Mobile PSA : A Novel Telehealth Tool for Prostate Cancer Follow-Up

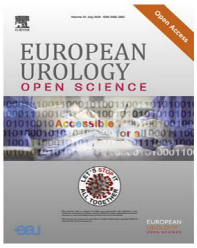
Bergroth, Robin

2021-06

Bergroth , R , Matikainen , M & Rannikko , A 2021 , ' Mobile PSA : A Novel Telehealth Tool for Prostate Cancer Follow-Up ' , European urology open science , vol. 28 , pp. 43-46 . https://doi.org/10.1016/j.euros

http://hdl.handle.net/10138/331802
https://doi.org/10.1016/j.euros.2021.04.004

available at www.sciencedirect.com
journal homepage: www.eu-openscience.europeanurology.com



European Association of Urology

Brief Correspondence

Mobile PSA: A Novel Telehealth Tool for Prostate Cancer Follow-Up

Robin Bergroth [a,*], *Mika Matikainen* [a], *Antti Rannikko* [a,b]

Article info

Article history:
Accepted April 13, 2021

Associate Editor:
Guillaume Ploussard

Keywords:
Telemedicine
Prostate-specific antigen
Prostate cancer
eHealth
COVID-19
Follow-up

Abstract

The prevalence of prostate cancer (PCa) is increasing. As the prognosis of PCa continues to improve, the increasing follow-up requirements after radical prostatectomy or radiotherapy puts significant pressure on health care systems. Follow-up is typically conducted by treating urologists, specialized nurses, or general practitioners. Despite the increase in patient numbers, resources are not likely to increase in proportion. Furthermore, the ongoing COVID-19 pandemic has led to a paradigm shift in our thinking towards telehealth solutions, primarily to avoid or limit physical contact and to spare resources. Here we report our novel telehealth solution for PCa follow-up, called Mobile PSA. Currently, more than 4500 PCa patients have been using Mobile PSA follow-up in our center. Mobile PSA can increase follow-up accuracy, as all biochemical relapses will be detected in a timely manner, can significantly reduce delays in reporting prostate-specific antigen results to patients, and can significantly reduce costs.

Patient summary: We assessed a new telehealth information system for prostate cancer follow-up that does not use an app. More than 4500 prostate cancer patients in our center have used this system, called Mobile PSA, for follow-up. The system significantly reduces delays in reporting prostate-specific antigen (PSA) test results to patients, increases the accuracy of detecting recurrence of elevated PSA, and reduces costs.

Prostate cancer (PCa) is the most common cancer among males in the Western world. PCa prevalence has increased dramatically in recent years owing to improvements in survival [1]. The number of men requiring PCa follow-up is thus constantly growing, while a corresponding increase in resources is unlikely. Therefore, alternative ways of delivering follow-up have been sought [2].

The ongoing COVID-19 pandemic has led to increasing interest in and acceptance of telemedicine in disciplines including urology and cancer care [3]. However, the literature on telemedicine use for PCa follow-up is scarce [4].

The European Association of Urology guidelines emphasize the role of prostate-specific antigen (PSA) for monitoring PCa recurrence and question the role of digital rectal examination [5,6]. PCa is one of the few cancers for which strict follow-up is justified, as effective secondary treatments given in time can improve survival [7]. The

