The Affidea MR Excellence Program:
A comprehensive MRI optimization and standardization project

N. Papanikolaou\textsuperscript{1,2}, P. Szatmari\textsuperscript{2}, R. Illing\textsuperscript{2}
\textsuperscript{1}Nicosia/CY, \textsuperscript{2}Budapest/HUN

Background / Purpose

Magnetic Resonance Imaging (MRI) is not only one of the most complex parts of the diagnostic chain, it is also one of the most expensive. Obtaining excellent anatomical and functional images is time consuming and requires high levels of technical expertise. Although vendors are attempting to codify workflows, there are numerous factors that lead to increasing heterogeneity in the way images are produced and the time it takes to produce them.

The purpose of the current exhibit was to harmonize and optimize quality and patient experience across 15 MRI centers in 5 European countries.
Materials and Methods

MRI Protocol Unification Project

MRI Protocol Standardization Project

- 8 standardization workshops,
- Consensus on standardized protocols,
- Site visits,
- Remote access to Protocol Exchange Platform.

3 different MRI vendors
5 European countries
14 type MRI systems
15 MRI sites
93 standardized protocols
More than 1500 pulse sequences

Materials and Methods

Core sequences:
Sequences which need to be performed for diagnostic image quality

Recommended sequences:
Sequences which are recommended to perform on top of core sequences, and enhancing diagnostic confidence in case technology and patient volume allows

Optional sequences
Sequences that are optional to perform, which enable advanced post processing and can be either separately reimbursed or can give competitive advantage a medical differentiator

Conditional sequences:
Sequences which need to be performed in case if certain condition, in which these are core
Materials and Methods

How?

Brief assessment of Image Quality (IQ) using a 5-point grading scale
1. Poor IQ: High Noise, Severe Artifacts, Low Contrast
2. Moderate IQ: Moderate Noise, Moderate Artifacts, Adequate Contrast
3. Mixed IQ: Low Noise, Minor Artifacts, Adequate Contrast
4. Very Good IQ: Low Noise, Fair Artifacts, Fairly Contrast
5. Excellent IQ: No Noise, No Artifacts, Excellent Contrast

5 most common bone losses
- Area: 4 cone sequences per scan
  - 25 sequences (Before optimization)
  - 20 sequences (After optimization)

Who?

3 Site Radiologists

Interrater variability will be assessed by means of ICC statistics

Why?

To decide which sequences should be conducted at each site in terms of sequence parameters, based on the Sequence Performance Index

SPI = [(IQHs)(IQPs)]

ICQ (Input from Radiologist)
NTH (Number of cases)
QT (Sequence Scan Time)
PQ (Sequence Visual Use)

Results

Results from all five countries indicated significant improvement both in terms of quality and patient experience. More specifically, in Lithuania the mean IQ scores were 2.87 (before the visit), 3.28 (during the visit) and 2.91 (after the visit), while the corresponding mean SPI's were 1.44, 1.83 and 1.38, respectively.

There was a 6.8% reduction in examination time after the visit, a 7.3% reduction in the non-scanning time, a 10.9% increase in the number of exams, a 1.3% reduction in utilization rate, a 7.3% improvement in the compliance to standardized protocol and a 17.2% improvement in the deviation of the standardized protocol.
Results

Scan Time 01:49
Scan Time 02:35

Scan Time 02:39
Scan Time 03:43
Conclusions

MREP has been successfully deployed in very heterogeneous environments in terms of MRI culture, equipment and level of expertise of the local staff.

It proved a challenging process that demands active engagement of a very diverse workgroup including Radiologists, Radiographers, Clinical Scientists, Software Engineers and active support of the Affidea local management.