

SERVICE EVALUATION

Physiotherapists utilizing diagnostic ultrasound in shoulder clinics. How useful do patients find immediate feedback from the scan as part of the management of their problem?

Gordon Lumsden  | Kerry Lucas-Garner | Sarah Sutherland | Ron DodenhoffShrewsbury and Telford Hospital NHS Trust,
Telford, UK**Correspondence**Gordon Lumsden, Shrewsbury and Telford
Hospital NHS Trust, Apley Castle, Telford TF1
6TF, UK
Email: gordon.lumsden@sath.nhs.uk**Abstract**

Aims: Physiotherapists are beginning to utilize diagnostic ultrasound imaging in upper limb/shoulder clinics. The aim of the present study was to receive feedback on the views of the patients concerning the usefulness of the information obtained immediately from the scan in the management of their problem.

Methods: A questionnaire was offered to all patients attending a physiotherapist-led upper limb/shoulder clinic who underwent ultrasound imaging as part of a shoulder assessment over a 6-month period. A total of 103 patients completed a questionnaire for analysis.

Results: Patients rated the ultrasound scan to be of benefit in all aspects. Regarding the ability to understand their shoulder problem better and in feeling reassured about their problem, 97% of patients either strongly agreed or agreed that this was the case. Concerning the capability of managing their problem, 89% of patients strongly agreed or agreed that they felt more able to do this. In total, 96% of patients evaluated the ultrasound scan to be of very high/high value to them.

Conclusion: Patients highly rate the information gained from ultrasound imaging in a physiotherapy-led upper limb/shoulder clinic and felt that it assisted them in the understanding, reassurance and management of their problem.

KEYWORDS

patient experiences, physiotherapy, upper limb function

1 | INTRODUCTION

Diagnostic musculoskeletal ultrasound (US) is becoming an increasingly popular and useful modality, used by an increasing breadth of health professionals. Once traditionally the preserve of radiologists, government policy, along with an increasing demand for musculoskeletal services from an ageing population with high expectations of a quality service, has led to other professionals extending their practices to incorporate US imaging (Department of Health, 2000). Physiotherapists have worked as “orthopaedic assistants” for at least 25 years (Byles & Ling, 1989) and more recently as “extended-scope practitioners” or “clinical specialists” in upper limb/shoulder clinics with the role of the assessment and management of patient problems. Typically, roles have advanced to incorporate requesting diagnostic examinations, prescribing, administering injections and listing for surgery

(Chartered Society of Physiotherapy, 2016), but a skilled assessment still lies at the heart of the process. Yet, although there are numerous tests documented for the examination of the shoulder, an exact diagnosis can still often be very difficult (Tennent, Beach, & Meyers, 2003). The rotator cuff is a complex intertwining of tendon, ligament, capsular and bursal tissue, and although many shoulder tests are highly sensitive, they have a low specificity (Lewis, 2009). This means that if the shoulder tests are carried out in healthy people and patients with shoulder pain, they would be able to identify all the true positives but they would also be positive in some healthy people, reducing their value in identifying an exact pathology.

Any modality that can contribute quickly to a more accurate working diagnosis and that may influence the education and management of a patient is to be welcomed. Furthermore, if patients are given correct information regarding the nature of their complaint, along with

possible treatment options and a prognosis, they are likely to feel more reassured and comply with an appropriate management strategy. The standard system currently in place is that patients are assessed in a clinic and referred for a US scan, after which the report is sent back to the referring clinician and a further appointment sent to the patient to discuss the results, before referring on for treatment. The physiotherapist-led service carries out the US imaging on the patient's first visit as well as discussing the results and management plan.

The aim of the present study was to assess patients' opinions regarding the value to them of physiotherapists using US imaging in an upper limb/shoulder clinic.

2 | METHODS

Patients attended a physiotherapist-led upper limb/shoulder clinic after a referral from their general practitioner (GP), physiotherapist or consultant for help in the management of their problem. Typically, these were patients considered to have complex problems, who often made poor progress in their recovery (experiencing ongoing weakness and pain, resulting in poor functional use of their arm, often with comorbid conditions). After a subjective and objective assessment, if it was felt appropriate, a US scan was carried out and the results were discussed immediately with the patient as part of their overall treatment plan. Not all patients were automatically scanned; for example, if the problem was deemed to be shoulder instability or capsulitis, other investigative modalities were deemed more appropriate. Upon leaving, patients were invited to complete a simple anonymous questionnaire designed to determine the usefulness of the scan from their own point of view. All patients consented verbally to complete a short questionnaire. The assessments were undertaken by one of three physiotherapists who were both experienced in treating shoulder conditions and trained in US scanning of the shoulder. All physiotherapists had been scanning for approximately 10 years. This particular clinic ran once weekly, and a GE LogiqE BT 12 diagnostic US machine was used for all the scans.

