

Appendix 1: Table showing detailed need categorization with exemplary literature and projects

Category	Demand	Subdemand/Assessment of	Exemplary Literature and Project References
Patient Characterization	Gait/Activity Assessment	Gait Analysis/Activity	1-7
		Fall Risk	8-12
	Surrounding Conditions	Sleep	Trauma: 13 Phone based: 14, 15 Wearable based: 16-19
		Nutrition	20-25
		Physiological Parameters	HR: 26-34 BP: 35-37 Osteoporosis; Imaging: 38, 39; Data Science: 40-42
	Previous Injuries and Medical Record Assessment	Electronic Medical Records	43-50
		Registry Data	51-56
Diagnosis	Pretreatment Workflow	Emergency Service Allocation/Triage	57-69
		Clinical Resource Management	70-81
	Imaging	Fracture detection	Detection: 82-86 Autom. Classification: 87-89
		Implant characterization	90
Intervention Preoperative	Patient Education	Visualize PreOP Planning	VR: 91 Phone/App: 92
	Surgeon Education	Courses	AR/VR: 93-95 APP/Web-based: 96-98
		Case discussion	Social Media: 99 Phone/Image Discussion: 100-107
	Surgical Planning	Surgical Planning	Collaboration: 108 3D-Printing: 109, 110 VR: 111, 112 Digital Planning: 113-121
		Fracture Database	96
		Surgical decision making	Determine ideal Hardware position and individualize reduction
	Implant construction	Preshaping Templates/Reduction Aids:	3D-Printing: 124-130
		Patient Specific Implants	3D-Printing: 131-134
	Perioperative	Procedural Optimization	Surgeon Skills
Standardization/SOP			140-142

		Improved Imaging/Navigation	General: 143-154 Accuracy: 146, 155, 156 Ease of visualization: 149, 157, 158 Radiation exposure: 149, 158-160 Information to field of view: 144, 147, 149
		Assisted Reduction:	Imaging/Navigation/Robotics: 156, 161-163 Robotics: 164, 165
		Remote teaching/advising	166-170
Postoperative	Compliance Assessment	Therapy/Weight-Bearing	171-176
		Medication	177-182
	Rehabilitation	Planning/Guidance/Training	AR/VR: 183, 184 Gait Analysis: 1, 185-189 Wearables: 3, 190-193 App/Phone based: 194-197
		Robotic Assistance	198-210
	Medical Management	Medication/Follow-Up	Follow Up: 211-213 Medication: 177-182

Outcome	Fracture Healing	Imaging/Techniques	214-218
		Biomechanical Analysis	219-232
	Wound Healing	Size Measurement/Healing Assessment	233-242
	Functional Outcome	Range of Motion	197, 212, 243-245
		PRO / ePRO / Scoring	246-254
		Quality of Performance	1, 186, 255-261
		Assistive Devices	262-266
	Quality of Life	Pain	Heart Rate: 26-34 Blood Pressure: 35-37 PRO and Pain Scoring: 246-254, 267-269 Digital Medication Monitoring: 177-182
		Nutrition	20-25
		Sleep	13-19

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