Bibliographic reference	Study type/ Design	Study quality (risk of bias)	Sample size n=	Participant characteristics	Participant Positioning/ Setup	Immobilization device if used
Davidson S, Kirsner S, Mason B, Kisling K, Barrett RD, Bonetati A, et al. Dosimetric impact of setup accuracy for an electron breast boost technique. Pract Radiat Oncol. 2015;5(5):e499-e504.(1)	Single Cohort study no comparator	Single Cohort study so not assessed	N=33	Age 33-77 years Post segmental-mastectomy patients	Modified lateral decubitas position	Vac-lok bag (Civco, Orange City, IA) used and indexed to the bed. An in-house compression device also used to reduce distance to tumour bed (in n=25 cases). Skin marks placed on the patient to help with reproducibility, marks also placed on the vac-lok
van der Salm A, Murrer L, Steenbakkers I, Houben R, Boersma LJ. Actual target coverage after setup verification using surgical clips compared with external skin markers in postoperative breast cancer radiation therapy. Pract Radiat Oncol. 2017;7(6):e369-e76.(2)	Repeated measures design.	Moderate	N=35	Early stage (ie stage I or II) post wide local excision (with axillary dissection or sentinel node intervention) some had adjuvant chemotherapy. 14 right sided, 21 left sided	Supine with arms up, tattoo alignment with skin marks	Not clear if a breast board used, no other immobilization device identified.
Batumalai V, Phan P, Choong C, Holloway L, Delaney GP. Comparison of setup accuracy of three different image assessment methods for tangential breast radiotherapy. J	Repeated measures design	Low to moderate	N=25	Post-op (conservative surgery) >18 years of age. No nodal irradiation. Mean age 61 (41-79) Mean BMI 28.7 (18-44.6)	Supine, vac-bag, breast board, both arms up and free breathing.	Vac-bag, supine breast board (CIVCO). Both arms up.

Med Radiat Sci. 2016;63(4):224-31[3].				Stage 0-2A. Breast sizes 9 small (230-694cc) 5 medium (700-1033cc) 11 Large (1128–1862 cc)	BMI and breast size measured	
Obayomi-Davies O, Kole TP, Oppong B, Rudra S, Makariou EV, Campbell LD, et al. Stereotactic Accelerated Partial Breast Irradiation for Early-Stage Breast Cancer: Rationale, Feasibility, and Early Experience Using the CyberKnife Radiosurgery Delivery Platform. Front Oncol. 2016;6:129[4].	Retrospective analysis (single cohort no comparator group)	Single Cohort study so not assessed	N=10	Patients were aged ≥48 years with stage 0 or I histologically confirmed invasive non-lobular carcinoma or ductal carcinoma *in situ* (DCIS). Tumour size was required to be ≤2 cm in maximum diameter and surgically excised with negative margins ≥2 mm. Patients with large seromas or hyper deformable breast tissue (poor breast integrity) were excluded due to concerns about fiducial marker tracking	Supine arms by sides, no breast immobilization used.	Four 2mm gold fiducial markers were implanted around the lumpectomy site under US guidance by a single radiologist-placed at 12.00, 6.00, 10.00 and 4.00 rad relative to the lumpectomy cavity. Contrast enhanced 1mm CT scan obtained in the supine position, arms by sides, no breast immobilization device used.
Batin E, Depauw N, MacDonald S, Lu H-M. Can surface imaging improve the patient setup for proton postmastectomy chest wall irradiation? Practical Radiation Oncology. 2016;6(6):e235-e41[5].	2 phase single cohort study	High	N=5 phase 1 N=10 phase 2	No information only information is post mastectomy having proton beam irradiation.	No detail on patient positioning. Used tattoos medially and laterally, at the SCF region and also lower on C/W for positioning.	No information
Mulliez T, Gulyban A, Vercauteren T, van Greveling A, Speleers B, De Neve W, et al. Setup accuracy for prone and supine whole breast irradiation. Strahlentherapie und Onkologie : Organ der Deutschen	Retrospective analysis of set-up accuracy from traditional skin marking methods	Low	N=103 supine position N=139 prone position	All patients had conservative surgery, without nodal irradiation. No patient characteristics table presented.	Supine patients were positioned on a CIVCO posirest-2© system, with both arms above the head and a knee support. Those that had prone position were prone on	No other immobilisation used.