A total of 55 males and 48 females, with a mean age of 56 (range 24–87) years, completed the questionnaire. Patients were asked four questions which had been modified from a previous questionnaire (Wheeler, 2010). These questions were chosen as they were considered to be unambiguous, informative and quick to answer. They included: Following the ultrasound scan in the physiotherapy clinic today:

1. Do you feel that you are better able to understand your shoulder problem?
2. Do you feel more reassured about your shoulder problem?
3. Do you feel that you are better able to manage your shoulder problem?
4. Do you feel that the ultrasound scan of your shoulder was of any value to you today?

Patients were asked to rate the first three questions on a five-point scale, ranging from "strongly agree" to "strongly disagree", and the fourth question on a similar scale, ranging from "very high value" to "no value".

3 | RESULTS

The results are summarized in Figures 1 and 2.

4 | DISCUSSION

The responses to the above questions demonstrated that patients felt that the feedback and education received by using information from the US images had a great deal of value. It is to be hoped that patients

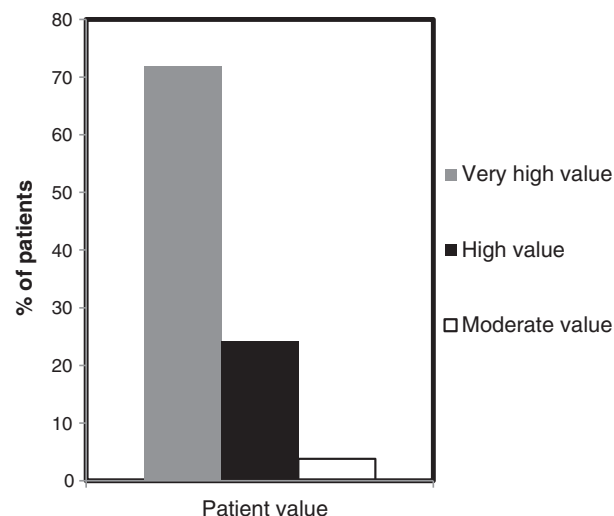


FIGURE 2 Patient perceptions of the overall value of an ultrasound scan

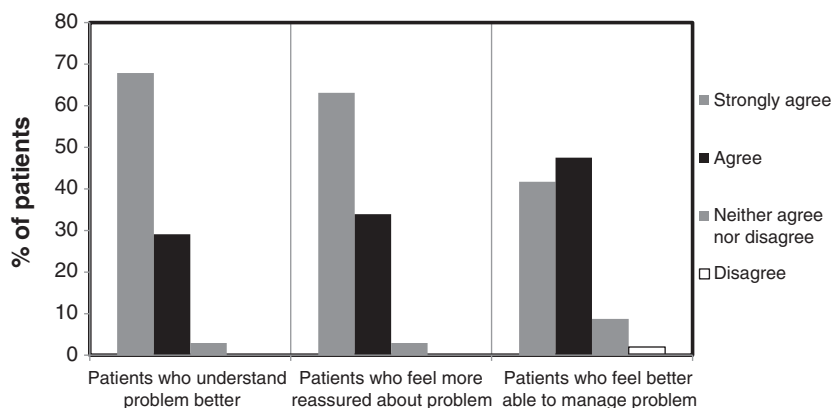


FIGURE 1 Patient responses to the understanding, reassurance and management of their shoulder problem

become equal partners in their own care, as often rehabilitation of shoulder complaints requires a great deal of understanding, compliance and motivation on behalf of the patient (and therapist). Improving dysfunctional movement patterns, regaining general fitness and shoulder strength, reframing beliefs and the resolution of pain can take many months, with both the patient and physiotherapist aiming to set realistic targets from the beginning. The presentation of a slightly stiff but very painful shoulder with tendinopathic appearances on scanning would lead to a different discussion and management strategy for the same shoulder with a large calcific deposit present within the tendon, even though their clinical presentations may be similar. A 45-year-old farmer, having fallen over a fence, and a US scan demonstrating an acute full-thickness cuff tear (see Figure 3), could benefit from an early surgical opinion instead of months of a stepwise treatment approach, which overall would delay the tailored treatment that is more likely to assist him.

