Economic evidence analysis for review question: B.1a What physical rehabilitation interventions are effective and acceptable for adults with complex rehabilitation needs after traumatic injury?

Introduction - objective of economic modelling

The committee considered the cost-effectiveness of intensive rehabilitation for people with complex traumatic injuries as an area of great importance. There was no existing economic evidence on the cost-effectiveness of intensive rehabilitation in people with complex traumatic injuries. Therefore, an exploratory economic analysis was undertaken to assess the potential cost-effectiveness of providing an intensive rehabilitation programme.

Interventions assessed

There was no evidence on the effectiveness of intensive rehabilitation in the guideline systematic review. As a result, the committee provided information on three intensive rehabilitation programmes that informed the economic model. Programme 1 (P1) and 2 (P2) were complex musculoskeletal, level two rehabilitation services, funded by Clinical Commissioning Groups. The private provider provided P1 with the NHS contract, and NHS provided P2. Both programmes aimed to promote a return to functional living and work and help reduce trauma's long-term impact. P1 was provided in a 24-bed unit with no information as to its content. P2 had the same staffing/programme set up as a prosthetic rehabilitation service and included daily rehabilitation (i.e. Monday to Friday 10 am - 3 pm) and included one to one and group physiotherapy, occupational therapy (OT), psychologist, and orthotics sessions. It also included group exercise classes. The participants had access to a gym for independent exercises and access to facilities to practice daily living activities such as kitchen, bathroom, and car. This programme was provided in an outpatient setting with hotel accommodation. Both programmes were delivered over a 3-week period.

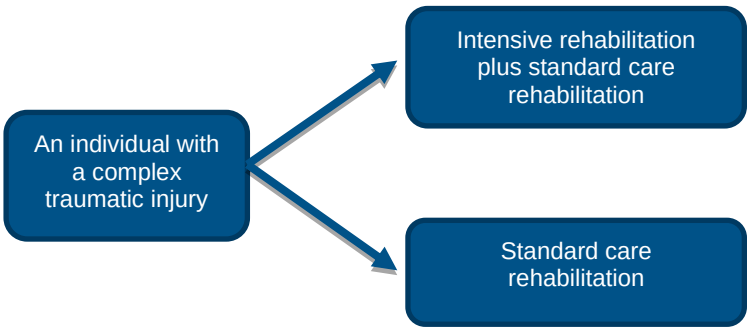
The committee also provided information on the police outpatient intensive rehabilitation programme (P3). P3 was mainly a physical rehabilitation programme to maximise patients' outcomes of improved health and fitness and expedite their return to police work. P3 was delivered over a 2-week period and included physiotherapy, hydrotherapy, back school and pain lectures, and one-to-one gym rehabilitation. The frequency of sessions varied.

Services gave the above intensive rehabilitation programmes in addition to standard care (SC) rehabilitation. The model considered SC rehabilitation-only as a comparator.

Economic modelling

A simple decision tree model was constructed using Microsoft Office Excel 2016. According to the model structure, an individual with complex rehabilitation receives either intensive rehabilitation with SC or SC rehabilitation only. The model was unable to consider individual health states, i.e. fully recovered, partially recovered etc. However, the effectiveness review identified 1 study that reported the average health-related quality of life scores in individuals who have undergone a rehabilitation programme. The analysis utilised these mean quality of life scores to estimate quality-adjusted life-year (QALY) gains due to intensive rehabilitation happening over a shorter time and recovery starting sooner. The time horizon was guided by clinical data availability (i.e. health-related quality of life scores) and was 3 years. A schematic diagram of the model is presented in Figure 4.

Figure 4: Schematic diagram of a decision tree model constructed for the assessment of the relative cost-effectiveness of intensive rehabilitation for individuals with complex rehab needs.



Costs and outcomes considered in the analysis

The economic analysis adopted the perspective of the National Health Service (NHS) and personal social services (PSS), as recommended by (NICE 2014).