Rontgengesellschaft [et al]. 2016;192(4):254-9[6].	assessed using CBCT				the AIO© prone breast system with a pelvic band to improve patient safety and comfort.	
Petillion S, Verhoeven K, Weltens C, Van den Heuvel F. Efficacy and workload analysis of a fixed vertical couch position technique and a fixed-action-level protocol in whole-breast radiotherapy. Journal of applied clinical medical physics. 2015;16(2):5265[7].	Prospective analysis – repeated within-subjects design to test different action level protocols and fixed vertical couch protocol on systematic and random errors.	Low	N=20 whole breast radiotherapy (WBRT) patients N=20 (WBRT-LN) patients	Age 43-88 years, median age 61 years WBRT Age 42-77years median age 55years (WBRT-LN)	Supine on Posiboard-2 breastboard (Civco medical). Arms raised above the head and immobilisation wedge under the knees. 4 skin marks, 3 aligned in the central plane, one on sternum, one either lateral, 4th skin mark 15cm caudal to the sternum.	No additional immobilisation
Fahimian B, Yu V, Horst K, Xing L, Hristov D. Trajectory modulated prone breast irradiation: a LINAC-based technique combining intensity modulated delivery and motion of the couch. Radiotherapy and oncology : journal of the European Society for Therapeutic Radiology and Oncology. 2013;109(3):475-81[8].	Experimental study	Not assessed non human study	Tested on one patient CT scan information	Not stated	Prone on breast board	Breast board
Ng SK, Zygmanski P, Jeung A, Mostafavi H, Hesser J, Bellon JR, et al. Optimal parameters for clinical implementation of breast cancer patient setup using Varian DTS software. Journal of	Experimental within subjects design and phantom study	Low risk of bias, but small sample (n=10)	Phantom study plus in patient assessment n=10	Not detailed (only Hounsfield Number of tumour bed clips presented)	No detail, patients were supine but not clear if they were flat or on a breast board.	No information

applied clinical medical physics. 2012;13(3):3752[9].						
Lyatskaya Y, Buehler A, Ng SK, Wong J, Bellon JR, Zygmanski P. Optimal gantry angles and field sizes in kilovoltage cone-beam tomosynthesis for set-up of women with breast cancer undergoing radiotherapy treatment. Radiotherapy and oncology : journal of the European Society for Therapeutic Radiology and Oncology. 2009;93(3):633-8[10].	Retrospective planning study no comparator group	Single Cohort study so not assessed	In total n=20 Supine position n=8 Prone position n=12	Limited patient characteristics table included. Average PTV size for prone cases =51.6 cc Average PTV size for supine cases= 47.1cc Average distance of the PTV from the chest wall: Prone d= 8.7cm Supine d= 3.8cm	Prone and supine positioning not clear if in the supine position a breast board was used.	No additional information about immobilisation provided
Chang AJ, Zhao H, Wahab SH, Moore K, Taylor M, Zoberi I, et al. Video surface image guidance for external beam partial breast irradiation. Pract Radiat Oncol. 2012;2(2):97-105[11].	Cross-over/within subjects design to test three different set-up approaches 1. Laser based positioning using tattoos. 2. Bony anatomy via KV orthogonal imaging. 3. Surface imaging	Some concerns	N=23	Not detailed	Supine, inclined, both arms elevated above the head	Alpha cradle

