Zhivon Whitepaper 2 · Managing External Coaptation Complications: Preventing Skin Problems

Wuhan Zhiheng Technology Co., Ltd. · Technical Whitepaper · September 2026

Audience: veterinarians, veterinary rehabilitation providers, nursing staff, informed owners

Basis: peer-reviewed literature (with sample sizes and sources stated), enterprise standard Q/WHZH 001-2026. All clinical figures below come from third-party studies and do not describe our product.

Summary

The risk of external coaptation is not only whether the device is "secure enough". In a prospective study of canine orthosis and prosthesis use, at least one skin complication was reported within the first 3 months in 58–90% of patients across four device groups. The problem is therefore not whether devices are used, but whether they are managed. This whitepaper sets out complication sources, high-risk locations, a practical daily check list, and escalation rules.

1. Real data: how common are skin problems?

Source: Rosen S, Duerr FM, Elam LH. *Prospective evaluation of complications associated with orthosis and prosthesis use in canine patients.* Front Vet Sci. 2022;9:892662 (PMC9372342 / PMID 35967994)

1. Real data: how common are skin problems?

Device group	≥1 skin complication within first 3 months	Group size
Carpal orthosis	9/10 (90%)	10
Tarsal orthosis	6/10 (60%)	10
Stifle orthosis	8/14 (58%)	14
Prosthesis	4/7 (58%)	7

Severity definitions used in that study:

- Minor skin complication: owner-described hair loss, irritation, or small sores
- Major skin complication: owner-described bleeding, large sores, or signs of infection

Three main complication categories identified: skin complications (abrasions, hair loss, sores), mechanical device problems, and patient non-acceptance of the device.

One more statement from the same study, which must travel with the numbers above: although most carpal and stifle patients improved in objective gait analysis, no control group was included, so it is unknown how much of that improvement can be attributed to the orthosis.

2. Five complication mechanisms

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Type	Main source	Early signals
Pressure injury	Bony prominences, device edges, over-tight straps	Erythema not resolving within 15–20 min, indentation marks
Moisture and infection	Sweat, urine, rain accumulating under the device	Macerated, soft, pale skin; odour
Migration and friction	Poor fit, wrong size	Chronic wound from repeated rubbing
Muscle atrophy and reduced compliance	Prolonged immobilisation, no rehabilitation training	Reduced muscle mass, resistance to wearing
Structural failure	Deformed shell, aged straps, compressed padding	Reduced support, changed fit

3. High-risk locations (lift and inspect — do not check the surface only)

· Bony prominences: around carpus, tarsus, elbow, tibial crest

· Device edges: untreated edges or displaced padding

· Interdigital spaces and distal limb: concentrated moisture and friction

· Under straps: pressure concentration, most commonly missed

· Skin folds: especially in brachycephalic and folded-skin breeds

4. Daily check list (3 minutes — print and post)

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Step	Action	Record
1	Remove or lift the device as instructed and inspect skin colour and integrity	Erythema location, whether it resolves, broken skin
2	Palpate temperature, check distal limb colour and swelling; compare limbs	Temperature difference, colour, swelling change
3	Check for odour, discharge or moisture	Odour, discharge amount, moist area
4	Check edges and padding for displacement or new pressure marks	Direction of displacement, new marks
5	Observe gait and willingness to bear weight against the previous day	Lameness grade, willingness to walk
6	Record time, location and changes	Photograph; contact the veterinarian if abnormal

5. Escalation

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Observation	Action
Local erythema not resolving within 15–20 min	Remove device, contact the veterinarian, reassess fit and padding
Ulceration, open sore, discharge or odour	Remove immediately and seek veterinary care
Distal limb cold, pale or cyanotic	Urgent — seek veterinary care promptly
Sudden severe lameness or complete refusal to bear weight	Seek veterinary care promptly
Visible device deformation or strap failure	Stop use; have a professional assess

6. Six safety practices

1. Measure and fit by a professional — do not select by body weight alone

2. Start with short daily wear on a new device and extend gradually as directed

3. Enforce activity restriction: leash walking on non-slip surfaces, no jumping or sharp turns

4. Keep the area clean and dry; if the device gets wet, address it promptly and contact the veterinarian

5. Attend scheduled rechecks; do not extend intervals on your own

6. Any adjustment (padding, straps, re-moulding) is performed by a professional — owners should not reheat or re-mould the sheet themselves

7. Mapping to the enterprise standard's safety requirements

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Q/WHZH 001-2026 requirement	Relevance to complication management
Material non-toxic, no irritating odour, suitable for prolonged contact (§4.4.1)	Basic premise for extended wear
No harmful release under normal use (§4.4.2)	Safety baseline in moist, friction-exposed conditions
Saliva-resistant, no shedding under light chewing (§4.4.3)	Addresses the chewing scenario directly
Flat surface without bubbles or cracks; smooth, burr-free edges (§4.2)	Burrs are a direct cause of friction injury
Surface integrity after simulated saliva soak at pH 6.5–7.5, 37 °C, 24 h (§5.4.2)	Surface behaviour under chewing and moisture exposure

These are **requirements** stated in a publicly filed standard, not test results.

8. Notes on data

1. The figures in sections 1 and 2 come from third-party peer-reviewed research, with design and sample stated. Devices, species and settings differ from our product; they are not a performance or efficacy claim for it.

2. Enterprise standard values are requirements, not measured results.

3. This document contains no untested in-use conclusions. If you publish your own observations, state the institution, period, sample size and report number, and describe it as a usability observation rather than an efficacy study.

References

1. Rosen S, Duerr FM, Elam LH. Prospective evaluation of complications associated with orthosis and prosthesis use in canine patients. *Front Vet Sci*. 2022;9:892662. doi:10.3389/fvets.2022.892662 (PMC9372342 / PMID 35967994)

2. VCA Animal Hospitals: Bandage and Splint Care in Dogs — vcahospitals.com/know-your-pet/bandage-and-splint-care-in-dogs

3. Vet Times: Low temperature thermoplastics used for splinting small animals — vettimes.com

4. GB/T 43839-2024 Safety technical requirements for products used for companion animals (pets)

5. Wuhan Zhiheng Technology Co., Ltd. — Enterprise Standard Q/WHZH 001-2026

This whitepaper is technical reference material and does not constitute veterinary advice. Clinical decisions must be made by a licensed veterinarian. The product is a health support product, not a medical device.

Zhivon™ · Wuhan Zhiheng Technology Co., Ltd. · www.zhivon.cn · service@zhivon.cn · WhatsApp +44 7743 764517

Application photo (actual use setting)