715

Table A3.2 Total appointments and attendance for those of working age (15-64) by specialty:

	Total Appt	Total Att	First Appt	First Att	FUp Appt	FUp Att
Accident & emergency	15,157	12,058	12,075	9,643	3,082	2,415
Acute internal medicine	20,283	16,995	13,748	11,941	6,535	5,054
Adult mental illness	1,181	1,177	221	221	960	956
Allied health professional episode	975,654	842,021	362,581	320,128	613,073	521,893
Anaesthetics	61,013	46,163	35,279	25,562	25,734	20,601
Audiological medicine	170	170	4	4	166	166
Cardiology	125,104	103,004	57,115	45,928	67,989	57,076
Cardiothoracic surgery	11,265	9,886	3,530	3,124	7,735	6,762
Chemical pathology	18,757	12,504	4,312	2,875	14,445	9,629
Child and adolescent psychiatry	47,884	47,884	1,568	1,568	46,316	46,316
Clinical cytogenetics and molecular genetics	1	1	1	1	0	0

Clinical genetics	774	698	752	678	22	20
Clinical haematology	138,220	114,169	14,557	11,441	123,663	102,728
Clinical immunology and allergy	10,599	6,888	4,893	2,901	5,706	3,987
Clinical neuro-physiology	17,766	15,389	17,217	14,919	549	470
Clinical oncology (previously radiotherapy)	92,613	84,264	12,638	11,811	79,975	72,453
Clinical pharmacology	64	51	0	0	64	51
Clinical physiology	1,110	792	528	427	582	365
Community medicine	2	1	1	0	1	1
Critical care medicine	132	104	104	83	28	21
Dental medicine specialties	69	59	17	13	52	46
Dermatology	152,923	117,809	54,154	41,028	98,769	76,781
Endocrinology	44,019	32,316	12,693	8,424	31,326	23,892
Ent	150,769	116,905	74,320	57,198	76,449	59,707
Gastroenterology	80,951	62,005	34,377	24,547	46,574	37,458
General dental practice	6	5	0	0	6	5
General medical practice	318	284	150	140	168	144
General medicine	240,903	189,763	77,249	60,153	163,654	129,610
General pathology	22	16	1	1	21	15
General surgery	229,567	187,068	118,526	97,492	111,041	89,576
Genitourinary medicine	13	5	11	4	2	1
Geriatric medicine	9,605	7,766	4,914	4,169	4,691	3,597
Gynaecology	244,599	191,111	131,548	103,095	113,051	88,016
Haematology	70	63	43	39	27	24
Histopathology	1	1	1	1	0	0
Immunopathology	659	454	459	302	200	152
Infectious diseases	6,851	5,134	2,329	1,809	4,522	3,325
Learning disability	2	2	2	2	0	0
Medical oncology	48,718	44,045	4,975	4,588	43,743	39,457
Medical ophthalmology	1,519	1,196	698	554	821	642
Midwife episode	237,955	215,384	76,128	66,810	161,827	148,574
Nephrology	45,510	37,791	4,043	3,015	41,467	34,776
Neurology	84,365	62,289	38,187	27,258	46,178	35,031
Neurosurgery	18,972	15,564	7,386	5,851	11,586	9,713
Nursing episode	460,831	387,568	93,085	75,986	367,746	311,582
Obstetrics	345,840	290,679	93,901	78,737	251,939	211,942
Old age psychiatry	14	14	14	14	0	0
Ophthalmology	260,682	207,451	97,892	77,367	162,790	130,084
Oral & maxillo facial surgery	9,925	8,776	5,332	4,729	4,593	4,047
Oral surgery	53,372	40,868	28,704	21,440	24,668	19,428
Orthodontics	25,827	21,486	1,248	1,044	24,579	20,442
Paediatric cardiology	1,350	1,262	308	236	1,042	1,026

Paediatric dentistry	599	599	32	32	567	567
Paediatric neurology	392	314	121	90	271	224
Paediatric surgery	560	465	227	202	333	263
Paediatrics	21,346	15,519	5,907	4,266	15,439	11,253
Palliative medicine	428	399	164	160	264	239
Plastic surgery	41,930	32,347	12,130	9,380	29,800	22,967
Psychotherapy	86	80	66	61	20	19
Radiology	223,026	220,907	151,918	151,684	71,108	69,223
Rehabilitation	27,368	20,354	7,072	5,201	20,296	15,153
Respiratory medicine (also known as thoracic medicine)	64,426	49,326	23,639	17,424	40,787	31,902
Restorative dentistry	242	215	92	89	150	126
Rheumatology	83,298	65,408	19,648	15,279	63,650	50,129
Sports and exercise medicine	1,174	1,067	599	545	575	522
Trauma & orthopaedics	426,784	340,645	155,653	125,592	271,131	215,053
Tropical medicine	110	0	110	0	0	0
Urology	93,239	72,078	39,181	30,060	54,058	42,018
Grand Total	**5,278,984**	**4,379,081**	**1,920,378**	**1,589,366**	**3,358,606**	**2,789,715**