	All were compared to clip matching as the gold standard					
Mohandass P, Khanna D, Kumar TM, Thiyagaraj T, Saravanan C, Bhalla NK, et al. Study to Compare the Effect of Different Registration Methods on Patient Setup Uncertainties in Cone-beam Computed Tomography during Volumetric Modulated Arc Therapy for Breast Cancer Patients. Journal of medical physics. 2018;43(4):207-13[12].	Cross over/within-subjects design	Some concerns	N=7	No details presented	Supine breast board, headrest, both arms up, holding handgrip, and vacuum cushion, 5mm bolus added to the c/w patient simulation via PET CT in free breathing	Vacuum cushion
Chiu TD, Parsons D, Zhang Y, Hrycushko B, Zhao B, Chopra R, et al. Prototype volumetric ultrasound tomography image guidance system for prone stereotactic partial breast irradiation: proof-of-concept. Physics in medicine and biology. 2018;63(5):055004[13]	Proof of concept study	Not assessed pilot phantom study only	No human participants	n/a	Prone	individually created breast cup.
Calvo-Ortega JF, Moragues S, Pozo M, Casals J. Dosimetric feasibility of an "off-breast isocenter" technique for whole-breast cancer radiotherapy. Reports of practical oncology and radiotherapy : journal of Greatpoland Cancer Center in Poznan and Polish Society of	Feasibility study (retrospective analysis)	Low	N=20	10 right sided and 10 left sided cases. PTV ranged from 163cm^3 to 1207cm^3 (mean = 463cm^3)	Supine (one or both arms up) knee support on a breast board	No other immobilisation device used.

Radiation Oncology. 2016;21(6):500-7[14].						
Probst H, Dodwell D, Gray JC, Holmes M. An evaluation of the accuracy of semi-permanent skin marks for breast cancer irradiation. Radiography 2006;12:186–8. https://doi.org/10.1016/j.radi.2005.07.001.	Randomised Controlled Trial	Low	N=342 Group A: skin marks and tattoos *n* = 176 Group B: skin marks only *n* = 166	Stage I/II breast cancer patients; chest wall patients with or without regional RT Group A: Mean age 58 years; range 29–89yrs vs 60 years for Group B: Mean age 60 years; range 34–84 yrs Large separation greater than 21cm was 24.1% group A vs 24% group B.	Supine on an inclined wedge; affected arm abducted at right angles grasping an arm pole.	No other immobilisation device.
González-Sanchis A, Brualla-González L, Fuster-Diana C, Gordo-Partearroyo JC, Piñeiro-Vidal T, García-Hernandez T, et al. Surface-guided radiation therapy for breast cancer: more precise positioning. Clinical and Translational Oncology 2021;23:2120–6. https://doi.org/10.1007/s12094-021-02617-6.	Repeated measures design	Low	N=252	Right breast n=134, left breast=118 Age median = 58 range 32-91 years Breast volume mean= 755.81cc range 755.81cc-2153cc	Supine no details of immobilisation or breast board used.	Set up assessed with skin marks first followed by surface scanning using VisionRT, AlignRT (London, England) system. Positional accuracy was determined via localisation of surgical clips performed with ExacTrac (ETX, BrainLab®, Germany)

Note: The papers that were selected based on the title and after reading were not used in the guideline are greyed out in the evidence table.