http://dx.doi.org/10.1016/j.euros.2021.04.004

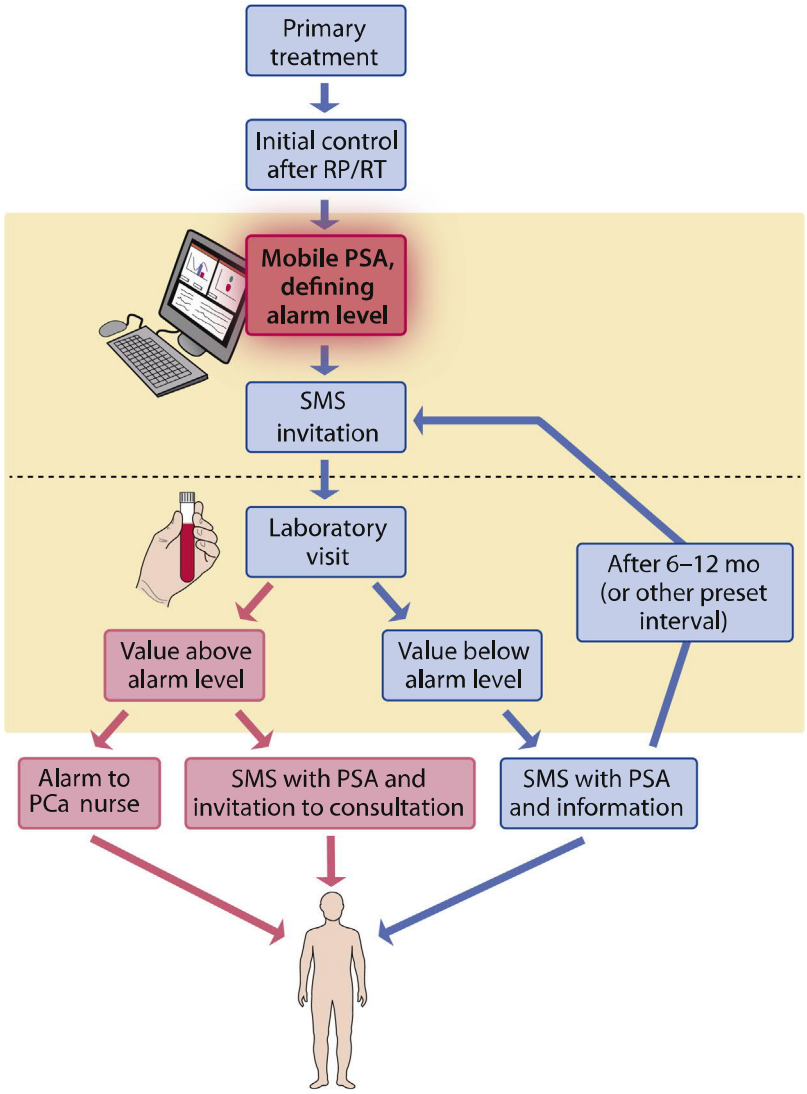


Fig. 1 – Details of the Mobile PSA system. RP = radical prostatectomy; RT = radiotherapy.

recommended schedule for visits after radical prostatectomy (RP) is at 3, 6, and 12 mo, then biannually up to 3 yr and annually thereafter. There is no consensus or recommendation on the total length of follow-up.

Here we report a novel and simple way of delivering follow-up efficiently to PCa patients after RP or radiation therapy (RT) using a telemedicine approach, which we call Mobile PSA. Specifically, our aims are to increase effectiveness, ensure timely detection of disease recurrence, and improve patient satisfaction.

In developing our tool, we set the following criteria. If there is no need for further treatment, patient recovery is uneventful, and pathology evaluation shows no rare non–PSA-producing variant at a follow-up visit conducted by a urologist after RP or RT, then the patient is asked if they would like to undergo follow-up "remotely" using the Mobile PSA system. If the patient agrees, we decide the interval for PSA measurements and the PSA alarm level, which can be set as a PSA concentration (absolute or as a given elevation above the nadir [for RT]) or a PSA level doubling time (or both). After entering these parameters in the system, everything is done automatically. The system sends a reminder to the patient to attend for a routine PSA monitoring test, interprets the result, and then sends it to the patient in an easily understandable format. Communication is via the short message service (SMS) system, and thus is simple, readily available on all mobile phones, and requires no login or software, such as an app, to operate. After a blood sample is drawn in the hospital laboratory (our hospital district has ~90 laboratory satellite units for sampling), the sample is routinely analyzed. A standardized laboratory computer system automatically analyzes and interprets the PSA result according to the alarm level set previously on a per-patient basis. The numerical result is sent back to the patient via SMS with an accompanying text clearly stating if the result is normal or if the alarm has been triggered. If the PSA result (either concentration or doubling time) has exceeded the preset trigger level set, then the

system also sends an alarm message to our PCa nurse, who then contacts the patient, discusses the matter, arranges a confirmatory PSA check, and schedules a face-to-face consultation with the urologist. Details of the Mobile PSA system are shown in Figure 1.