Table A4 - Total appointments and attendance for the employed population (74% of the above):

	Employed Population		
	All	**First**	**Follow ups**
Total no. of appointments	3,906,448	1,421,080	2,485,368
Total no. of attendances	3,240,520	1,176,131	2,064,389

Table A5 – DNA by age group for the West Midlands

	Total Attendances	Total DNA	% of Total DNA
0-4	321,642	31,689	5%
5-9	250,358	26,202	4%
10-14	232,361	20,611	3%
15-19	253,397	30,375	5%
20-24	311,613	42,445	7%
25-29	438,562	54,664	8%
30-34	457,634	53,375	8%
35-39	402,846	47,128	7%
40-44	351,029	38,638	6%
45-49	460,472	45,522	7%
50-54	542,451	45,302	7%
55-59	573,991	40,709	6%
60-64	587,086	34,702	5%

65-69	664,644	30,807	5%
70-74	716,890	29,562	5%
75-79	612,117	28,002	4%
80-84	468,199	24,967	4%
85+	377,687	26,758	4%
No age	1,762	256	0%
Grand Total	8,024,741	651,714	100%

5.2 Evidence review

The scope of this review was to examine the evidence of where remote access technologies have been implemented previously in clinical settings. This includes both internet based technologies, such as skype, as well as telephone based consultations. The intention is for this to then feed this paper's analysis by informing the assumptions made in calculating potential opportunities and in which specialties.

This section aims to provide a summary of the relevant studies that have been reviewed as a result of the rapid literature scan that has been undertaken by completing an internet search (there will be limitations in terms of the depth of evidence reviewed).

It should be noted that literature on the subject is sparse and although the evidence suggests potential in the use of remote access technologies, the majority of the evidence reviewed related to small scale one off experiments with very few having conducted before and after evaluations.

Advantages and limitations of virtual online consultations in a NHS acute trust: the VOCAL mixed-methods study (Shaw et al, 2018)[9]

To investigate alternatives to face to face consultations including the use of virtual/remote access technologies, the Virtual Online Consultations – Advantages and Disadvantages (VOCAL) study undertook a multilevel, mixed-method examination. This looked at the use of Skype video consultations at a micro level (interpersonal), meso level (organisational) and macro level (national policy).

Thirty virtual consultations in diabetes, antenatal diabetes and cancer surgery clinics were compared to traditional face to face consultations. National stakeholders were also interviewed, patient advisory groups were engaged, and operational processes were observed.

9 Shaw S, Wherton J, Vijayaraghavan S, Morris J, Bhattacharya S, Hanson P, et al. Advantages and limitations of virtual online consultations in a NHS acute trust: the VOCAL mixed-methods study. Health Serv Deliv Res 2018;6(21).

The results showed that virtual consultations were slightly shorter in duration when compared to traditional appointments and patients did more talking. The method was popular with patients and staff and appeared safe, effective and accessible when clinical, technical and practical preconditions were met. However, it was deemed that such circumstances were a small proportion of the clinical workload in its entirety. Between 2% and 22% of consultations were conducted via remote access technologies by the end of the study. It was suggested that as with other innovations, some clinicians require incentives and support, whereas others will readily adopt the technology. There were also issues identified with embedding the new technology in organisations where there is opposition to change, with adoption being more complex and time consuming that anticipated.

*Quality of care for remote orthopaedic consultations using telemedicine: a randomised controlled trial (*Buvik et al, 2016)[10]

A randomized control trial compared standard consultations in orthopaedic outpatient clinic at the University Hospital of North Norway (UNN) to video assisted remote consultations. The basis of the studies design was the intention to treat principle. Of the 1570 patients assessed for eligibility, 628 were deemed eligible (40%). The study involved 402 patients (owing to some patients declining to participate/not responding) and found that 98% of consultations were considered 'good' or 'very good' by the evaluating orthopaedic surgeons. It was found that there was no significant difference in consultation durations between the two methods. The conclusions support that the use of remote access technologies are safe for selected patients, although economic impact and patient satisfaction assessments need to be undertaken.

