

POSTER 7

Influencing product design

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Introduction & Aims/Objectives

As a wheelchair service team (wheelchair therapists, technical instructors and rehabilitation engineers, clinicians and administrators) we spend a great deal of our time trialling equipment with clients and carers, prescribing equipment and evaluating it for general use. Through this process, on occasion, we identify issues with the equipment and look for an alternative rather than questioning and suggesting changes to improve usage for our clients.

Following is a discussion as to how the Guy's and St Thomas's NHS Foundation Trust Wheelchair Service Team (GSTT WCS) worked with Invacare to bring about some changes to the Ben NG series. The aim of this poster is to show how an individual wheelchair service team, through their knowledge of equipment and user requirements, can work with a manufacturer to bring about design change.

Background and outcome

As a team, GSTT WCS has developed a standard range of equipment from which clinicians can prescribe. This ensures equity of provision, detailed knowledge of the equipment within the range by clinicians with the aim to promote improved prescription, increased ability to refurbish and reuse, and the ability to hold spares which in turn speeds up delivery times and increases client satisfaction. There are also cost benefits as prescription mistakes are often costly.

Prior to introducing new equipment into the range, the team is involved in a formalised evaluation process to ensure that the equipment meets the requirements of the service and its users. This evaluation includes reviewing: safety issues; documentation; features v cost; transportation; warranty; specific issues pertaining to powered wheelchairs; maintenance costs; user / prescriber feedback. A consensus decision is then made either to pursue further evaluation in the community or not to use the equipment. Where the decision is made not to use the equipment, feedback is given to the manufacturer.

The Invacare Ben and Duo wheelchairs were being used by GSTT WCS as the fleet wheelchairs. When the Ben NG series was being introduced, the team undertook an evaluation of the new chairs as described above. Part of this evaluation included a comparison with the existing Ben and Duo.

Following are some of the pros and cons that were identified and fed back to Invacare. In italics are Invacare's responses to the concerns identified:

Ben 9 vs Ben 9 NG

Pros:

- Backrest folding mechanism (Action style) may be more robust than traditional drop catch.
- Available with options – ht adj armrests, ELRs, shortened hangers, ally or plastic footplates, 1¼ or 1¾” castors.

Cons:

- Shorter grip-handle length may be more difficult to hold, and provides less leverage for tipping.
- *Agreed*
- Lower push handle height may be an issue for medium/tall attendants.
- *Agreed*
- No fixed back-post option.
- *There is no fixed back post on either specification*
- Action style brake is lower for attendants to reach and is more likely to loosen/break as attendants regularly use their feet to operate it.
- *Warranty data and reconditioning activity for the Action 3 transit brake and Ben 9 + brakes indicate the Action 3 brake performance is far more reliable. Over 5000 Action 3 transits have been supplied over the last 4 years. There are virtually no complaints regarding its reliability*
- Optional extras increase cost to make this model potentially less economical than alternatives.
- *All option costs for the NG specifications are exactly same as the Ben 9+ and Duo*

Duo vs Ben 9 NG SP

Pros:

- Lighter overall weight than Duo.
- Backrest folding mechanism (Action style) may be more robust than traditional drop catch.
- Available with options – ht adj armrests, ELRs, shortened hangers, ally or plastic footplates, 1¼ or 1¾” castors.

Cons:

- Rear wheel position poor for self-propulsion – behind backrest. No option for active.
- *The rear wheel position is in exactly the same place as the Duo SP in relationship to the back post*
- When block mounted forward:
 - Hole 1: QRW pin fouls on folding mechanism and may disengage QR accidentally.
 - *Possible, in extreme circumstances. This feature is not a part of the product specification, it is only possible to do this as a local modification*
 - Hole 2: Makes wheelchair extremely unstable and brakes cannot be fitted far forward enough on frame.
 - *Agreed, but Invacare have never claimed that this could be done. There are no forward or double forward wheel positions within Duo specification.*
- Rear wheel position far too stable even in standard – extremely difficult for attendant to tip wheelchair, and more difficult to manoeuvre. Tipping places great stress on back post folding mechanism.
- *Conducted various tests and agreed with your findings, but it is the change in seat rake which causes the unacceptability level of stability. When the same seat rake is achieved the NG is easier to tip than the Duo. This is due to the larger wheel being used on the ng specification.*
- Flat seat angle - increases difficulties with over-stability.
- *Agreed. See comments above*

- Limited options for rear wheel size/configuration and therefore seat height.
- *This option will be available. We are testing a new castor. This has delayed the availability of this option.*
- Poor engineering of axle blocks – excessive play in wheels due to lack of locking washer. Likely for bolt hole in frame to distort.
- *This will be improved*
- Overall width ½ cm wider than Duo.
- Optional extras increase cost (including requesting RWSB) to make this model potentially less economical than alternatives.
- *Option costs are exactly same as the Ben 9+ and Duo.*

Discussion

Following this feedback Invacare determined the two main design flaws as being height and length of the push handles, and the seat rake on the self propelling version. Acknowledgement of both of these flaws led to a change in design and a six month delay in the product launch.

What this hopefully demonstrates is that a wheelchair service team working in the field of mobility equipment prescription and provision is able to influence the design of the equipment we issue when we follow an analytical process of evaluation and work in conjunction with manufacturers.

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