## Implementation Costs of a Cataract Decision Aid

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**A health economic analysis of Involve-CAT**

Implementing the clinical decision aid (CDA) to help patients decide whether to have cataract surgery could have resource implications for the NHS. The additional resource is the time taken to collect data needed for the CDA and administer it during the shared decision making (SDM) discussion and subsequent impact on discussions in the remaining appointment. There is also the potential for the CDA to impact the number of patients choosing to have surgery and, if it affects the risk profile of patients having surgery, the healthcare use following surgery (e.g. A&E visits). This analysis compares the additional resources incurred as a result of implementing the CDA compared to standard care in the INVOLVE-CAT pilot RCT study.

***Methods***

The aim was to estimate the difference in costs between participants receiving standard care and those receiving the CDA. Costs of the CDA intervention were assumed to comprise the clinician time spent conducting the clinic appointment and associated assessments.

Resource use

*Clinic appointment*

Data were obtained from participants’ CRFs. The start and end time of each stage of the appointment were recorded on the CRF by the clinicians undertaking the research assessment and clinical assessment appointment. Figure 1 presents the times that were recorded, what each stage involved and the resulting durations that were calculated. The primary outcome of the analysis is highlighted in yellow. The CDA could impact the remaining appointment after the SDM, thus the primary analysis compares the difference in costs incurred from the start of the SDM to the end of the appointment. Costs were obtained from the Personal Social Services Research Unit (PSSRU). The cost per minute of the clinician’s time was calculated and used to estimate the total resource use for each participant’s clinic appointment. The clinical assessment and SDA were predominantly led by consultant ophthalmologists.

The CDA required an additional assessment of near vision. This was not recorded in CRFs. Two optometrists recorded how long the assessment of near vision took for a subset of patients in the CDA arm and calculated the mean time. Secondary analysis included the cost of this additional near vision assessment.

*Additional resource use*

Resource utilisation data was obtained from the hospital records of participants from one centre. Data included day case and inpatient admissions, post-operative appointments and location, A&E attendances and outpatient appointments.

**Appointment start time**

Research appointment and first contact with clinical team

* Demographics
* Visual function assessment
* Medical history (including ocular)
* Eligibility assessment for surgery and randomisation

**Clinician assessment start time**

* Anterior segment exam
* Fundus examination

**Shared decision-making start time**

* CDA or standard care discussion

**Shared decision-making end time**

* Shared decision-making outcome and calculator results

**Appointment end time**

Total appointment duration

Clinical assessment to end of appointment

SDM duration

SDM to end of appointment

*Figure 5 Recording of times and durations calculated*

Analysis

Cost differences between study arms were assessed using two-sample t-tests. The primary analysis evaluated the cost of the CDA and impact on subsequent discussions only. Secondary analysis included an estimated cost of undertaking a near vision assessment in the CDA arm. Frequencies were calculated for the additional healthcare resource use. Although the CDA might influence the decision to have surgery, in fact all patients in both arms of the pilot study elected to have cataract surgery. We report healthcare use for the cataract procedure and subsequent healthcare by arm, but do not provide a comparison of costs.

***Results***

Appointment duration

Table 1 reports statistics describing the duration of selected stages of the appointment. The mean duration was longest in the CDA arm for all intervals reported. Standard deviations were larger in the CDA arm due to one SDM discussion lasting 80 minutes. Regardless, median times in the CDA arm were also longer. Data for SDM discussion duration was missing for two participants in the standard care arm.

*Table 3 Appointment duration descriptive statistics*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | ***Arm*** | |  |
|  |  | ***CDA*** | ***Standard Care*** | ***Total*** |
| ***SDM to end of appointment (minutes)*** | *N* | *20* | *20* | *40* |
| *Mean (SD)* | *29.0 (18.1)* | *21.0 (5.7)* | *25.0 (13.9)* |
| *Median* | *29.5* | *20* | *21* |
| *Minimum* | *5* | *12* | *5* |
| *Maximum* | *88* | *31* | *88* |
| ***SDM duration (minutes)*** | *N* | *20* | *20* | *40* |
| *Mean (SD)* | *16.9 (16.8)* | *8.6 (4.1)* | *12.7 (12.8)* |
| *Median* | *12.5* | *8* | *9* |
| *Minimum* | *4* | *3* | *3* |
| *Maximum* | *80* | *18* | *80* |
| ***Clinical assessment to end (minutes)*** | *N* | *20* | *22* | *42* |
| *Mean (SD)* | *46.3 (32.4)* | *27.4 (8.0)* | *36.4 (24.7)* |
| *Median* | *41* | *26.5* | *30* |
| *Minimum* | *11* | *15* | *11* |
| *Maximum* | *155* | *50* | *155* |

Two optometrists recorded how long the assessment of near vision took for a subset of patients in the CDA arm. The mean duration of the two assessors was 2.6 minutes (156 seconds) (Table 2).