Full-thickness rotator cuff tears increase with age and can be seen as part of the ageing process, and although some are non-problematic, others can be hugely disruptive to patients' lives (Jones, Hanchard, Hamilton, & Rangan, 2013; Milgrom, Schlaffler, Gilbert, & van Holsbeeck, 1995; Minns Lowe, Moser, & Barker, 2014). It is only by relating the imaging findings to the patient's history and physical assessment that the unwarranted treatment of asymptomatic pathology will be prevented. Sometimes symptoms can be linked to provocative activities, and therefore advice can be given to patients to modify their movements. Alternatively, some patients who are clearly affected emotionally by intense pain or for whom central sensitization is the dominant pain mechanism require a more cognitive-based education, where it can be explained that the anatomical state of their shoulder does not reflect the pain they are experiencing, and that it is more an issue with an excitable nervous system (Louw, Diener, Butler, & Puentedura, 2011) and tissue deconditioning. For US scanning to be used to its full potential in managing shoulder pain, practitioners also need to be thoroughly acquainted with modern pain neurophysiology and its potential effect on performance, and not only the possible peripheral pathologies involved (Struyf et al., 2015).



FIGURE 3 An example of a full-thickness supraspinatus tear. A young person with a problematic shoulder and tear such as this would benefit from an early surgical opinion [Colour figure can be viewed at wileyonlinelibrary.com]

Whereas specialist physiotherapists have excellent functional anatomy knowledge and assessment proficiency, they have a great deal of learning to do regarding the technical and practical aspects of scanning, as well as image interpretation skills. Guidelines from the Royal College of Radiologists (2014) state that US imaging must be undertaken by trained and experienced practitioners holding recognized qualifications (such as Consortium for the Accreditation of Sonographic Education [CASE] accreditation or postgraduate education and training). Although there are now many good short weekend courses on US imaging emerging, one would not gain employment within a radiology department without a relevant postgraduate qualification. The British Elbow and Shoulder Society (BESS) has established guidelines for surgeons to develop their competency in detecting rotator cuff tears by attending a shoulder US course, performing practice scans, then utilizing US scanning prior to surgery and auditing their results (Rees, 2011). Several universities in the UK are now offering postgraduate courses for health professionals, and the Chartered Society of Physiotherapy is also currently formulating a guidance document for their members on how to establish competency in US imaging.

There is no common consensus on how US scanning should be implemented in the clinical environment by non-traditional users. Some physiotherapists have already developed evidence-based care pathways (Lewis, 2015; O'Connaire & Lewis, 2011), incorporating an assessment, US scan, education and guided injection of patients within a rehabilitation framework, and have also demonstrated the value of physiotherapists using US-guided hydrodistension for frozen shoulders. The value of one-stop upper limb clinics utilizing US is very apparent (Miller et al., 2008; Seagger, Bunker, & Hamer, 2011), providing an immediate diagnosis, reducing the need for repeat patient attendances, making financial savings and shortening the time before definitive management. US-guided injections performed with visual information and education, which can also be incorporated into such a clinic, can reduce the need for repeated blind injections, as well as making a positive contribution to pain and anxiety levels in patients (Karkucak et al., 2016). It has also been demonstrated that patients observing real-time US images during US-guided procedures, accompanied by an explanation of anatomy and pathology, improved their overall experience, as well as enhancing their understanding and reducing their level of anxiety (Sahbudin, Bell, Kumar, Raza, & Filer, 2015).

A pilot study of a rheumatologist utilizing US in the management of patients with inflammatory arthritis (Acebes et al., 2016) was shown to be extremely useful, both with the referring clinicians and the patients attending. Referrers felt that it helped their decision making and the monitoring of disease activity/treatment response, and patients felt that they benefited from a clear explanation of their condition, and of the significance of the US findings. A high level of satisfaction with, and perceived patient benefit of, diagnostic US utilization in a variety of anatomical regions has also been reported in a sports clinic run by a sport and exercise medicine consultant (Wheeler, 2010). Furthermore, in an observational study set in two university sports medicine clinics (Goodman, Schmitt, Petron, Gee, & Mallin, 2015), a US scan added subsequently to the history, physical examination and radiographs changed the diagnosis and management in 53% and 60% of patients, respectively. It also led to the elimination of magnetic resonance imaging (MRI) requests in 21% of patients. In our

study, it was suspected, although no data were collected, that US scanning in the physiotherapy clinic led to a reduction in requests for MRI. It has been suggested that 45% of shoulder MRI examinations are often unnecessary (Sheehan et al., 2016), and that a combination of X-ray and US can accurately diagnose 85% of shoulder pathologies referred to a tertiary care hospital.