Costs consisted of intervention costs only. The committee discussed the importance of other health and care costs. For example, the committee noted that intensive rehabilitation would reduce primary care visits, outpatient visits, hospital admissions, A&E attendances, etc. The committee could not identify relevant cost data sources to support their inclusion.

The committee discussed the relevance of care costs in this population. The committee was of a mixed view. The committee explained that care costs might be only relevant in individuals with spinal cord injuries (SCI) and the elderly. It would be not unusual for a hip fracture to trigger care costs in older individuals. The committee also explained that mainly family members provide informal care in this population. Nevertheless, a sensitivity analysis was undertaken to explore the impact of including care costs in the analysis. Lynne-Stoked (2015) explored the cost-effectiveness of rehabilitation in individuals with complex neurological disability. The study reported care costs for different levels of dependency. The low dependency group comprises the least severe individuals with admission Northwick Park Dependency (NPDS) score < 10. The NPDS tool provides an assessment of patient care needs. It is an ordinal scale incorporating activities of daily living, safety awareness, behavioural management and communication. Individuals with NPDS < 10 were largely independent for basic self-care and provided a reasonable proxy of care needs in people with complex rehabilitation needs, where such costs are relevant.

The measure of outcome was the QALY. A discount rate of 3.5% was used for all future costs and outcomes (NICE, 2014).

Clinical input parameters

The systematic review has not identified any relevant literature on the effectiveness of intensive rehabilitation. The main benefit of intensive rehabilitation is that it is of a shorter duration, is more intense, and benefits start accruing quicker. For example, clinicians would give intensive rehabilitation over 3 weeks, whereas SC rehabilitation would be spread out over 15 months. In the base-case analysis, the model assumed that intensive rehabilitation would be initiated at the same time as standard care rehabilitation.

The committee explained that intensive rehabilitation would be initiated only in a small proportion of individuals with the most severe injuries and complex needs, and the timing will depend on factors such as weight-bearing, psychological state, number and pattern of injuries, immobilisation period, healing rate, an individual is returning to work or a higher-level function. The sensitivity analysis explored the impact of different starting points of intensive rehabilitation relative to SC rehabilitation.

Utility data and estimation of QALYs

To express outcomes in the form of QALYs, utility scores were required. Utility scores represent the health-related quality of life (HRQoL) associated with specific health states on a scale from 0 (death) to 1 (perfect health); they are estimated using preference-based measures that capture people's preferences on the HRQoL experienced.

NICE recommends the EuroQol five dimension questionnaire (EQ-5D) (Brooks 1996) as the preferred measure of HRQoL in adults for use in a cost-utility analysis. The standard version of the EQ-5D has not been designed for use in children. As a result, alternative standardised and validated preference-based measures of health-related quality of life that have been designed specifically for use in children can be considered (NICE, 2013).

Monticone (2018), an RCT (N=52) included in the guideline systematic review, reported Short-Form 36 (SF-36) scores in individuals with a hip fracture and complex rehabilitation needs. This was the only RCT included in the systematic review that reported usable data. The committee acknowledged that even though a hip fracture population may not be the best proxy, it would provide a conservative estimate of improvements in health-related quality of life expected in individuals who have the most severe injuries and complex needs and would be eligible for an intensive rehabilitation programme. The intervention in this RCT comprised balancing exercises, 5 x 90 minute individually performed sessions per week for 3 weeks. The sessions involved balance task-specific proprioceptive balancing exercises and walking on a rectilinear trajectory with or without. The intervention also included the exercises designed to replicate everyday activities such as climbing stairs or avoiding obstacles. The standard physiotherapy group comprised general physiotherapy exercise sessions, 5 x 90 minutes individually performed sessions per week for 3 weeks. Sessions involved open kinetic chain exercises to improve the range of hip motion, increase hip and lower limb muscle strength, and maintain the length and elasticity of thigh tissues. All participants received walking training and an ergonomic advice booklet. The study reported SF-36 scores at baseline, at the end of treatment, and 12-month follow-up for both intervention and SC groups. The SF-36 scores were transformed into EQ-5D-3L scores using a published algorithm (Ara 2008). Ara 2008 reported a number of different models that could be used to convert between SF-36 and EQ-5D-3L. However, their conclusion was that there was very little to choose between the goodness of fit and the accuracy of the predictions generated by the various models presented, and based on validations, they advocated EQ (1) model as the first choice, and this was the model used in this analysis. The committee reviewed the converted scores and explained that the intervention group's improvements were more representative of the improvements observed in their practice. The scores in the control group were used as part of the sensitivity analysis.