Efficiency, Satisfaction, and Costs for Remote Video Visits Following Radical Prostatectomy: A Randomized Controlled Trial. (Viers et al, 2015)[11]

The study randomised 55 prescreened men with a history of prostate cancer to assess visit efficiency and patient/provider satisfaction/costs when using virtual visits in outpatient settings in comparison to traditional office visits. The results were that virtual appointments were alike to traditional appointments:

- patient–provider face time (mean 14.5 vs 14.3 min; $p = 0.96$),
- patient wait time (18.4 vs 13.0 min; $p = 0.20$),

[10] Buvik A, Bugge E, Knutsen G, Småbrekke A, Wilsgaard T. Quality of care for remote orthopaedic consultations using telemedicine: a randomised controlled trial. BMC Health Serv Res 2016;16:483. https://doi.org/10.1186/s12913-016-1717-7

[11] Viers BR, Lightner DJ, Rivera ME, Tollefson MK, Boorjian SA, Karnes RJ, et al. Efficiency, satisfaction, and costs for remote video visits following radical prostatectomy: a randomized controlled trial. Eur Urol 2015;68:729–35. https://doi.org/10.1016/j.eururo.2015.04.002

- total time devoted to care (17.9 vs 17.8 min; p = 0.97).

Virtual appointments had equivalent efficiency, similar satisfaction, and lower patient costs when compared to traditional face to face appointments.

Diabetes web-based outpatient consultations, Newham University Hospital NHS Trust (Health Foundation, 2014[12], Vijayaraghavan et al., 2015)[13]

Newham University Hospital NHS Trust team implemented a web-based outpatient consultations service for diabetes patients. The team offered online consultations via webcam to patients under the care of one consultant and one specialist nurse, where clinically appropriate and where physical examination was not required. Over the initial reporting period of ten months, 89 patients signed up for web-based consultations, a patient uptake rate of 62%. Patients reported that they preferred webcam consultations to face-to-face appointments, saying that they saved them time, were far more convenient and they were more likely to attend the web consultations. Staff and patients reported that the quality of care over webcam was at least as good as that provided face-to-face. The main reasons given for declining the offer of a webcam appointment were no access to the internet at home (52%); just 'prefer face to face' (18.5%); not confident with the internet / computer (9%).

NHSE have since reported (2016)[14] that since its launch in 2011 the Diabetes web-based follow up is used routinely for young people aged 16-25 years, and 480 webcam appointments have been carried out, reducing 'do not attends' (DNAs) from 30-50 per cent to 16 per cent.

The service is thought to increase productivity and patient throughput by 22% – 28%, saving approximately £27 per consultant appointment in clinician time.

Results indicate that further savings can been made through a reduction in DNAs, better health outcomes and associated decrease in A&E admissions, with increasing use. Patients have made significant savings – impacting upon earnings - and wider societal benefits have also been achieved.

[12] Health Foundation. 2014. *Shine: Improving the value of local healthcare services. How healthcare teams took on the challenge to improve quality while reducing the cost of services. Learning report.* Health Foundation. http://www.health.org.uk/sites/default/files/ShineImprovingTheValueOfLocalHealthcareServices.pdf [Accessed July 2018]

[13] Vijayaraghavan S, Wherton J, Senn S, Byrne E, Greenhalgh T. Web-based Consultations in Diabetes – A Useful Tool for Supporting Patient Self-management? Final Report of DREAMS (Diabetes Review, Education and Management by Skype) Study to Health Foundation. Newham: Barts Health Trust; 2014.

[14] NHSE (2016) https://www.england.nhs.uk/2016/01/newham-diabetes-pilot-scheme/

Implementing Real-Time Video Consultation in Plastic Surgery. (Westra et al., 2015)[15]

The study uses a randomized controlled trial to compare follow-up consultations between traditional and virtual consultation types 6 weeks after surgery. Virtual patients were satisfied with the system and experienced less time taken for the appointment – overall and in terms of waiting time. However, they also found virtual patients reported lower satisfaction in patient-physician communication. Conclusions suggested improving the online communication of physicians through specialist training.