The Mobile PSA system has been used by 4757 patients up to December 25, 2020. Of these, 526 have discontinued. The first PSA result was sent by the system on November 28, 2011. The median time from when a sample is drawn for PSA measurement and the result is sent to the patient via SMS is 4.9 h. Some 92.9% of the patients have received their PSA result within 8 h after blood was drawn for PSA measurement. The time distribution for result receipt is shown in Supplementary Figure 1.

We set out to evaluate the accuracy of the Mobile PSA system for detecting PSA recurrence. Previously our standard practice was that the treating urologist had the first face-to-face consultation visit after RP with the patient. Once it was confirmed that the patient had recovered uneventfully, that there was no need for further adjuvant or salvage treatment, and that PSA remained undetectable, then the follow-up was transferred to the patient's general practitioner (GP). If PSA became measurable again, the GP was instructed to refer the patient back to our urology department for assessment for possible salvage RT. For comparison, we selected a historical cohort of men treated with RP between 2006 and 2014 who had their follow-up transferred to GPs. Only those patients who had undetectable PSA for the first year after RP and at least one additional PSA measurement were chosen, as these patients represented men who had not received adjuvant or early salvage therapy. Of 2355 patients, 436 fulfilled these criteria, of whom 78 (18%) were eventually referred back for elevated PSA. Moreover, 16 patients had PSA >0.4 μg/l and 11 had PSA >1.0 μg/l, that is, clearly above the recommended threshold for salvage RT (0.2–0.4 μg/l). In the Mobile PSA cohort, as per the system settings, all PSA recurrences were detected in time and early salvage RT could be considered.

Table 1 – Costs and savings per control and during 10-yr follow-up [a]

Variable	Cost (€)		Saving, € (%)
	Traditional FU	Mobile PSA	
Per testing point			
PSA measurement	7	7	0
Patient contact	115–260	15	100–245 (87–94%)
Per patient (10-yr FU)			
PSA measurement	84	84	0
Patient contact	1380–3120	180	1199–2939 (87–94%)

FU = follow-up; PSA = prostate-specific antigen.
[a] The 10-yr FU (after initial outpatient clinic visits) consists of PSA measurement every 6 mo until 3 yr, and then annually (as recommended in the European Association of Urology guidelines). This gives a total of 12 PSA testing points. Patient contact is via doctor/nurse or letter in traditional FU. For Mobile PSA the SMS message cost of €0.10 is considered negligible and is not considered here.

Finally, we evaluated and compared costs between traditional follow-up and Mobile PSA. The costs and the savings obtained are shown in Table 1 per testing point and per patient during typical 10-yr follow up. Depending on the patient volume, significant cost reductions can be achieved.

Our results demonstrate that Mobile PSA, a simple telemedicine approach, can be effectively utilized in clinical practice. This is especially important because of the current global COVID-19 pandemic and the increasing unfavorable imbalance between demand and resources for PCa follow-up. Automated patient communication via SMS technology has not previously been used for cancer follow-up, but has been successfully used for reminding patients about their medication [8] and appointments, among other messages. A meta-analysis found that SMS reminders significantly increased the likelihood of patient attendance at scheduled clinical appointments [9]. SMS has also been used for self-testing of the international normalized ratio for patients on warfarin and was associated with greater patient satisfaction [10]. As the time spent waiting for a PSA result can induce anxiety, the faster response provided by Mobile PSA may decrease psychological stress and increase patient satisfaction, a topic of our ongoing evaluation.

In conclusion, our data support the use of Mobile PSA as a simple telemedicine approach for PSA follow-up after RP/RT. This has an impact on safety in the current COVID-19 pandemic and on costs compared to traditional follow-up. Furthermore, the accuracy for determining biochemical recurrence is probably superior to follow-up conducted by GPs, and the window of curative salvage treatment will not be missed. In addition, follow-up at a tertiary referral center provides a cost-effective means of collecting comprehensive follow-up data, the obvious backbone of any quality-of-care program.