Kruithof 2020 undertook a prospective multicentre non-randomised study to examine health status and psychological outcomes after trauma. The study included 4,883 individuals with various injuries, including pelvic injury; hip fracture; tibia, complex foot and femur fracture; traumatic brain injury; thoracic injury; rib fracture. The study reported EQ-5D-3L scores at baseline, end of treatment, and also follow-up. These scores were used as part of a sensitivity analysis.

In the model, individuals were modelled to start at a baseline health-related quality of life in both groups. In the intensive rehabilitation group, individuals were modelled to improve from baseline to the end of treatment health-related quality of life over the duration of an intensive rehabilitation (i.e. 3 weeks). Following this, individuals were modelled to improve from the end of treatment to 12-month follow-up health-related quality of life. From then on, individuals were modelled to remain at a follow-up health-related quality of life for the model's duration.

In the SC group, individuals were assumed to move from baseline to the end of treatment health-related quality of life over the duration of SC rehabilitation (i.e. 15 months). Following this, individuals were modelled to move from the end of treatment to the 12-month follow-up

health-related quality of life. From then on, individuals were modelled to remain at a follow-up health-related quality of life for the model's remainder duration.

Relative effectiveness

Since there was no evidence on intensive rehabilitation's relative effectiveness plus SC (versus SC only), the analysis used the committee expert opinion to approximate this. The committee explained that they would expect at least a 5% improvement in health-related quality of life scores with intensive rehabilitation plus SC (vs SC only). The sensitivity analysis assessed the impact of varying this assumption. The UK general population norm EQ-5D-3L score was used as a ceiling value (i.e. the health-related quality of life scores were varied up to a level of approximately 0.857).

Cost data

An intensive rehabilitation programme costs were estimated based on the committee's cost data on musculoskeletal and police rehabilitation and are summarised in Table 78.

The committee explained that the costs for P3 do not include costs associated with psychological support. Consequently, this cost was topped up with the counsellor input. The model assumed that, on average, an individual would require 6 sessions. The NHS Band 7 worker's unit cost is £56 per client hour (Hospital-based scientific and professional staff, Curtis & Burns, 2019). The committee also explained that intensive rehabilitation is most likely to be provided by one provider for the region (e.g. major trauma centre for their trauma network). Individuals will either have to commute for their rehabilitation or stay in hotel accommodation nearby for the programme's duration. Modelling assumed that individuals would stay in hotel accommodation at the cost of £68 per night. The hotel's cost was based on the accommodation provided by a rehabilitation programme identified through an online search. The inflated cost of programme P3 will be referred to as P4.

The intervention cost of standard care was zero, given that it was administered in both arms.

In the sensitivity analysis, care costs were estimated by combining the hours of care reported in Lynne-Stokes (2015) with a relevant unit cost. According to the study, the care hours per week were 15.9 at admission. The care hours were combined with national unit cost data for daycare for adults requiring physical support (age 18-64), estimated at £20 per client hour (Curtis & Burns, 2019). Based on the committee expert opinion, the probability of care costs in this population was 0.05. In the intensive rehabilitation programme, group care costs were assumed to be incurred during the rehabilitation programme (i.e. 3 weeks) and 3 months following the discharge. In the standard care group, the care costs were assumed to be incurred for the standard care rehabilitation duration (i.e. 15 months). Sensitivity analysis varied assumptions on care costs.