The unique real-time image produced by US scanning, and the ease with which patients can visualize the images and at the same time communicate with the clinician, may give it an advantage over other forms of imaging for which there is limited evidence that the tests are actually reassuring (van Ravesteijn et al., 2012). It is likely that many patients attending the upper limb/shoulder clinic have already undertaken failed conservative treatment and been given a variety of diagnoses by different practitioners. The utilization of the US images in the educational process can rework some of the suggested diagnoses, while offering a more specific explanation accompanied by a positive message for the best management path. It appears that to maximize the doctor-patient relationship, GPs would also welcome the ability to impart a more specific diagnosis to their patients (Ottenheijm et al., 2014), rather than treating on the basis of presenting signs and symptoms.

The research base of physiotherapists utilizing US imaging is in its infancy, although logically it potentially has an extremely valuable contribution to make in optimizing assessment and treatment for certain types of patients. It is important that any new service development that is implemented must demonstrate the value that it brings to improving patient services. Although considered a comparatively cheap form of imaging, studies on the additional costs incurred by introducing US scanning into a physiotherapy upper limb clinic, in relation to improving the patient's health status, are necessary (Dinnes, Loveman, McIntyre, & Waugh, 2003). For this reason, quality training programmes, professional standards, continuing audit and research to inform practice must be established to guarantee that the patient receives the highest quality of care. With this in place, the benefit for patient understanding and the management of their condition is very apparent.

4.1 | Limitations

It should be acknowledged that there are many variables in a clinical environment that may contribute to a positive encounter, and therefore it could be argued that the patients' satisfaction came from a positive interaction with the physiotherapist and had little to do with the images, although the questionnaire clearly relates to the US scan. This could only be fully answered by running the service evaluation as a randomized controlled trial comparing the satisfaction between patients who had immediate feedback from the results of the scan with those who did not, or, alternatively, comparing patients who did or did not have a scan. As this was a service development study, this was beyond its scope, but it should still be recognized that collecting local patient outcome data is very important to informing patient care.

Although all three physiotherapists had been scanning shoulders for an average of 10 years, there was no attempt to standardize either a common systematic approach to performing the scan or the type of information relayed to the patient. Three physiotherapists were equally involved in the assessments, with no difference in patient satisfaction evident between them. Furthermore, it could be argued that patients

would have been left feeling satisfied even though the US diagnosis had been incorrect. It is important that false-positive or -negative results do not lead to incorrect treatment, referral or management expectations for the patient. One of the benefits of physiotherapists utilizing diagnostic US in this environment is the surgical and radiology support that exists for the discussion of uncommon findings and presentations, as well as the option of correlating US imaging with X-ray, computed tomography and MRI when necessary.

US imaging tends to be performed less frequently in primary care settings but, even here, the combination of a clinical history, physical examination and scan should assist in the patient management in many cases. It has been established that specialist musculoskeletal radiologists and shoulder surgeons are able to diagnose shoulder disorders accurately using diagnostic musculoskeletal US but there is still a lack of evidence regarding its accuracy when used by rheumatologists, GPs, sports physicians, sonographers, podiatrists or physiotherapists (Iossifidis, Ibrahim, & Petrou, 2015; McCulloch, McBride, Choudhury, Armitstead, & Simons, 2013). Clearly, this is an important area for further study.

5 | CONCLUSION

It is important that patients are given timely and suitable information about their condition, in order to have a discussion about the right management decision for them. The present service evaluation study demonstrates the positive benefits that patients perceive when feedback, advice and a management plan are communicated immediately following assessment and US imaging in a physiotherapy upper limb/shoulder clinic.

CONFLICT OF INTEREST

The author(s) declare no potential conflicts of interest with respect to the research, authorship and/or publication of this article.

AUTHOR CONTRIBUTIONS

G.L. and R.D. conceived the study. G.L., S.S. and K.L.G. performed the study. G.L. completed the data analysis, first draft and final version of the manuscript. All authors reviewed and approved the final version.