Author contributions: Robin Bergroth had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

Study concept and design: Bergroth, Matikainen, Rannikko.
Acquisition of data: Bergroth, Rannikko.
Analysis and interpretation of data: Bergroth, Matikainen, Rannikko.
Drafting of the manuscript: Bergroth.
Critical revision of the manuscript for important intellectual content: Matikainen, Rannikko.
Statistical analysis: Bergroth.
Obtaining funding: Rannikko.
Administrative, technical, or material support: None.
Supervision: Matikainen, Rannikko.
Other: None.

Financial disclosures: Robin Bergroth certifies that all conflicts of interest, including specific financial interests and relationships and affiliations relevant to the subject matter or materials discussed in the manuscript (eg, employment/affiliation, grants or funding, consultancies, honoraria, stock ownership or options, expert testimony, royalties, or patents filed, received, or pending), are the following: None.

Funding/Support and role of the sponsor: This study was supported by unrestricted scientific grants from the Finnish Cancer Foundation and

the Jane and Aatos Erkko Foundation. The sponsors played no direct role in the study.

Appendix A. Supplementary data

Supplementary material related to this article can be found, in the online version, at doi: https://doi.org/10.1016/j.euros.2021.04.004.

References

[1] Center MM, Jemal A, Lortet-Tieulent J, et al. International variation in prostate cancer incidence and mortality rates. Eur Urol 2012;61:1079–92.
[2] Dickinson R, Hall S, Sinclair JE, Bond C, Murchie P. Using technology to deliver cancer follow-up: a systematic review. BMC Cancer 2014;14:311.
[3] Novara G, Checcucci E, Crestani A, et al. Telehealth in urology: a systematic review of the literature. How much can telemedicine be useful during and after the COVID-19 pandemic? Eur Urol 2020;78:786–811.
[4] Castaneda P, Ellimoottil C. Current use of telehealth in urology: a review. World J Urol 2020;38:2377–84.
[5] Mottet N, van den Bergh RCN, Briers E, et al. EAU-ESTRO-ESUR-SIOG guidelines on prostate cancer. Arnhem, The Netherlands: European Association of Urology; 2020.
[6] Chaplin BJ, Wildhagen MF, Schroder FH, Kirkels WJ, Bangma CH. Digital rectal examination is no longer necessary in the routine follow-up of men with undetectable prostate specific antigen after radical prostatectomy: the implications for follow-up. Eur Urol 2005;48:906–10.
[7] Stish BJ, Pisansky TM, Harmsen WS, et al. Improved metastasis-free and survival outcomes with early salvage radiotherapy in men with detectable prostate-specific antigen after prostatectomy for prostate cancer. J Clin Oncol 2016;34:3864–71.
[8] Kannisto KA, Koivunen MH, Välimäki MA. Use of mobile phone text message reminders in health care services: a narrative literature review. J Med Internet Res 2014;16:e222.
[9] Guy R, Hocking J, Wand H, Stott S, Ali H, Kaldor J. How effective are short message service reminders at increasing clinic attendance? A meta-analysis and systematic review. Health Serv Res 2012;47:614–32.
[10] Grogan A, Coughlan M, Prizeman G, et al. The patients' perspective of international normalized ratio self-testing, remote communication of test results and confidence to move to self-management. J Clin Nurs 2017;26:4379–89.

[a]*Department of Urology, University of Helsinki and Helsinki University Hospital, Helsinki, Finland*
[b]*Research Program in Systems Oncology, Faculty of Medicine, University of Helsinki, Helsinki, Finland*

*Corresponding author. Department of Urology, Helsinki University Hospital, P.O. Box 900, FI-00029 HUS, Finland. Tel. +358 9 4711; Fax: +358 9 47166684.
E-mail address: robin.bergroth@helsinki.fi (R. Bergroth).