Due to the lack of suitable data, the analysis has not considered other health and care costs.

Table 78: The mean (deterministic) values of all input parameters used in the economic model.

Input parameter	Deterministic / mean value	Source of data – comments
Percent improvement in the end of treatment and follow-up health-related quality of life scores with intensive rehabilitation	5%	Committee expert opinion
Utilities (annual)		
Base-case analysis		

Input parameter	Deterministic / mean value	Source of data – comments
Baseline EOT FU	0.317 0.674 0.798	Monticone 2018, RCT, Italy, intervention group scores. SF-36 scores were converted to EQ-5D-3L using a published algorithm by Ara (2008). For the baseline, a more conservative estimate of the two groups was used, i.e.intervention group.
Sensitivity analyses		
Baseline EOT FU	0.317 0.479 0.501	Monticone 2018, RCT, Italy, control group scores. SF-36 scores were converted to EQ-5D-3L using a published algorithm by Ara (2008). For the baseline, a more conservative estimate of the two groups was used, i.e.intervention group.
Baseline EOT FU	0.490 0.560 0.760	Kruithof 2020, a prospective multicentre non-randomised study, Netherlands, N=4883. The study examined health status and psychological outcomes after trauma including pelvic injury, hip fracture, tibia, complex foot and femur fracture, traumatic brain injury, thoracic injury, rib fracture, etc.
Rehabilitation programme costs per patient		
P1 – inpatient rehabilitation	£10,542	Information provided by the Committee. Complex musculoskeletal rehabilitation service, 24 bedded unit (private provider with the NHS contract); activity was level 2 rehabilitation, Clinical Commissioning Group (CCG) funded. The purpose was return to functional / work and help reduce the long-term impact of trauma.
P2 – inpatient rehabilitation	£9,912	Information provided by the Committee. Complex musculoskeletal rehabilitation service provided within same staffing / programme as prosthetic rehabilitation service (NHS provider). Activity was level 2 rehabilitation, CCG funded. The purpose was return to functional living / work and help reduce the long term impact of trauma. The programme included daily rehabilitation, Monday to Friday, 10 am to 3pm. It included one to one therapy sessions including physiotherapy, occupational therapy, psychology, and orthotics. Group therapy sessions and group exercise classes. Individuals also had access to gym for independent exercises, access to facilities to practise activities of daily living e.g. kitchen, bathroom, car. The cost included accommodation (hotel services).
P3 - outpatient rehabilitation	£1,118	Information provided by the Committee. Physical rehabilitation programme focussing on improved health and fitness. The purpose was to expedite the return, of ill and injured individuals to work. The frequency of sessions varied i.e. some individuals didn't need seeing every day but other individuals required to be seen for longer periods or two to three times a day. The programme included physiotherapy, hydrotherapy, back school and pain lectures, and individual one to one gym rehabilitation sessions. The programme was delivered over a 2-week period.
P4 - outpatient rehabilitation (P3), plus counselling, plus	£2,882	Same as P3 (above), plus counselling delivered by Band 7 NHS worker, at £56/hour (Curtis & Burns, 2019). It was modelled that individuals will have 6

Input parameter	Deterministic / mean value	Source of data – comments
accommodation costs		therapy sessions. Cost of a hotel accommodation was included at a rate of £68/night for the duration of the rehabilitation programme.
Care costs	£318	Estimated using care hours reported by Lynne-Stokes (2015). Care hours were assigned the unit cost of £20/hour (Day care for adults requiring physical support (age 18-64), Curtis & Burns 2019). In the intensive rehabilitation programme group care costs were assumed to be incurred during the rehabilitation programme (i.e. 3 weeks) and for 3 months following the discharge. In the standard care group, the care costs were assumed to be incurred for duration of the standard care rehabilitation (i.e. 15 months). Care costs were varied in the sensitivity analysis.
Probability of requiring care / incurring care costs	0.00 in the base case, 0.05 in sensitivity analyses	The committee expert opinion. Care costs were included only during the duration of active rehabilitation.
Discount rate for costs and outcomes	3.5%	As per NICE guidelines manual (NICE, 2014)