*Table 4 Assessment of near vision estimates*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | ***Number of patients assessed*** | ***Mean duration***  ***(seconds)*** | ***Minimum duration (seconds)*** | ***Maximum duration (seconds)*** |
| ***Optometrist 1*** | *5* | *252* | *180* | *300* |
| ***Optometrist 2*** | *6* | *60* | *40* | *80* |

Unit cost data

The duration of each appointment was combined with unit cost data to estimate the resource use for each participant. Unit costs are reported in Table 3. The assessment of near vision was conducted by a Band 7 optometrist. This assessment is not usually conducted in usual care, so costs were only applied to the CDA arm. A nurse assistant (Band 3) or nurse (Band 5/6) are also able to conduct this assessment.

Hospital optometrists are not included in the PSSRU costs. Cost per minute of a Band 7 radiographer’s time is therefore used in its absence.

*Table 5 Unit costs*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ***Resource*** | ***Cost per hour (£)*** | ***Cost per minute (£)*** | ***Notes*** | ***Source*** |
| ***Consultant ophthalmologist*** | *108* | *1.80* | *Consultant medical hospital doctor* | *PSSRU, 2018* |
| ***Optometrist*** | *57* | *0.95* | *Cost of a Band 7 radiographer* | *PSSRU, 2018* |

Analyses of costs

The mean total costs associated with NHS resource use and used in the primary analysis are reported in Table 4. Mean cost for the CDA arm was £52.20, which was not significantly different than standard care (mean £37.80, difference £14.40, p=0.06).

*Table 6 Costs of healthcare resource use – Primary analysis*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | ***Arm*** | |  | ***95% confidence intervals*** | |  |
|  | ***CDA (£)***  ***Mean (SD)*** | ***Standard care (£)***  ***Mean (SD)*** | ***Difference (£)*** | ***Upper CI*** | ***Lower CI*** | ***p- value of t-test*** |
| ***SDM start to end of appointment*** | *52.20 (32.63)* | *37.80 (10.19)* | *14.40* | *-1.06* | *29.88* | *0.06* |

Table 5 reports secondary analysis which includes the estimated cost of the assessment of near vision. Total mean costs were significantly larger in the CDA arm (difference £16.87, p=0.03).

*Table 7 Costs of healthcare resource use - Secondary analysis*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | ***Arm*** | |  | ***95% confidence intervals*** | |  |
|  | ***CDA (£)***  ***Mean (SD)*** | ***Standard care (£)***  ***Mean (SD)*** | ***Difference (£)*** | ***Upper CI*** | ***Lower CI*** | ***p- value of t-test*** |
| ***SDM to end of appointment and near vision assessment*** | *54.67 (32.63)* | *37.8 (10.19)* | *16.87* | *1.39* | *32.35* | *0.03* |

Additional resource use

Table 6 reports healthcare resource use following the clinical assessment appointment. Data was obtained from clinical records and pertains to 23 participants from one participating site. Data is summarised as the total number of healthcare contacts in each arm. One patient had surgery on both eyes within the duration of the study. Some patients had two post-operative visits and some post-operative appointment data was missing. One patient attended for surgery but was rescheduled, returning at a later date. The initial appointment is not included. There is little difference between study arms, although the CDA had fewer eye-related outpatient appointments.

*Table 8 Subsequent healthcare resource use*

|  |  |  |  |
| --- | --- | --- | --- |
|  | ***CDA N=11*** | ***Standard Care N=12*** | ***Total N=23*** |
| ***Cataract operations (total)*** | *11* | *13* | *24* |
| ***Community post-operative appointment (total)*** | *9* | *7* | *16* |
| ***HES post-operative appointment (total)*** | *3* | *4* | *7* |
| ***Outpatient optical appointments (total)*** | *2* | *5* | *7* |
| ***Outpatient other speciality (total)*** | *5* | *5* | *10* |
| ***A&E attendances (total)*** | *3* | *2* | *5* |

***Conclusion***

Including the CDA in a cataract surgery SDM discussion does increase NHS costs, although costs were not significantly greater than standard care. Including an assessment of near vision conducted by an optometrist has the impact of making the CDA significantly more expensive, however. The estimated time to conduct the near vision assessment was widely disparate between the two assessors, therefore its accuracy is uncertain. Furthermore, in the Involve-CAT study optometrists conducted the assessment, whereas in practice nurses or nurse assistants could administer it.