Comparing hospital and telephone follow-up after treatment for breast cancer: randomised equivalence trial (Beaver et al., 2009a, Beaver et al., 2009b)[16]

A two centre randomised equivalence trial randomised participants to telephone follow-up by specialist nurses or standard hospital follow-up. Of the 2542 patients assessed for eligibility and identified as a routine breast cancer follow up, 1646 patients did not meet the inclusion criteria. 374 were willing to participate in the study; 183 participants were randomised to hospital and 191 to telephone follow-up. The mean time patients remained in the study was 24 month (range 2-43 months). Analysis found that the women in the telephone group were no more anxious than the face-to-face follow-up and overall reported higher levels of satisfaction than those attending hospital clinics. Economic evaluation found patients who had telephone follow-up had approximately 20 per cent more consultations (634 versus 524), the duration of telephone consultations was longer and the frequent use of junior medical staff in hospital clinics resulted in higher routine costs for telephone follow-up. No significant differences were found in the costs of treating recurrence. The authors concluded that telephone follow-up for breast cancer may reduce the burden on busy hospital clinics but will not necessarily lead to cost or salary savings.

A virtual outpatient department provides a satisfactory patient experience following endoscopy (Ryan et al., 2014)[17]

An Irish case study reports on telephone follow-up of post-endoscopy patients as an alternative to attendance at an outpatient department. Patients contacted 10-14 days after their endoscopy via a

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[15] Westra I, Niessen FB. Implementing real-time video consultation in plastic surgery. Aesthetic Plast Surg 2015;39:783–90. https://doi.org/10.1007/s00266-015-0526-4

[16] Beaver, K., et al. 2009a. Economic evaluation of a randomized clinical trial of hospital versus telephone follow-up after treatment for breast cancer. *The British journal of surgery,* 96**,** 1406-15.
Beaver, K., et al. 2009b. Comparing hospital and telephone follow-up after treatment for breast cancer: randomised equivalence trial. *British Medical Journal,* 338.

[17] Ryan, M., et al. 2014. A virtual outpatient department provides a satisfactory patient experience following endoscopy. International journal of colorectal disease, 29**,** 359.

weekly phone clinic. Over a ten week period 166 patients underwent endoscopy of which 79 (47.6%) were deemed suitable for virtual outpatient (VOPD) follow-up. The remaining 52.4% (87 patients) were excluded due to established criteria: not low risk (45), incomplete exam (29), or patient preference (14). Overall, 84.8% (67/79) of patients recruited to VOPD follow up were successfully followed up, 11.4% (9/79) were contacted by mail, and 3.8% (3/79) were brought back to the outpatient department. Patients recruited to VOPD follow up tended to be significantly younger than those who were not (558.2 versus 60.78, p=0.029), and have normal test results (49.4 versus 31.0, x^2=5.070, p=0.025). Patient questionnaires were completed by 74.6% of patients followed up by telephone (50/67). Overall patients were satisfied with the VOPD experience. The authors recognise that practical issues such as patients with a language barrier or mild cognitive impairment may arise with the implementation of a VOPD.

Nurse-led urology telephone clinic, Salisbury Foundation Trust (Calkin, 2013) [18]

The introduction of a nurse-led telephone clinic for follow up urology appointments is reported to have saved more than 200 hospital attendances a year at Salisbury Foundation Trust.

Telephone Clinics in Follow Up of Renal Transplant Recipients, University Hospital of Coventry and Warwickshire (Centre for Sustainable Healthcare) Patients are offered the choice to remain in the traditional follow up system or switch to quarterly telephone clinic follow up, with just one annual traditional ('face-to-face') outpatient appointment at their local renal clinic. In preparation for a telephone consultation, patients undertake their blood tests in the normal way (at UHCW this entails visiting either their GP, one of four local hospitals, or the city centre phlebotomist service). Patients are also asked to provide up-to-date blood pressure and weight readings (which can either be taken at home or at the Family Practice). Cancer follow-up, Barts Health Trust Hollins et al. (2014b)

Telephone follow-ups for breast and testicular cancer patients in their homes rather than clinic are part of Barts Health Trust plans to streamline its outpatient pathway.

In conclusion, the evidence review has highlighted where alternatives to traditional face to face consultations have previously been implemented in clinical settings. It can be seen that there are a number of specialties where the use of technologies such as skype may be suitable for outpatient appointments. These will now be used to inform the model to estimate the potential impact of the shift for the West Midlands. In addition to this, the proportions of patients that were found eligible for virtual online consultations in the studies will be used to inform the socio-economic analysis.

[18] Calkin, S. 2013. Nurse-led clinic cuts follow up urology visits. *Nursing times*.

However, it is important to highlight the limitations in the previous studies and therefore the reliability of the information derived.

The Strategy Unit.

Strategy Unit
Tel: 0121 612 1538
Email: strategy.unit@nhs.net
Twitter: @strategy_unit

NHS
Midlands and Lancashire
Commissioning Support Unit