Data analysis and presentation of results

Only a deterministic analysis was undertaken, where data are analysed as point estimates; results are presented as mean total costs and QALYs associated with each option are assessed. Relative cost-effectiveness between alternatives was estimated using incremental analysis, and incremental cost-effectiveness ratios (ICERs) were calculated. ICERs expressed the additional cost per additional unit of benefit (i.e. QALY) associated with one option relative to its comparator. Estimating such a ratio allowed consideration of whether the additional benefits were worth the additional cost when choosing an option. The option with the highest ICER below the cost-effectiveness threshold was deemed to be the most cost-effective option.

One-way sensitivity analyses explored the impact of varying:

The cost of an intensive rehabilitation programme

The utility values

The duration of an intensive rehabilitation programme

The duration of standard care rehabilitation

The start of an intensive rehabilitation programme

The care costs

Economic modelling results

Under the base-case assumptions (i.e. using Montecorne 2018 intervention arm utility values, assuming 5% improvement in utility values [vs. SC], assuming that an individual is initiated on intensive rehabilitation at the start of their rehabilitation journey) the ICER ranged from £2,600/QALY for P3 to £24,900/QALY for P1. The results are summarised in Table 79.

As expected, in the scenario where no assumptions are made about the relative improvement in health-related quality of life scores in the intensive rehabilitation group (vs SC), the ICERs are less favourable and ranged from £3,500/QALY for P3 to £33,300/QALY for P1. In this scenario, benefits are only due to intensive rehabilitation being of shorter duration and benefits starting to accrue sooner.

Based on the committee expert opinion, an intensive rehabilitation programme's duration could be 2 weeks (base-case 3 weeks). The impact of varying this model input was negligible, with ICERs remaining largely unchanged.

The committee advised that SC rehabilitation duration could be anywhere between 12-24 months (base-case 15 months). Assuming the lower end of the estimate, as expected, the ICERs were slightly less favourable and ranged from £2,900/QALY for P3 to £27,700/QALY for P1. Modelling, the upper-end estimate of 24 months the ICERs ranged from £1,700/QALY for P3 to £15,900/QALY for P1. Related to this, one of the main assumptions was that it takes 60 weeks for people receiving standard care rehabilitation to achieve the same health-related quality of life as people in the intensive rehabilitation group achieve in 3 weeks. By varying the duration of standard care rehabilitation, it was found that outpatient rehabilitation (P3) remained potentially cost effective with an ICER < £20,000 per QALY gained at all times. However, the duration of standard care rehabilitation needs to be at least 80 weeks for an ICER of inpatient rehabilitation (P1) to be below the lower NICE cost-effectiveness threshold of £20,000 per QALY gained and 47 weeks for an ICER to be below the upper NICE cost-effectiveness threshold of £30,000 per QALY gained.

The committee advised that care costs may be applicable only for a small proportion of individuals (i.e. 5%). Including care costs had a negligible impact and the ICERs remained largely unchanged.

The model was sensitive to assumptions about health-related quality of life scores. The base-case analysis used utility scores from Monetcorne 2018 intervention arm. Using the same study's utility scores from the control arm (i.e. conservative estimate) has resulted in substantially higher ICERs. The ICERs ranged from £6,300/QALY for P3 to as much as £59,500/QALY for P1. Similarly, using the utility values from Kruithof 2020 resulted in slightly higher ICERs, which ranged from £3,200/QALY for P3 to £30,600/QALY for P1.

Table 79: Summary of incremental cost-effectiveness ratios (ICERs) of intensive rehabilitation programmes under various scenarios.