References

1. Davidson S, Kirsner S, Mason B, Kisling K, Barrett RD, Bonetati A, et al. Dosimetric impact of setup accuracy for an electron breast boost technique. Pract Radiat Oncol. 2015;5(5):e499-e504.
2. van der Salm A, Murrer L, Steenbakkers I, Houben R, Boersma LJ. Actual target coverage after setup verification using surgical clips compared with external skin markers in postoperative breast cancer radiation therapy. Pract Radiat Oncol. 2017;7(6):e369-e76.
3. Batumalai V, Phan P, Choong C, Holloway L, Delaney GP. Comparison of setup accuracy of three different image assessment methods for tangential breast radiotherapy. J Med Radiat Sci. 2016;63(4):224-31.
4. Obayomi-Davies O, Kole TP, Oppong B, Rudra S, Makariou EV, Campbell LD, et al. Stereotactic Accelerated Partial Breast Irradiation for Early-Stage Breast Cancer: Rationale, Feasibility, and Early Experience Using the CyberKnife Radiosurgery Delivery Platform. Front Oncol. 2016;6:129.
5. Batin E, Depauw N, MacDonald S, Lu H-M. Can surface imaging improve the patient setup for proton postmastectomy chest wall irradiation? Practical Radiation Oncology. 2016;6(6):e235-e41.
6. Mulliez T, Gulyban A, Vercauteren T, van Greveling A, Speleers B, De Neve W, et al. Setup accuracy for prone and supine whole breast irradiation. Strahlentherapie und Onkologie : Organ der Deutschen Rontgengesellschaft [et al]. 2016;192(4):254-9.
7. Petillion S, Verhoeven K, Weltens C, Van den Heuvel F. Efficacy and workload analysis of a fixed vertical couch position technique and a fixed-action-level protocol in whole-breast radiotherapy. Journal of applied clinical medical physics. 2015;16(2):5265.
8. Fahimian B, Yu V, Horst K, Xing L, Hristov D. Trajectory modulated prone breast irradiation: a LINAC-based technique combining intensity modulated delivery and motion of the couch. Radiotherapy and oncology : journal of the European Society for Therapeutic Radiology and Oncology. 2013;109(3):475-81.
9. Ng SK, Zygmanski P, Jeung A, Mostafavi H, Hesser J, Bellon JR, et al. Optimal parameters for clinical implementation of breast cancer patient setup using Varian DTS software. Journal of applied clinical medical physics. 2012;13(3):3752.
10. Lyatskaya Y, Buehler A, Ng SK, Wong J, Bellon JR, Zygmanski P. Optimal gantry angles and field sizes in kilovoltage cone-beam tomosynthesis for set-up of women with breast cancer undergoing radiotherapy treatment. Radiotherapy and oncology : journal of the European Society for Therapeutic Radiology and Oncology. 2009;93(3):633-8.
11. Chang AJ, Zhao H, Wahab SH, Moore K, Taylor M, Zoberi I, et al. Video surface image guidance for external beam partial breast irradiation. Pract Radiat Oncol. 2012;2(2):97-105.
12. Mohandass P, Khanna D, Kumar TM, Thiyagaraj T, Saravanan C, Bhalla NK, et al. Study to Compare the Effect of Different Registration Methods on Patient Setup Uncertainties in Cone-beam Computed Tomography during Volumetric Modulated Arc Therapy for Breast Cancer Patients. Journal of medical physics. 2018;43(4):207-13.
13. Chiu TD, Parsons D, Zhang Y, Hrycushko B, Zhao B, Chopra R, et al. Prototype volumetric ultrasound tomography image guidance system for prone stereotactic partial breast irradiation: proof-of-concept. Physics in medicine and biology. 2018;63(5):055004.
14. Calvo-Ortega JF, Moragues S, Pozo M, Casals J. Dosimetric feasibility of an "off-breast isocenter" technique for whole-breast cancer radiotherapy. Reports of practical oncology and radiotherapy : journal of Greatpoland Cancer Center in Poznan and Polish Society of Radiation Oncology. 2016;21(6):500-7.
15. Probst H, Dodwell D, Gray JC, Holmes M. An evaluation of the accuracy of semi-permanent skin marks for breast cancer irradiation. Radiography 2006;12:186–8. https://doi.org/10.1016/j.radi.2005.07.001.
16. González-Sanchis A, Brualla-González L, Fuster-Diana C, Gordo-Partearroyo JC, Piñeiro-Vidal T, García-Hernandez T, et al. Surface-guided radiation therapy for breast cancer: more precise positioning. Clinical and Translational Oncology 2021;23:2120–6. https://doi.org/10.1007/s12094-021-02617-6.