Closing the Osteoporosis Diagnosis Gap: Insights From a Feasibility Study Into Opportunistic Screening From Wrist X-Rays

Objective: Feasibility study aimed at assessing patient flow from a wrist X-ray to Dual Energy X-ray Absorptiometry (DXA) assessment in cohorts presenting with and without a fracture. The primary objectives were to:

1. Evaluate whether referral rates to DXA align with the anticipated prevalence of osteoporosis
2. Explore practicalities of implementing IBEX BH opportunistic screening which measures wrist bone density from a standard X-ray.

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Materials and Methods

Anonymised data from the Royal Cornwall Hospital Trust (RCHT) radiology information system (RIS) was audited to assess the rate of DXA referrals for patients over 50 attending for a wrist X-ray. Two cohorts were assessed: those presenting with a fracture and those without.

A 6-week random sample of anonymised wrist X-rays were then analysed using IBEX BH software which measures bone density at the ultra-distal and distal third regions. The outputs were used to assess the likely pick-up rate that could be achieved if the software were part of future service provision.

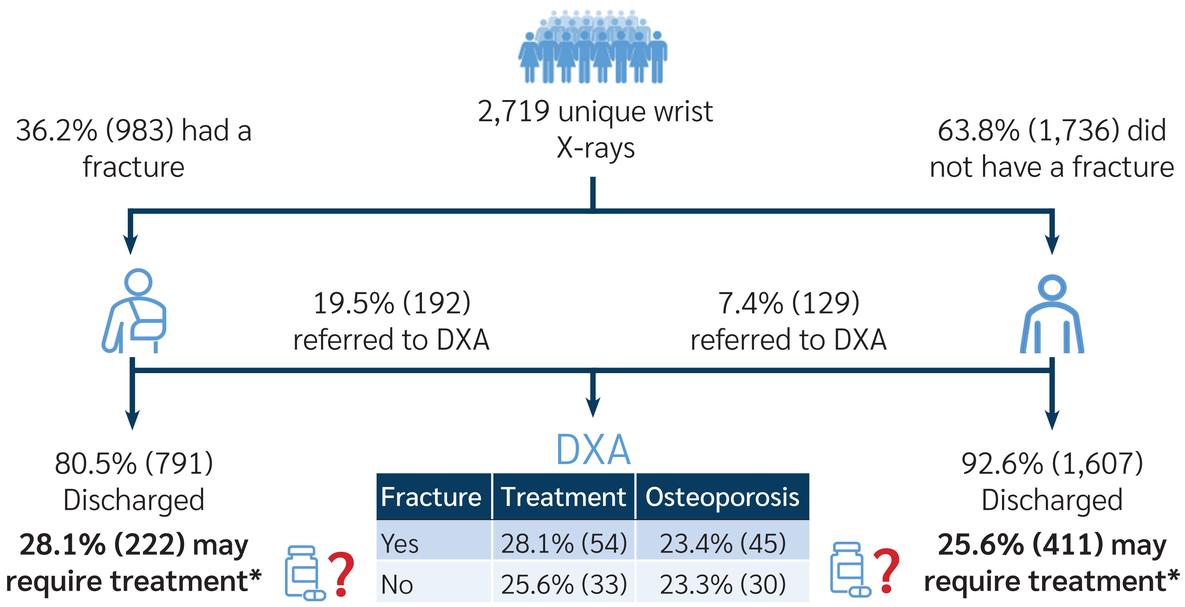
Results - Data Audit

In a one-year period from 01/08/21 to 31/07/22, 2,719 patients had a wrist X-ray which could have been assessed by IBEX BH.

983 (36.2%) presented with a fracture. 192 (19.5%) in the fracture group were referred to DXA within one year of their scan, compared to 129 (7.4%) in the non-fracture group. This is a DXA referral rate of 11.8%.

From those in the fracture group referred to DXA, 54 (28.1%) were recommended treatment, compared to 33 (25.6%) in the non-fracture group.

Applying these treatment rates to the group not sent to DXA indicates a worst-case treatment gap of 87.9%. Assuming instead, a prevalence of osteoporosis of 18% [1] and treatment rate of 1.16 (calculated from the table below), the expected treatment gap is 84.7%.



Fracture	Treatment	Osteoporosis
Yes	28.1% (54)	23.4% (45)
No	25.6% (33)	23.3% (30)

*Assumes prevalence in the discharged patient group is the same as the DXA referred group (very likely this is lower)

RIS Data Audit August 2021 to July 2022

Results – Opportunistic Screening

The IBEX BH software was tested on a random sample of anonymised wrist images and showed a pickup rate of 33% who would be referred for DXA under proper use.

IBEX BH Output	# Patients	Totals
Osteoporosis	20 (33%)	59
Normal	35 (60%)	
Fail	4 (7%)	
Excluded	5 (N/A)	5

Opportunistic Screening with IBEX Bone Health Software from a 6-week Retrospective Random Sample of Wrist X-rays

Discussion

- Referral rates to DXA from the data audit are lower than the expected prevalence of osteoporosis in this population (11.8% referral versus 18% expected prevalence [1])
- We have estimated a treatment gap of 84.7% to 87.9%
- Closing the treatment gap represents an additional 481 patients on treatment, based on the lower estimate of 84.7%
- This could prevent approximately 30 fractures, based on a number needed-to-treat of 16 [2]
- IBEX BH pick up rate was 33%. This could result in an additional burden on DXA as only 11.8% of patients were referred during the audited period.
- Higher pick up could be mitigated by smarter referrals to DXA, potentially increasing the fraction of those treated following DXA from 26.9% in the audited period.
- Treatment rates are notably similar between patients referred to DXA with and without a fracture. This is surprising as intuitively one would imagine that the presence of a fracture would increase the treatment rate

Conclusion

This study evidenced that there is almost certainly a large cohort of patients suffering from osteoporosis who are not being referred to DXA, resulting in a large treatment gap. Screening patients for osteoporosis from a wrist X-ray offers a way to opportunistically increase referrals and close the treatment gap.

Acknowledgements

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Disclosures

IBEX Innovations has a commercial interest in the adoption of IBEX BH.

References

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