Scenario	ICER of P1 plus SC vs. SC only	ICER of P2 plus SC vs. SC only	ICER of P3 plus SC vs. SC only	ICER of P4 plus SC vs. SC only
5% improvement in utility values (vs. SC) – base-case*	£24,900	£23,400	£2,600	£6,800
5% improvement in utility values (vs. SC) – no discounting	£23,600	£22,200	£2,500	£6,400
0% improvement in utility values (vs. SC)	£33,300	£31,300	£3,500	£9,100
5% improvement in utility values (vs. SC), 2 wks. duration of intensive rehabilitation (base-case 3 wks.)	£24,500	£23,300	£2,600	£5,600
5% improvement in utility values (vs. SC), 12 mos. duration of SC (base-case 15 mos.)	£27,700	£26,000	£2,900	£7,600
5% improvement in utility values (vs. SC), 24 mos. duration of SC (base-case 15 mos.)	£15,900	£15,000	£1,700	£4,400
5% improvement in utility values (vs. SC), plus care costs	£22,800	£21,300	£600	£4,700
5% improvement in utility values (vs. SC), plus Montecorne 2018 control arm utility values	£59,500	£55,900	£6,300	£16,300
5% improvement in utility values (vs. SC), plus Kruithof 2020 utility values	£30,600	£28,800	£3,200	£8,400

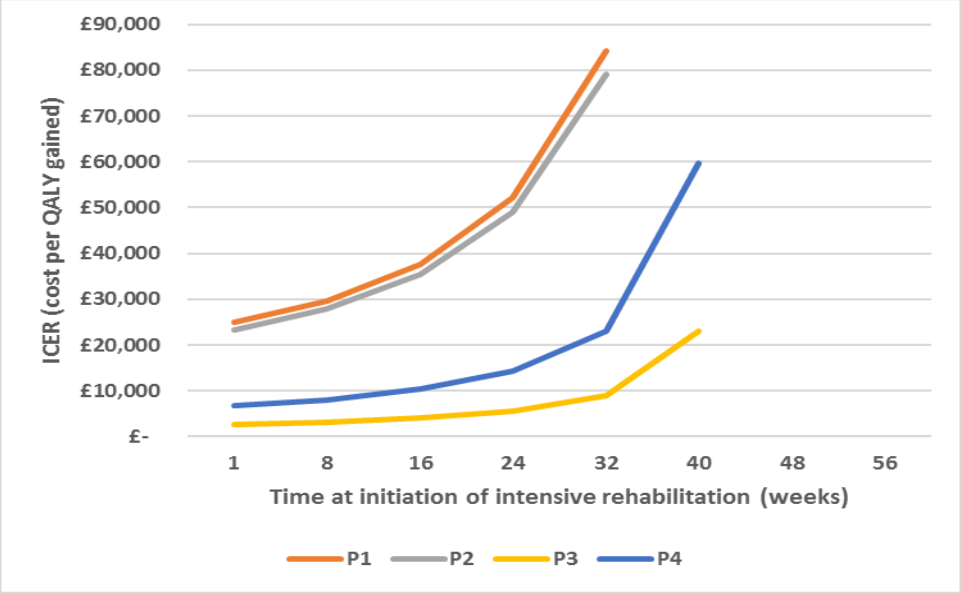
ICER: incremental cost-effectiveness ratio; P1: inpatient intensive rehabilitation (muscoleskeletal service 1); P2: inpatient intensive rehabilitation (muscoleskeletal service 2); P3: outpatient intensive rehabilitation (police physical rehabilitaion); P4: outpatient intensive rehabilitation (police physical rehabilitaion plus psychological support and travel/accommodation costs); SC: standard care

**Base-case: Monetcorne 2018 intervention arm utility values; 5% improvement in utility values for intensive rehabilitation (vs. SC); 3 wks. duration for intensive rehabilitaion; 15 months. duration for SC rehabilitation; no care costs; an individual is initiated on intensive rehabilitation at the start of their rehabilitation journey; discounting applied to costs and outcomes*

The committee explained that clinicians could initiate intensive rehabilitation anywhere along an individual's rehabilitation pathway. A further sensitivity analysis explored how changing intensive rehabilitation's starting time (relative to SC) affected its cost-effectiveness (Figure 5).