ORCID

Gordon Lumsden  <http://orcid.org/0000-0002-5650-1731>

REFERENCES

- Acebes, C., Harvie, J. P., Wilson, A., Duthie, J., Bowen, F., & Steven, M. (2016). Clinical usefulness and patient satisfaction with a musculoskeletal ultrasound clinic: Results of a 6-month pilot service in a rheumatology unit. *Rheumatology International*, 36(12), 1677-1681. <https://doi.org/10.1007/s00296-016-3538-8>
- Byles, S. E., & Ling, R. S. M. (1989). Orthopaedic out-patients - A fresh approach. *Physiotherapy*, 75(7), 435-437. [https://doi.org/10.1016/S0031-9406\(10\)62619-3](https://doi.org/10.1016/S0031-9406(10)62619-3)
- Chartered Society of Physiotherapy (2016). *Advanced practice in physiotherapy: Understanding the contribution of advanced practice in physiotherapy to transforming lives, maximising independence and empowering populations*. London: Chartered Society of Physiotherapy. Retrieved from <http://www.csp.org.uk/publication/advanced-practice-physiotherapy>

- Department of Health (2000). *Meeting the challenge: A strategy for the allied health professions*. London: Department of Health. Retrieved from <http://www.csp.org.uk/publication/advanced-practice-physiotherapy>
- Dinnes, J., Loveman, E., McIntyre, L., & Waugh, N. (2003). The effectiveness of diagnostic tests for the assessment of shoulder pain due to soft tissue disorders: A systematic review. *Health Technology Assessment*, 7(29), iii, 1–166. <https://doi.org/10.3310/hta7290>
- Goodman, M. Q., Schmitt, R. E., Petron, D., Gee, C., & Mallin, M. (2015). The effect of bedside ultrasound on diagnosis and management of patients presenting to a sports medicine clinic with undifferentiated shoulder pain. *Journal of Diagnostic Medical Sonography*, 31(2), 82–85. <https://doi.org/10.1177/8756479314565237>
- Iossifidis, A., Ibrahim, E. F., & Petrou, C. (2015). Ultrasound for the detection of full-thickness rotator cuff tears: The learning curve for an orthopaedic surgeon using a novel training method. *Shoulder and Elbow*, 7(3), 158–162. <https://doi.org/10.1177/1758573214557146>
- Jones, S., Hanchard, N., Hamilton, S., & Rangan, A. (2013). A qualitative study of patients' perceptions and priorities when living with primary frozen shoulder. *BMJ*, 3(9), e003452. <https://doi.org/10.1136/bmjopen-2013-003452>
- Karkucak, M., Cilesizoglu, N., Capkin, E., Can, I., Batmaz, I., Kerimoglu, S., ... Ayar, A. (2016). Education and visual information improves effectiveness of ultrasound-guided local injections on shoulder pain and associated anxiety level: A randomised controlled study. *American Journal of Physical Medicine and Rehabilitation*, 95(1), 9–14. <https://doi.org/10.1097/PHM.0000000000000305>
- Lewis, J. S. (2009). Rotator cuff tendinopathy/subacromial impingement syndrome: Is it time for a new method of assessment? *British Journal of Sports Medicine*, 43(4), 259–264. <https://doi.org/10.1136/bjism.2008.052175>
- Lewis, J. (2015). Frozen shoulder contracture syndrome – Aetiology, diagnosis and management. *Manual Therapy*, 20(1), 2–9. <https://doi.org/10.1016/j.math.2014.07.006>
- Louw, A., Diener, I., Butler, D. S., & Puentedura, E. J. (2011). The effect of neuroscience education on pain, disability, anxiety and stress in chronic musculoskeletal pain. *Archives of Physical Medicine and Rehabilitation*, 92(12), 2041–2056. <https://doi.org/10.1016/j.apmr.2011.07.198>
- McCulloch, R. A., McBride, T., Choudhury, Z., Armitstead, C., & Simons, A. W. (2013). Surgeon-lead shoulder ultrasound for rotator cuff tears, accuracy and learning curve. *Shoulder and Elbow*, 5(1), 30–32. <https://doi.org/10.1111/j.1758-5740.2012.00223.x>
- Milgrom, C., Schlaffler, M., Gilbert, M., & van Holsbeeck, M. (1995). Rotator cuff changes in asymptomatic adults. The effect of age, hand dominance and gender. *Journal of Bone and Joint Surgery (Br)*, 77-B(2), 296–298. Retrieved from <https://www.ncbi.nlm.nih.gov/pubmed/7706351>