The sensitivity analysis showed that if P1 or P2 is initiated later than 8 weeks into individual's rehabilitation journey the ICERs are above NICEs upper threshold of £30,000/QALY. Similarly, if P3/P4 is initiated later than 30 weeks into individual's rehabilitation journey the ICERs are above NICEs upper threshold of £30,000/QALY. To initiate intensive rehabilitation beyond these cut-offs there is a need for more robust data on effectiveness and long-term costs to show that such an approach to rehabilitation represents a cost-effective use of scarce NHS resources.

Figure 5: Sensitivity analysis – time at initiation of an intensive rehabilitation programme



Abbreviations: P1: inpatient intensive rehabilitation (muscoleskeletal service 1); P2: inpatient intensive rehabilitation (muscoleskeletal service 2); P3: outpatient intensive rehabilitation (police physical rehabilitaion); P4: outpatient intensive rehabilitation (police physical rehabilitaion plus psychological support and travel/accommodation costs)

The analysis also modelled that individuals improve from baseline to the end of treatment health-related quality of life throughout their rehabilitation, i.e. 3 weeks and 60 weeks for intensive rehabilitation and standard care rehabilitation, respectively. Following this, individuals in both groups were modelled to improve from the end of treatment health-related quality of life to 12-month follow-up health-related quality of life, i.e. it takes 12 months post-intervention to fully recover, regardless of the intervention's initial duration. As a result, of this assumption, it would have taken a relatively long time for people in standard care arm to recover fully. To test this assumption, the sensitivity analysis was undertaken where it was modelled that people in standard care arm following the end of rehabilitation fully recover straightaway after the end of treatment, i.e. 60 weeks. The conclusions remained unchanged, with the ICERs slightly less favourable, i.e. £3,000/QALY for P3 and £28,800/QALY for P1.

Discussion – limitations of the analysis

The analysis results suggested that intensive rehabilitation could be cost-effective under certain assumptions, mainly if initiated early in an individual's rehabilitation journey and in an outpatient setting.

Providing intensive rehabilitation later along a patient's rehabilitation pathway reduces the potential for an intensive rehabilitation programme since standard care rehabilitation would have generated some benefits already. However, the committee explained that standard care physiotherapy over 1 year doesn't achieve what intensive rehabilitation does in 3 weeks. The committee member with an experience of trauma explained after 1 year of standard care physiotherapy, she was still using a wheelchair, and she felt it wasted time. It had a very detrimental effect on her quality of life. The implication of this would be that an individual with standard care physiotherapy is actually lingering at the baseline or only a very slightly higher quality of life level for months. This would mean that no or very minimal gains are achieved with standard care rehabilitation and analysis, where an individual starts at the same baseline quality of life irrespective of when intensive rehabilitation is initiated, may actually be a more representative scenario, i.e. the time at which intensive rehabilitation is initiated does not matter much as no substantial gains are achieved with standard care rehabilitation, for example, an individual who started in a wheelchair is very likely to be in a wheelchair after one year of standard care physiotherapy.

Related to the above, the committee assumed that individuals improve from baseline to the end of treatment health-related quality of life throughout their rehabilitation, i.e. 3 weeks and 60 weeks for intensive rehabilitation and standard care rehabilitation, respectively. Following this, individuals in both groups were modelled to improve from the end of treatment health-related quality of life to 12-month follow-up health-related quality of life, i.e. it takes 12 months post-intervention to fully recover, regardless of the intervention's initial duration. As a result, of this assumption, it would have taken a relatively long time for people in standard care arm to recover fully. To test this assumption, the sensitivity analysis was undertaken where it was modelled that people in standard care arm following the end of rehabilitation fully recover straightaway, i.e. after 60 weeks. The conclusions were unchanged. However, the base case analysis did assume that people improve in standard care arm throughout, but it just takes much longer and is in line with the view that standard care physiotherapy over 1 year doesn't achieve what intensive rehabilitation does in 3 weeks, with people still immobile and using a wheelchair, dependent, and unable to participate in social activities with a detrimental effect on their quality of life.

The committee discussed the applicability of quality of life scores and relatively large observed changes in scores by the end-of-treatment and follow-up. The health-related quality of life scores used in the base case analysis were based on an RCT in individuals with a hip fracture and complex rehabilitation needs (Monticone 2018). This was the only RCT included in the systematic review that reported usable data. The committee acknowledged that even though a hip fracture population may not be the best proxy, it would provide a conservative estimate of improvements in health-related quality of life expected in individuals who have the most severe injuries and complex needs and would be eligible for an intensive rehabilitation programme. This assumption was tested in an extensive sensitivity analysis by using alternative health-related quality of life scores.

The committee explained that individuals eligible for intensive rehabilitation programmes have severe injuries and complex needs and that, in their view, such large changes in health-related quality of life, as reported in Montecorne 2018, are realistic. An example would be when an individual is in a wheelchair when an intensive rehabilitation programme is initiated and comes out running 5k and ready to return to work. The committee explained that intensive rehabilitation could achieve this in 3 weeks if it is timed at the right time. This view was supported by a committee member with experience of trauma and who has received intensive rehabilitation. She explained that that the difference intensive rehabilitation made

was huge and could easily translate to the optimistic quality of life changes observed in Montecorne 2018 and even beyond. Related to this, one of the main assumptions was that it takes 60 weeks for people receiving standard care rehabilitation to achieve the same health-related quality of life as people in the intensive rehabilitation group achieve in 3 weeks. The sensitivity analysis showed that the findings for outpatient rehabilitation were robust o change in this model input. However, the findings for inpatient intensive rehabilitaion were much more sensitive to this model input.

This is an exploratory, simplified analysis characterised by many limitations, including utility scores from a small single study, effectiveness informed by the committee. An alternative scenario was tested where analysis made no relative effectiveness (except for rehabilitation duration differences) assumptions. In this scenario, inpatient intensive rehabilitation was not cost-effective with an ICER just above the NICE upper cost-effectiveness threshold of £30,000/QALY. An outpatient intensive rehabilitation remained potentially cost-effective with an ICER of less than £20,000/QALY. The outpatient programme with additional hotel and psychological support costs were borderline cost-effective using the NICE upper cost-effectiveness threshold.

The committee explained that individuals might require more than one burst of intensive rehabilitation. Given the lack of effectiveness, utility and cost data, it would be extremely challenging to show that such an approach would be cos-effective.

The committee explained that police rehabilitation costs are potentially representative of services delivered with the NHS. However, the committee noted that it was very physiotherapy based. Nevertheless, in the sensitivity analysis where the outpatient rehabilitation programme included psychological support, the results remained unchanged, i.e. it remained potentially cost-effective.

To show that intensive rehabilitation is cost-effective when initiated later on along an individual's rehabilitation journey would require robust effectiveness and cost data, i.e. impact on other health and care costs.

The committee noted that hotel stay costs might not be relevant for all people, reducing intervention cost. The committee referred to an audit of complex trauma people at the major trauma clinic, which found that the mean distance from an individual's home to the tertiary rehabilitation centre was 40-50 miles, with a range of 1-90 miles (the committee private communication). The committee explained that people could travel to a rehabilitation centre from their homes rather than stay at a hotel. However, as an example, an online search of a rehabilitation programme indicated that the recommended hotel by the programme charged approximately £70/night. This would be not much different to a cost of a 40-50 mile round-trip to and from a rehabilitation centre and would not make much difference to the costings.

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