- Miller, D., Frost, A., Hall, A., Barton, C., Bhoora, I., & Kathuria, V. (2008). A 'one-stop clinic' for the diagnosis and management of rotator cuff pathology: Getting the right diagnosis first time. *International Journal of Clinical Practice*, 62(5), 750–753. <https://doi.org/10.1111/j.1742-1241.2007.01682.X>
- Minns Lowe, C. J., Moser, J., & Barker, K. (2014). Living with a symptomatic rotator cuff tear 'bad days, bad nights': A qualitative study. *BMC Musculoskeletal Disorders*, 15, 228. <https://doi.org/10.1186/1471-2474-15-228>
- O'Connaire, E., & Lewis, J. S. (2011). *Arthrographic hydrodistension for frozen shoulder*. A physiotherapy-led initiative in primary care. Poster pdf. The Health Foundation. Retrieved from www.health.org.uk/sites/health/files/Shine2011_TreatmentOfFrozenShoulderInaPrimaryCareSetting_poster.pdf
- Ottenheim, R. P. G., Hesselms, N. J. J. M., Kemper, A., Moser, A., de Bie, R. A., Dinant, G. J., & Cals, J. W. L. (2014). GPs' Perspectives on the diagnostic work-up in patients with shoulder pain: A qualitative study. *Journal of Evaluation in Clinical Practice*, 20(3), 239–245. <https://doi.org/10.1111/jep.12114>
- van Ravesteijn, H., van Dijk, I., Darmon, D., van de Lar, F., Lucassen, P., Hartman, T. O., ... Speckens, A. (2012). The reassuring value of diagnostic tests: A systematic review. *Patient Education and Counseling*, 86(1), 3–8. <https://doi.org/10.1016/10.1016/j.pec.2011.02.003>
- Rees, J. (2011). *Point of access shoulder ultrasound by shoulder surgeons*. BESS Working Group. Oxford: University of Oxford. Retrieved from <http://ow.ly/L79X30f4jQj>
- Royal College of Radiologists, the Society and College of Radiographers (2014). *Standards for the provision of an ultrasound service*. London: Royal College of Radiologists. Retrieved from <https://www.rcr.ac.uk/publication/standards-provision-ultrasound-service>
- Sahbudin, I., Bell, J., Kumar, K., Raza, K., & Filer, A. (2015). Observation of images during ultrasound-guided procedures improves the patient experience. *Annals of the Rheumatic Diseases*, 74(Suppl. 2), 641. <https://doi.org/10.1136/annrheumdis-2015-eular.3566>
- Seagger, R., Bunker, T., & Hamer, P. (2011). Surgeon-operated ultrasonography in a one-stop shoulder clinic. *Annals of the Royal College of Surgeons*, 93(7), 528–531. <https://doi.org/10.1308/147870811X13137608454939>
- Sheehan, S. E., Coburn, J. A., Singh, H., Vanness, D. J., Dean, F., Sittig, D., ... Brunner, M. C. (2016). Reducing unnecessary shoulder MRI examinations within a capitulated health care system: A potential role for shoulder ultrasound. *Journal of the American College of Radiology*, 13(7), 780–787. <https://doi.org/10.1016/j.jacr.2016.03.015>
- Struyf, F., Lluch, E., Falla, D., Meeus, M., Noten, S., & Nijs, J. (2015). Influence of shoulder pain on muscle function: Implications for the assessment and therapy of shoulder disorders. *European Journal of Applied Physiology*, 115(2), 225–234. <https://doi.org/10.1007/s00421-014-3059-7>
- Tennent, T. D., Beach, W. R., & Meyers, J. F. (2003). A review of the special tests associated with shoulder examination. *American Journal of Sports Medicine*, 31(1), 154–160. <https://doi.org/10.1177/03635465030310011101>
- Wheeler, P. (2010). What do patients think about diagnostic ultrasound? A pilot study to investigate patient-perceived benefits with the use of musculoskeletal diagnostic ultrasound in an outpatient clinical setting. *International Musculoskeletal Medicine*, 32(2), 68–71. <https://doi.org/10.1179/175361410X12652805807954>

How to cite this article: Lumsden G, Lucas-Garner K, Sutherland S, Dodenhoff R. Physiotherapists utilizing diagnostic ultrasound in shoulder clinics. How useful do patients find immediate feedback from the scan as part of the management of their problem?. *Musculoskeletal Care*. 2017;1–5. <https://doi.org/10.1002/msc.1213>